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Chapter

Accommodating Individual Differences: Tailored Messages to Improve the Effectiveness of Message Delivery for Self-Management of Chronic Diseases

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Abstract

User-generated content and platforms on personal health management through apps are commonly used these days as individuals can share their information with others and customize the platform of any media or software/website by their information gathering patterns. For example, a 7-year-old boy familiar with YouTube may view some subscribed channels to learn more about the gummy bear vitamin he takes daily. However, an 80-year-old woman may have trouble gathering information about the 50+ women's vitamin products and whether it is okay to take them without conflicting with her current health condition, unless she calls her health providers or visits a local pharmacy directly. Likewise, this chapter will further discuss the effectiveness of individual behavioral changes by tailored messages with individual differences. An experimental study will be introduced, exploring individual differences to examine health messages. Ultimately, with differences in value orientation, we can consider constructing individualized or tailored health messages. Therefore, more effective ways of creating tailored health messages for technology-based health management interventions will be considered, helping self-management of chronic diseases.

Keywords: health management intervention (HMI), chronic diseases, psychological reactance, health literacy, experiment

1. Introduction

Health literacy matters when an individual is involved in health management intervention (HMI). In the HMI program, intervention users can receive general and individualized health information, set personal goals, self-management, and physical activity or diet goals, and monitor their health conditions [1]. Although the users do

not communicate with health professionals daily, they can still check and report their health conditions. The HMI program can offer an extended reach to the users through health education, self-care support, and facilitated communication between intervention users or between intervention users and health care providers [2].

In terms of strategic communication, professional communicators and scholars are focused on developing health messages released in HMIs. Readers perceive the same health information differently depending on how health messages are tailored. Since individuals receive personalized or tailored health messages highlighting specific information, readers become more or less interested in the issue. In other words, because individuals have different values and perspectives on the same information and form different opinions after getting the information, tailored messages are more effective in getting readers' attention. Thus, tailored messages are created to accommodate the individual perspectives of readers, considering individual differences in personal interests, concerns, and need for information [3].

However, there are also barriers to bringing about positive behavior changes. When one feels that something interrupts one's autonomy or freewill, one is likely to reject what an external subject has encouraged one to change. In this study, value orientation and reactance theory will be leading principles. They will be applied to explore a dynamic of attitudinal and behavioral decision-making processes.

An experimental study will examine purpose in life and behavioral intention for healthy behavior change. Applying this life-based knowledge, the current study empirically seeks to prove key elements promoting and impeding healthy behaviors. A study introduced in this chapter will also focus on finding useful elements to include in informative or persuasive health messages to help readers absorb the delivered information more effectively and comply with suggested behaviors. The context of this study is technology-based HMIs delivering tailored or individualized health messages promoting healthy behavior changes. Specifically, healthy behavior changes reducing risk factors of diabetes will be highlighted for creating effective health messages in this study.

1.1 Message tailoring for health literacy associated with individual differences

Patient-centered communication (PCC) is a communicational approach that considers the needs and desires of the patient [4]. PCC improves patient satisfaction and behavioral outcomes [4, 5]. In other words, patients' values, needs, and goals are taken seriously to build better relationships and lead patients to make better decisions [6, 7]. Because the health professional is the initial source of health information, the health professional's communication skill influences the patient's adherence to follow suggested guidance [8]. Thus, PCC uses strategic techniques such as involving the patient in the discussion, exploring the patient's ideas and concerns, and caring about the patient's understanding [9, 10].

Previous studies [11, 12] proved that message tailoring strategies associate with different levels of health literacy in patients. In reference [11], customized HMIs had better self-management outcomes for type 2 diabetes management, such as physical activity, quality of life, and diabetes knowledge. Besides, [12] emphasized the importance of mutual understanding between health providers and patients as they tested the effectiveness of tailored/universal language use for patients with high/low health literacy. The result showed that low health literacy patients had a better understanding when physicians interacted with tailored languages. Such findings support a

patient-centered approach to developing health messages with a clear understanding of individuals' needs, interests, and health literacy.

This chapter considers individuals' value orientation as a promising variable for customizing health messages. Vic Strecher introduced personal value orientation as an essential category for tailoring messages, a leading researcher and digital innovator in tailored messaging. His book *On Purpose* [See 13] made a compelling case for personal value orientations as a critical determinant of healthy behavior changes. Considering one's life purpose, self-directed, positive change is possible [13]. As a health professional, he found a pivotal linkage between purpose in life and health behavior changes. It shows the importance of knowing and recalling one's purpose in life when one encounters difficulty in decision-making. Specifically, one's life purpose can be a useful element for promoting healthy behaviors.

1.2 Health management interventions (HMIs) for diabetes

Many studies on technology-based diabetes HMIs have been conducted to improve the effectiveness of target behavior changes [14–16]. As participants receive health information regularly and check their health condition during a specific period (e.g. 3, 6, or 12 months), their target behaviors have been tracked through involved interventions. The major measurements to assess the effectiveness of interventions include HbA_{1c} [17], BMI [18, 19], physical activity [20, 21], and self-efficacy [22].

Generally, health care practitioners and researchers expect technology-driven solutions to provide various benefits, such as improving patient outcomes and saving health care fees. However, there are few empirically homogeneous studies, including the same type of technologies or interventions and showing significant effects of the intervention on behavior changes [14, 15]. Even though there are some significant effects on target behavior changes, standard features of interventions leading to healthy behavior changes cannot easily be found due to a lack of standardized protocols and suggested variables considered in the intervention design process. Such heuristic conclusions require health program developers and researchers to consider a more comprehensive approach to various strategies and technologies for intervention development.

In terms of the effect of health messages, many variables need to be considered in the message development stage. Some variables can be facilitators for following the guideline of the health messages, but others can be barriers to compliance with the suggestion of the messages. Some influencers of individual decision-making are individual values (e.g. desired consequences of healthy behavior change), personal beliefs (e.g. expected outcomes, acceptability, and self-efficacy), and previous knowledge, among others [23]. When individuals receive tailored materials implementing those influencers, individuals reveal more (a) positive thoughts about the provided materials, (b) thoughts reflecting a personal connection to the materials, (c) thoughts indicating that a self-assessment took place, and (d) intentions to make behavioral changes [3]. In other words, having an informative focus on health messages is not enough to have expected effects on health message readers. Instead, influencers triggering individuals' evaluation of or interest in the news should be carefully considered. Thus, the study introduced in this chapter sheds light on the influencers of individual decision-making when individuals receive health messages, including suggestions for healthy behavior changes. Specifically, individual value orientations determining life purpose and psychological reactance preventing healthy behavior changes are the focus of this study.

There are gaps in the linkage between individual influencers and message effects, as shown by individual attitude and source appraisal toward the suggested behaviors and messages and ultimate behavior changes. Specifically, the interaction of health messages and personal value orientation as a stimulator of recalling individual life purpose and complying with suggested behavior changes needs to be studied further for the following reasons.

First, the studies on intervention programs for health education and healthy behavior changes have not much focused on developing strategic messages. The distinction between general and individualized information [1] is a sort of effort to consider differences in message development, but it is not enough. Most previous studies targeting healthy behavior changes via intervention programs [14–16] are more focused on the relationship between outcome measurement and functional features (e.g. monitoring, goal setting, peer chatting, personal challenges, etc.) and modality of interventions (e.g. website, email, phone call, app tracking, etc.). These are important, but it is not enough to encompass the overall effectiveness of interventions. The correlation between individualized messages and intervention effects must be considered more closely.

Furthermore, individual value orientations determining purpose in life have not been proved statistically as a precondition of behavioral intentions [16]. Although scholars have tried to link the presence and absence of personal value orientation and consistency and inconsistency between value orientation and suggested behavior change [24], these ideas must be further explored.

1.3 Projected behavioral changes by HMIs

Personal value orientation has been considered an essential influencer of healthy behavior changes. A healthy lifestyle is one of the fundamental health promotion goals. As for highlighting health and linking it to personal value orientation, people are affected by the value and perform the health-promoting behaviors [25]. Values are used as a starting point to decide on meaningful activities and increase the likelihood that when the activities are matched to the values, individuals will reach their goals [26]. Indeed, values are linked to individual health behaviors and are used for health education [27].

In previous studies, personal value orientation has been utilized for positive health behavior changes [26, 27]. For example, as a reinforcer that maintains and strengthens depression control, personal value orientation was used for depression management. In encouraging healthy behavior change, establishing values helps individuals ensure that selected healthy behaviors will have positive effects over time. Instead of being random required to choose a healthy behavior, connecting it to values positively impacts achieving ultimate behavioral goals [27]. Additionally, people who received inductive messages intended to raise self-enhancement value rated that they are at higher risk for HIV and showed higher intention to purchase condoms and to take education programs than people who did not receive self-enhancement messages [28]. As an element of message tailoring, discounts can be directly reflected to help one accomplish one's own goal in the self-management of diabetes.

Psychological reactance can be examined to measure behavioral changes by tailored messages with a personal value orientation. Reference [29] introduced psychological reactance theory (PRT) as a framework explaining the rejection of persuasive messages with several variables (intention to comply with suggested behaviors, source appraisal, etc.). In other words, PRT describes possible reasons for noncompliance

with recommended behaviors [30]. It is important to project whether patients or intervention participants will comply with the suggested behavioral changes or not. It connects to their satisfaction with tailored messages. Reactance is a sort of voluntary motivation against external pressure caused by intrinsic motivation. Reactant individuals are likely to show negative attitudes [31]. In this study, the meaning of attitude is closer to affective and cognitive attitude rather than conative attitude, because the behavioral intention is separately measured. In particular, the attitude toward the suggested health behavior and attitude toward the health messages are the variables measured in this study.

2. Hypotheses

Although personal value orientation is positively applied to healthy behavior changes [25, 27], few studies connect personal value orientation to psychological reactance. However, it is not difficult to discern the relevance of unique value orientation and psychological reactance if “self” and “the subject of control” are considered. When healthy behavior changes are promoted, personal value orientation relates to the things vital to one’s life [27]. Thinking about one’s value orientation is to reflect on oneself and one’s life. In doing so, self-identity is ensured and helps select healthy behaviors [26]. In contrast, psychological reactance is caused by eliminating one’s freedom. That is, reactance is caused by threatening one’s self-esteem [32].

Although thinking about oneself is equal to both personal value orientation and reactance, reactance has a negative effect on compliance with suggested behavior changes [33]. Once reactance is aroused, reactant individuals tend to be autonomous and dominant [34]. This implies that there may be a counterpart effect of reactance in triggering personal value orientation for healthy behavior changes or for complying with suggested behaviors.

Reactance is aroused differently depending on individual characteristics. Certain situations appear to arouse more reactance than others; certain people seem more reactant than others [34]. In other words, individuals likely evaluate the same health message on diabetes differently depending on individual differences and given conditions or messages. In this study, differences in personal value orientation can be a cue to determine the degree of reactance arousal.

Additionally, there is a difference in the meaning of two extreme personal value orientations: self-enhancement and self-transcendence. For self-enhancement, the nature of control is internal to oneself [35]; for self-transcendence, the nature of control is external. Thus, people who have more self-enhancement values are likely to be more sensitive to having their autonomy threatened. Although narcissism is the extreme case when self-enhancement value is overloaded, we can also find a cue explaining the relationship between self-enhancement and reactance: “Narcissists have an inflated sense of entitlement, so they should be more prone to reactance because they are more likely than others to believe they deserve things that they are not getting” [36]. It has been shown that narcissists react more than others [37]. For self-enhancement value, it is uncertain how much reactance is aroused for those who value self-enhancement in their life. Still, at least the difference between self-enhancement and self-transcendence values is likely to be disclosed.

H1. Triggering personal value orientation will be associated with psychological reactance.

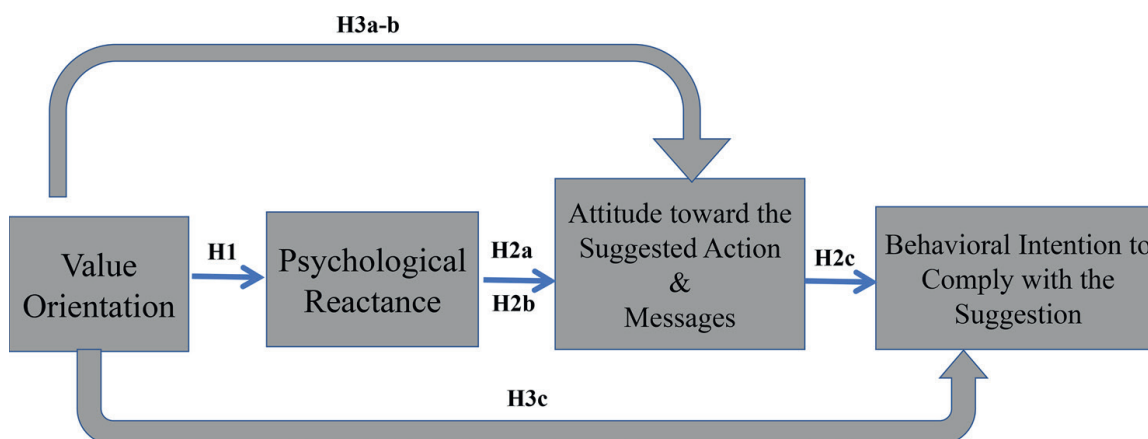


Figure 1.
Hypotheses.

H1a. Participants whose self-enhancement value is triggered will show higher psychological reactance than those whose self-transcendence value is triggered.

Regarding health behavior change, high reactant patients are less likely to follow a suggested behavior (e.g. smoking or drinking cessation); low reactant patients are more likely to follow a suggested behavior [33].

H2. Psychological reactance will be negatively associated with a) attitude toward a suggested behavior, b) attitude toward the presented message, and c) behavioral intention to change.

To promote health behavior change, triggering personal value orientation could give more control over the determinants of one's life. A previous study tested the relationship triggering personal value orientation and behavioral outcomes. The study found that a participant who received a message triggering personal value orientation could link health behavior with ultimate consequences and felt more control over their behavior [28]. Recalling personal value orientation leads one to think more critically about one's behavior and exert more control over one's behavior. Triggering personal value orientation improves one's ability to link the value to decision-making and increases a specific behavioral intention (**Figure 1**) [28].

H3. Triggering personal value orientation will be associated with a) a more negative attitude toward a suggested behavior, b) a more negative attitude toward the presented message, and c) higher behavioral intention.

3. Methodology

Participants. This study has two main criteria for participation: age and diabetes. For age, participants between the ages of 45 and 64 years are recruited through *Amazon Mechanical Turk* (<https://www.mturk.com/mturk/welcome>). The researcher opened a HIT or project on MTurk with two keywords of the study: experiment and news article evaluation. Participants signed up to the study to evaluate health-related news articles possibly released in health intervention programs. As participants initiated the experiment, they were told about a more detailed summary of the study

through an informed consent form. Participants granted their agreement to participate in the study.

They are in the mid-aged adults. A priori G*Power analysis was conducted for the expected effect size of .25 with an $\alpha = .05$. The study revealed that a sample size of 232 was needed to sufficiently power the design test.

Procedures. Personal value orientation is tested in advance before presenting health-related intervention messages. Self-enhancement or self-transcendence value is categorized to consider individual differences in value orientation. Then, both groups of participants are given two health-related articles: physical activity and health nutrition. One condition was randomly assigned among a selected set of stimuli ($N = 2$). For example, if one evaluates self-enhancement value higher in questions about personal value orientation included in the recruitment survey, they are randomly assigned to one of two self-enhancement value conditions (1: self-enhancement-presence; 2: self-enhancement-absence). It applies to the self-transcendence group.

Personal Value Orientation. In this study, value orientation is operationally defined by the value orientation in Value Theory [35], because personal value orientation shows the most important element in one's life. It has the power to move one's mind. Among many value orientations, this study selected the two most extreme value orientations: self-enhancement and self-transcendence. Personal value orientation is a facilitator of healthy behavior changes. It is measured whether self-enhancement or self-transcendence value drives your purpose in life. Depending on individual value orientation, participants receive one of four conditions triggering either self-enhancement or self-transcendence value for promoting healthy behavior changes. Self-enhancement and self-transcendence values are measured using 20 items (self-enhancement, $n = 4$, $\alpha = .834$; self-transcendence, $n = 16$, $\alpha = .907$) with a Likert scale of -1 (*opposed to my values*) and 0 (*not important*) to 7 (*extremely important*). Eight items are a value orientation measurement [38], such as "social power" and "wealth" for self-enhancement value and "equality" and "a world at peace" for self-transcendence value; the other 12 items are drawn from *On Purposes* [13, pp.73], such as "popularity" and "admiration" for self-enhancement value and "empathy" and "compassion" for self-transcendence value.

Stimuli. Two news articles were from a real online daily news outlet, *Healthday* (<http://healthday.com>). "Diabetes" was used as a search term for news articles, and the two articles were selected considering news frames and article-released dates. One article on health nutrition management and the other one on active physical exercise were presented to participants. Both articles were written in the typical form of news articles with a headline, subhead, journalist's name, day and date, and an accompanying picture, respectively. Based on the original articles, the length of the article's presence/absence of a value orientation was considered for creating stimuli. The number of words was controlled.

Personal value orientation phrases in stimuli. To create messages triggering personal value orientation, concepts of self-enhancement and self-transcendent values are carefully considered [13]. For instance, in the self-enhancement value condition for nutrition management, two sentences were added at the end of the news article: sentence 1. Caring about your health condition is directly linked to caring about your success in your life—sentence 2. Your diet is like saving money; considering your nutrition condition in daily life is a good investment for your life success.

Your diet is like savings; considering your nutrition condition in daily life is a good investment for your family or significant others. In contrast, for the

self-transcendence value presence condition for nutrition management, two sentences were added at the end of the news article: Sentence 1. Caring about individuals' health conditions is directly linked to caring about others significant to you or those who need your help during the rest of your life—sentence 2.

3.1 Measured variables

Personal Value Orientation. For manipulation check of unique value orientation, two items are measured: “The information in the news article tried to make me think about my value orientation.” and “The information in the news article tried to make me think about changing/continuing my current health behaviors as guided in the news article for my value orientation,” with a Likert scale of 7 (*strongly agree*) to 1 (*strongly disagree*).

Psychological Reactance. The state of reactance operationally defines psychological reactance. A four-item stating reactance scale [39, 40] with a Likert scale of 7 (*strongly agree*) to 1 (*strongly disagree*) is measured. For example, the questions in the nutrition management condition are as follows: “I am uncomfortable being told how to feel about managing vitamin D”; “I do not like that I am being told how to feel about managing vitamin D”; “It irritates me that the news article told me how to feel about managing vitamin D”; and “I dislike that I am being told how to feel about managing vitamin D.” Reliability analysis confirmed its internal consistency ($\alpha = .937$).

Attitude toward Suggested Behaviors. Attitude toward suggested behaviors is operationally defined by evaluating personal attitude toward suggested behaviors: vitamin D management and physical activity. Participants' attitude toward the suggested behaviors was asked through seven-point semantic differential questions [31]. The main question is, “Based on this information, how would you rate your attitude toward vitamin D management/exercise?” The word pairs used are negative/positive, unnecessary/necessary, good/bad (reverse coded), foolish/wise, detrimental/beneficial, and favorable/unfavorable (reverse coded). Reliability analysis confirmed its internal consistency ($\alpha = .929$).

Attitude toward Presented Health Messages. Attitude toward presented health messages is operationally defined by the personal impression of the presented health message. Three items gauged participants' attitudes toward the health message. A set of seven-point semantic differential scales is anchored by bad/good, favorable/unfavorable (reverse-coded), and negative/positive [32, 41], as the answer to “How would you rate your overall impression of this information on the following scale?” Reliability analysis confirmed its internal consistency ($\alpha = .807$).

Behavioral Intention to Comply with Suggested Behaviors. Behavioral intention to comply with suggested behaviors is operationally defined by the willingness to conform to the suggested behavior. A 100-point rating scale is used for measuring respondents' behavioral intention. A single item is asked: “How willing are you to manage vitamin D or exercise regularly in the following week?” [31, 39]. Reliability analysis confirmed its internal consistency ($\alpha = .807$).

4. Results of experiment study

Tests of Hypotheses. H1 predicted that triggering individual value orientation or how much my life is worth to me would be associated with psychological reactance. A one-way ANOVA was used to examine the level of psychological reactance to the

presence and absence of triggering personal value orientation. For the nutrition article, the analysis also showed a significant difference in psychological reactance between triggering personal value orientation and not triggering personal value orientation, $F(1,309) = 167.01, p = .000, \eta_p^2 = 0.35$. That is, those who read a nutrition-related article triggering personal value orientation have lower psychological reactance than others who read another article not triggering personal value orientation. For the physical activity article, the analysis also showed a significant difference in psychological reactance between triggering personal value orientation and not triggering personal value orientation, $F(1,309) = 71.30, p = .000, \eta_p^2 = 0.19$. That is, those who read a physical activity-related article triggering personal value orientation have lower psychological reactance than others who read another article not triggering personal value orientation. Thus, H1 was supported.

With H1, one with a self-enhancement value was expected to show higher psychological reactance than the other with a self-transcendence value (H1a).

For the article on nutrition, the result of a one-way ANOVA revealed a significant difference in psychological reactance by individual value orientation, $F(1,155) = 79.40, p = .000, \eta_p^2 = .34$. Those with more self-enhancement values showed higher psychological reactance than others with more self-transcendence values. For the article on physical activity, the result of a one-way ANOVA showed a significant difference in psychological reactance by individual value orientation, $F(1,160) = 85.33, p = .000, \eta_p^2 = .35$. Those with more self-enhancement values showed higher psychological reactance than others with more self-transcendence values. Thus, H1a was supported.

Psychological reactance was associated with some of the dependent variables. Particularly for nutrition, psychological reactance was positively associated with attitude toward the presented message ($F[1, 309] = .16, p = .048$). However, attitude toward the presented message was expected to relate to psychological reactance negatively. Additionally, other variables were negatively correlated, but they were not significant.

For physical activity, psychological reactance was negatively associated with attitude toward the presented message ($F[1, 309] = 11.90, p = .001$), attitude toward a suggested behavior ($F[1, 309] = 19.42, p = .000$), and behavioral intention to follow a suggested behavior ($F[1, 309] = 4.56, p = .033$). In terms of correlation, these results show that higher psychological reactance is associated with a negative attitude toward the presented message ($\beta = -.17$), a negative attitude toward a suggested behavior ($\beta = -.18$), and a lower behavior intention to follow a suggested behavior ($\beta = -.11$). H2 was partially supported.

For H3 test, on the nutrition-related article, triggering self-enhancement value was significantly associated with a) more negative attitude toward a suggested behavior than self-transcendence value, $M_{\text{self-enhancement}} = 5.62$ (SD = 1.09), $N = 68$; $M_{\text{self-transcendence}} = 6.06$ (SD = 1.26), $N = 89$; $F(1,155) = 5.39, p = .02, \eta_p^2 = .03$. Thus, H3 was partially supported.

5. Discussion

This study aimed to consider how tailored messages as a part of technology-based interventions could become more effective in helping self-management to relieve diabetes symptoms. This study was guided by the idea that strategic health messages that consider facilitators and barriers work differently even though they include the same

information. An individual value orientation was regarded as a facilitator of suggested healthy behavior change and freedom threat as a barrier to suggested healthy behavior change. Specifically, a personal value orientation or how my life has worth for me was represented by different value orientations such as self-enhancement value and self-transcendence value. To develop these ideas further, earlier literature was reviewed in terms of (1) patient-centered message strategies considering tailored messages according to individual features such as personal value orientation, (2) psychological reactance theory as a barrier to suggested healthy behavior change, and (3) potential integration effects of message strategies and psychological reactance.

With such ideas, an experimental study was conducted to measure levels of psychological reactance caused by freedom threat, motivation to restore threatened freedom, attitude to the suggested healthy behaviors/messages, intention to comply with suggestions, and source appraisal. To do this, participants in the study were presented with two news articles on nutrition and physical activity to repeat identically manipulated tests for one of among eight conditions: 4 (personal value orientation—self-enhancement value: presence vs. absence; self-transcendence value: presence vs. absence) x 2 (freedom threat: presence vs. absence) between subjects for adults with diabetes.

The data indicate that a facilitator of behavior change—personal value orientation—and a barrier to it—freedom threat—affect decision-making against suggested behavior. Specifically, triggering personal value orientation and freedom threat was associated with psychological reactance. Psychological reactance was mainly associated with higher motivation to restore threatened freedom, a more negative attitude toward a suggested behavior and the presented message, lower behavioral intention, and lower source appraisal (dependent variables). There were correlations between dependent variables of psychological reactance. Psychological reactance is also mediated between personal value orientation and some dependent variables (i.e. motivation to restore suggested behavior and attitude toward a suggested behavior). However, no interaction effect between personal value orientation and freedom threat was found for psychological reactance on physical activity and all dependent variables. Direct relationships between personal value orientation and dependent variables were also not found.

Summary of Findings. The following section of this chapter interprets the research findings. It discusses practical and theoretical implications for designing strategic health messages and developing related theories: value theory and psychological reactance theory. First, results regarding the direct effect of a facilitator and a barrier on psychological reactance are discussed. It is valuable to apply for designing mediated intervention programs, since certain factors can be a booster (personal value orientation) or a barrier (psychological reactance). Considering individuals' response patterns can help finding actual effects. In this study, a discussion of the direct effect follows this: 1) the direct effect of psychological reactance to dependent variables related to decision-making; 2) the direct effect of personal value orientation on dependent variables; 3) correlation between dependent variables, and 4) direct interaction effect of freedom threat on dependent variables. Finally, the mediation effect of psychological reactance between personal value orientation and dependent variables is examined.

The direct effect of a facilitator and a barrier to continue an intervention. The first hypothesis predicted that triggering personal value orientation would be associated with psychological reactance. In terms of value orientation, it was predicted that participants whose self-enhancement value was triggered would show higher

psychological reactance than other participants whose self-transcendence was triggered. The hypothesis was supported on all counts. Participants reported that they had lower psychological reactance when they read value-triggering articles. This result shows that personal value orientation attenuates psychological reactance. The concepts—personal value orientation and psychological reactance—both focus on “self,” so it is not difficult to link these, although previous studies have not tested this linkage. Personal value orientation reflects oneself and one’s life [27]. In contrast, reactance is a negative response when one recognizes that one’s self-esteem is threatened [32]. Thus, H1 proved that when one reads health-related news, if the author approaches readers in terms of a personal value orientation or primary value in one’s life, the negative effect of psychological reactance is attenuated.

Additionally, H1a considered different value orientations: self-enhancement and self-transcendence. As predicted, the result revealed that participants who read a self-enhancement value-triggering article showed higher psychological reactance than others who read a self-transcendence value-triggering article. H1a was supported. In terms of psychological reactance, if reactance is aroused, one tends to be dominant and autonomous [34]. Similarly, if one thinks self-enhancement value is important, it is likely for one to have a locus of control internal to oneself [35]. Thus, although triggering personal value orientation attenuates psychological reactance, self-enhancement value remains more of an effect of psychological reactance than self-transcendence, whose locus of control is external (influenced by external situations). As a newly tested variable attenuating psychological reactance, triggering a personal value orientation opens a possibility applicable to strategic health messages. However, different individual value orientations should be considered simultaneously, because triggering value produces other effects depending on individual value orientation. As a representative example, this study examined two extreme value orientations: self-enhancement and self-transcendence. H1a proved that triggering personal value orientation is more effective for participants with self-transcendence values.

Direct effect on decision-making for a suggested behavior in an intervention. The second and third hypotheses predicted an immediate impact on dependent variables related to decision-making (i.e. attitude toward a suggested behavior, attitude toward the presented message, and behavioral intention to comply with suggested behavior). Specifically, H2 considered the direct effect of psychological reactance on dependent variables. The direct impact of psychological reactance was significant for motivation to restore freedom and attitude toward the presented messages for the nutrition article. On the other hand, the direct effect of psychological reactance was significant for all dependent variables for the physical activity article. The partial acceptance of H3 strengthened the previous result of the psychological reactance theory [29, 31]. This result proved that psychological reactance was associated with consequential decision-making for suggested behavior changes. It shows how important control for psychological reactance is. To achieve expected outcomes, health communication strategists should not ignore the negative effect of causing psychological reactance so that readers reject the suggested behavior with negative attitudes, higher motivation to restore freedom, and derogation of the source. However, the message topic is still worth considering here because not all topics resulted in the same outcomes.

H3 predicted the direct effect of personal value orientation on dependent variables related to decision-making. The result was not significant, so the hypothesis was not supported. Referring to H1, which considered the different types of value orientations together, alternative H3 was analyzed. The direct effect of different value orientations on dependent variables was partially significant. Specifically,

triggering self-enhancement value was significantly associated with attitude toward a suggested behavior for nutrition, and it was significantly associated with motivation to restore threatened freedom for physical activity. There are many perspectives to be considered to succeed in developing effective health messages using personal value orientations. However, previous studies that evaluated health contexts with the most important value in one's life showed the positive effect of this variable on positive behavior changes [24]. This suggests that other mediators or moderators may affect decision-making when one's primary personal value orientation is triggered.

Practical Implications. This investigation aimed to find determinants of persuasive message effects, specifically in the context of health news articles helping with diabetes self-management.

This study can help health professionals better understand effective strategies for health message development for diabetes self-management interventions. In particular, this study is different from the previous studies done mainly through health professionals for a similar topic. It investigated means for practitioners to develop effective messages for self-management diabetes intervention in terms of recruitment, retention, and ultimate healthy behavior changes from the perspective of a strategic communication researcher. In other words, the study intended to help practitioners develop different messages for self-management diabetes intervention with the fresh eyes of a strategic communication researcher. Considering a facilitator (i.e. personal value orientation) and a barrier (i.e. freedom threat) to the persuasive effect of messages suggesting healthy behavior changes for people with prediabetes/diabetes, the current study sought to find key elements determining the success or failure of the health-message.

With such an idea, this research provides various angles of implications applicable to an intervention program: 1) development of persuasive messages and determination of necessary baseline information for initial recruitment in a diabetes intervention, 2) development of related and valuable messages for participants to increase retention rates, and 3) ultimately, development of effective messages to facilitate behavior changes in the long term.

Theoretical Implications. The present study expanded the depth and breadth of theory for the following three reasons:

First, this study examined a new variable—personal value orientation—for message tailoring and linked it to the original psychological reactance theory (PRT).

Second, the basic assumptions of the original psychological reactance theory—about reactance—were elaborated and strengthened. That is, the original relationship between variables was retested to examine the interaction between antecedents of reactance and dependent variables of reactance.

Third, the statistical power of existing assumptions had increased alongside the testing significance of the relationship between variables. Although the direct effect was not supported for a behavior change, the direct effect from personal value orientation on psychological reactance was fully funded. It was suggested in previous studies, such as the research of Martin et al. (2011), but this was not thorough enough to support personal value orientation as a pretreatment variable.

Lastly, the interdisciplinary approach (e.g. strategic communication, psychology, information technology, health, etc.) applied in this study worked to match similar studies conducted in different academic areas. This implies fruitful opportunities opened for researchers to collaborate on an intervention development project to help self-management of diabetes symptoms.

Conclusion. The health literacy matters when patients want to care about their health. Considering individuals' different levels of health literacy, other needs and personal values can be counted together. It is to help patients continue their health plans or boost decision-making complying with suggestions by health providers. The COVID-19 response clearly illustrates how inequities can sharpen and deepen when publics did not receive appropriate information to take actions [42]. It does not include adjusting the level of health knowledge or health literacy only, but also it needs to consider how well tailoring health messages for target audiences.

Conflict of interest


The authors declare no conflict of interest.

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