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Full Length Research Paper

Long-Term Impact of Message Framing and Chronic Regulatory Focus in Stroke Patients

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Prior studies about framing with chronic regulatory focus have indicated that a gain-framed message was effective to motivate individuals with promotion focus to perform the health behavior, whereas for those with prevention focus, a loss-framed message was beneficial. However, little research has examined the persuasive effects on the clinical settings. Furthermore, unlike those findings, this study hypothesized that a gain-framed message might be more persuasive to motivate both stroke patients with promotion focus and prevention focus because (1) rehabilitation was non-risky and had certain outcomes and (2) rehabilitation was important to reach the desired goal and fulfill responsibility. The results revealed that the gain-framed message produced a favorable attitude toward the recommended behavior and facilitated long-term behavioral change. This study offered health care providers useful guidelines to design influential messages for target patients to prompt health behavior.

Keywords: message framing, chronic regulatory focus, prospect theory, regulatory focus theory, stroke, rehabilitation

INTRODUCTION

Stroke is the cerebrovascular disease leading to the dysfunction of brain tissue. According to the U.S. Department of Health, the incidence rate of stroke for people beyond 35 years old is 330 per 100,000 people. As the age increases, the incidence rate increases. Following a stroke, more than half of the patients suffer from moderate to severe deficits resulting in impaired functional activity and heavy loading on their families (Bugge, Alexander & Hagen, 1999; Jorgensen, Nakayama, Raaschou, Vive-Larsen, Stoier & Olsen, 1995). This disability may persist for life and limit functional independence (Duncan, Samsa, Weinberger, Goldstein & Bonito, 1997). Early and intensive rehabilitation has been proven to result in good functional outcome and facilitate cortical organization (Askim et al., 2010; Moore, Roth, Killian & Hornby, 2010). The amount of volitional activity is the major determinant factor for this improvement (Klein & Jones, 2008). Hence, it is important to motivate stroke patients to engage in rehabilitation actively (Cooke, Mares, Clark, Tallis & Pomeroy, 2010).

The aging society is a common situation around the world, resulting in a high prevalence of chronic diseases such as hypertension and stroke (Astin & Closs, 2007; WHO, 2005a). Hyperextension patients have a six times higher probability of developing strokes than regular persons (Taiwan Stroke Association, 2008). Approximately two-thirds of stroke patients have a stroke after 65 years old, meaning that the incidence rate of stroke increases significantly as the person ages (Council for Economic Planning and Development, 2010). To manage patients with chronic illness effectively, the WHO (2005a) proposed the patient-centered approach emphasizing prompting health and preventing chronic conditions such as recurrent stroke (Mohan et al., 2009)

to help the health care providers design and implement communication strategies such as message framing (Myers, 2010).

Persuasive health messages can be framed to emphasize the benefits of engaging in health behaviors such as vaccination (gain-framed) or the cost of failing to engaging in such behavior such as breast self-examination (loss-framed) (O'Keefe & Jensen, 2007). According to prospect theory, people's responses or decisions to message can be influenced by their risky or uncertainty perceptions of the target behavior (Tversky & Kahneman, 1981). Message framing has been studied extensively across a wide domain of health behaviors such as diabetes, cancer and salt consumption (Grady, Entin, Entin & Brunyé, 2011; van't Riet, Ruiters, Smerecnik & de Vries, 2010; van't Riet, Ruiters, Werrij & de Vries, 2010). Through social learning, attitudes can be altered by presenting information, leading to behavioral change (Ajzen, 1991). When the message is behavior-relevant information, the attitude-behavior relationship would be stronger (Glassman & Albarracín, 2006). However, only a few of them address actual health problems or real treatment decisions. This study intends to help fill this gap by adding empirical findings to message framing effects to help health providers deliver influential messages to target patients.

Research has found that the persuasive effects of messages may depend on a person's dispositional motivation styles such as chronic regulatory focus. According to regulatory focus theory (Higgins, 1998), there are two types of motivation styles. One is promotion focus, i.e., being motivated to approach the ideal and concerned with the hope and aspiration. The other one is prevention focus, i.e., concerned with the duties and

obligations and being motivated to be responsible (Higgins, 1997, 1998, 2000). Previous studies showed that if the health message matches the regulatory focus, it would increase the persuasive effects. For participants with prevention focus, a loss-framed message produced more persuasive effects than a gain-framed message to motivate them take vaccinations, whereas participants with promotion focus are more likely to take vaccinations with a gain-framed message (Gerend & Shepherd, 2007). Other health behavior studies also have similar consistent results (Shen, Mercer, & Laura, 2015; Uskul, Sherman, & Fitzgibbon, 2009). This suggests that if the message fits patients' regulatory focus, it would lead to favorable attitudes and increased behavioral intentions (Higgins, 2000).

However, participating in rehabilitation can improve functional independence and increase quality of life (Putala et al., 2011), offering stroke patients opportunities to achieve hope and duties. Furthermore, receiving rehabilitation in the medical units is relatively safe (non-risky) and has training effects. Hence, this study hypothesized that a gain-framed message would have positive impact for stroke patients with both promotion and prevention focus. Moreover, whether a message that interacts with chronic regulatory focus has persuasive effects on long-term follow-up is still questionable. This study examines the long-term behavioral change when message framing about rehabilitation outcome matches the patient's chronic regulatory focus.

METHODS

This study hypothesized that a gain-framed message would have positive effects to persuade stroke patients with chronic promotion and prevention focus to engage in

rehabilitation. To test the hypothesis, this study used a 2 (message framing: gain vs. loss) by 2 (chronic regulatory focus: promotion vs. prevention) between subjects design to investigate the communication effects, including message effectiveness, attitudinal change, behavioral intention and a one and three month follow-up behavioral frequency.

Participants

Patients were recruited from different medical units in Kaohsiung City, Taiwan. The inclusion criteria were (1) mini-mental state score >24; (2) first stroke; and (3) attending rehabilitation. Patients were excluded if they had cardiovascular instability, severe joint contracture, significant osteoporosis, previous peripheral or central nervous injury or the inability to adhere to a therapist's requirements. The patients' medical histories, including disease, episodes of stroke, date of the current stroke, and date of the first therapy session, were recorded by the therapists.

Design and Stimulus

This study followed the educational materials from the Taiwan Stroke Association and American Stroke Association to design the messages. Each message was approximately 120 words in length and presented in different ways, stressing either the benefits of engaging in rehabilitation, such as "If you engage in rehabilitation, your change to be totally independent will increase by 15%," or the costs of not engaging in rehabilitation, such as "If you do not engage in rehabilitation, your change of total independence will decrease by 15%." The manipulation check was taken right after the message. This study adopted four items with a 7-point Likert scale, such as "The message tells me the advantages of

Table 1. The manipulation check of message framing.

Variable	Message framing	n	M	SD	t	p
Gain-framed message	Gain	49	8.65	2.10	7.791	0.000***
	Loss	49	5.33	2.19		
Loss-framed message	Gain	40	4.03	2.49	12.205	0.000***
	Loss	40	9.65	2.34		

*** $n < 0.001$

Table 2. Communication effects of the message framing by chronic regulatory focus.

Independent Variables	Message effectiveness			Attitude after message			Behavioral intention		
	M (SD)	F	p	M (SD)	F	p	M (SD)	F	p
promotion focus	5.50			6.32			6.16		
× gain (n = 25)	(1.04)	1.03	0.32	(0.71)	4.98	0.03**	(0.62)	0.19	0.67
promotion focus	5.13			5.71			5.75		
× loss (n = 24)	(1.31)			(1.10)			(0.68)		
prevention focus	5.58			6.11			5.68		
× gain (n = 19)	(0.88)	1.64	0.21	(0.66)	3.79	0.06*	(0.58)	3.54	0.07*
prevention focus	5.29			5.77			5.90		
× loss (n = 21)	(0.67)			(0.88)			(1.04)		

* $p < 0.1$, ** $p < 0.05$

rehabilitation” and “The message tells me the disadvantages of not doing rehabilitation” ($\alpha = .81$) to assess whether participants perceived if the message

tendency was gain or loss-framed (1 = totally disagree, 7 = totally agree) (Maguire et al., 2010).

Chronic regulatory focus was based on Lockwood,

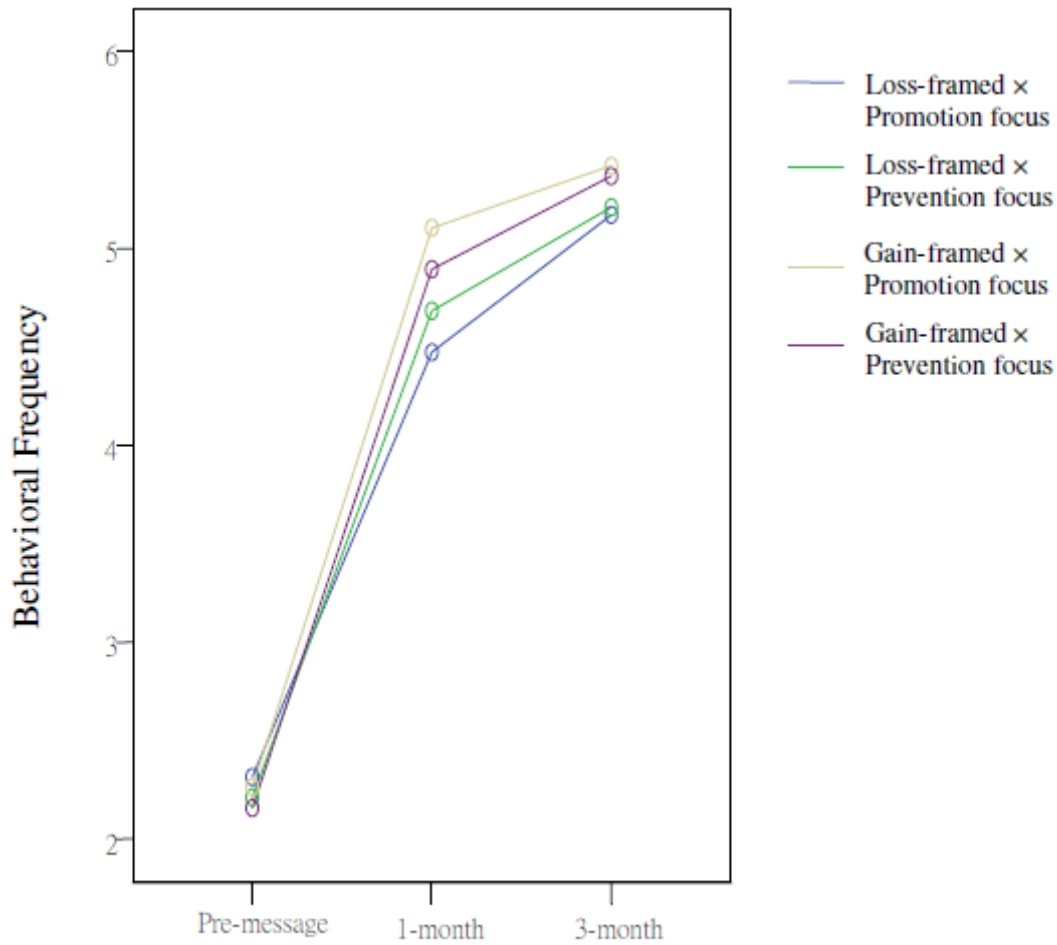


Fig. 1. Mean behavioral frequency at three time periods.

Jordan and Kunda (2002) to design 18 items to assess participants' regulatory focus. These included prevention, "I am anxious that I will fall short of my therapy responsibilities" ($\alpha = .86$) and promotion, "I am focused on achieving positive outcomes in my rehabilitation" ($\alpha = .80$) dimensions. Instead of a 9-point scale, this study used a 7-point Likert scale to be aligned with other measures.

The dependent variables included attitude, message effectiveness, behavioral intention and behavioral frequency. This study followed questions suggested by Jones, Sinclair and Courneya (2003) to design the attitude scale. There were four items with a 7-point Likert scale (1 = totally disagree, 7 = totally agree) asking

personal attitudes toward rehabilitation such as "Rehabilitation is beneficial." The scores of four items were averaged to obtain an attitude score (Cronbach's $\alpha = 0.86$). The score of the message was obtained by averaging the four items with a 7-point Likert scale: credibility, objectiveness, convincingness, and usefulness adopted from Dillard, Weber, and Vail (2007), such as "the message I received was convincing." The score of four items was averaged to obtain a message effectiveness score (Cronbach's $\alpha = 0.91$). Behavioral intention was assessed by four items adopted from Rothman et al. (1993) with a 7-point Likert-scale (1 = totally disagree, 7 = totally agree). For example, "I intend to engage in

rehabilitation within the next 6 months." A score was obtained by averaging four items (Cronbach $\alpha = 0.88$). Stroke patients were asked to provide their demographic information such as age, gender and income as control variables. In Taiwan, when stroke patients went to medical units to receive rehabilitation, they had to log in their National Health Insurance Card. The medical units report their presence to apply for National Health Insurance payments. Hence, this study collected behavioral frequency by National Health Insurance Card within three periods: a week before the study, 1-month follow-up and 3-month follow-up.

Procedures

Eligible stroke patients received the booklets from their therapists and were randomly assigned to receive either a gain or a loss- framed message. Since chronic regulatory focus was defined as a personal trait and change in attitude was hypothesized as related to behavioral intention and long-term behavior, it was preferable to complete the questionnaire about chronic regulatory focus and attitude prior to the message. Right after the message, stroke patients were asked to answer the manipulation check. Then they were required to answer questions about self-efficacy, message effectiveness, attitude, behavioral intention and demographic information. For behavioral frequency, previous studies usually collected data from personal reports that might be contaminated by emotion or situational factors. This study tried to use National Health Insurance Card data to record stroke patients' behavioral frequency a week before the study, and at 1- and 3- month follow-ups to provide reliable information.

RESULTS

Participant Characteristics

There were 96 stroke patients originally enrolled in the study. However, due to transport problems ($n = 2$), orthopedic injury ($n = 1$), heart attack ($n = 2$) and a recurrent stroke ($n = 2$), 48 females (54%) and 41 males (46%) with ages ranging from 22 to 88 years ($M = 55.26$, $SD = 12.97$) remained to complete the entire study. Patients' income ranged from 0 to 100000 NT dollars ($M = 22471$, $SD = 26736.28$). To ensure that gender, age, educational level and income didn't have an impact on therapy frequency, regression analyses/ANOVA was performed to check the relationships. The results revealed that therapy frequency [$F(4, 83) = 1.05$, $p = .38 > .10$] was not influenced by demographic information.

Manipulation Check

A paired-sample t test was used to make sure there was a difference between the gain and the loss-framed messages. The results revealed that patients perceived the apparent differences between a gain ($n = 49$, $t = 7.791$, $p < .001$) and loss- framed message ($n = 40$, $t = 12.205$, $p < .001$) (Table 1). The manipulation was successful.

Hypothesis Test

To test the hypothesis, the scores of matching items on regulatory focus measure were averaged to obtain a separate prevention and promotion score. The mean prevention score was subtracted from the mean promotion score to get a predominant chronic regulatory focus score for each patient. Positive scores represented

a chronic promotion focus whereas negative ones were prevention focused. The two focus groups were almost equal with the patients (prevention focus: $M = 5.17$, promotion focus: $M = 4.92$, $t(88) = -.98$, $p = .33 > .001$). This study used regression analysis to test the communicative effects. The results revealed that neither message effectiveness (framing: $\beta = -0.093$, $p = 0.43 > 0.1$; chronic regulatory focus: $\beta = -0.03$, $p = 0.80 > 0.1$; framing \times chronic regulatory focus interaction term: $\beta = 0.07$, $p = 0.97 > 0.1$) nor behavioral intention (framing: $\beta = -0.89$, $p = 0.45 > 0.1$; chronic regulatory focus: $\beta = 0.078$, $p = 0.50 > 0.1$; framing \times chronic regulatory focus interaction term: $\beta = -0.13$, $p = 0.47 > 0.1$) were predicted by message framing, patients' chronic regulatory focus and the interaction effect of message framing and regulatory focus. Although there were some effects on attitude after message, they were only marginally influenced by message framing ($\beta = -0.35$, $p = 0.093 < 0.1$). The study further used the regression analysis to examine whether attitudinal change predicted long-term behavior. The results did not support the hypothesis ($\beta = 0.062$, $p = 0.76 > 0.1$). However, through an independent sample t-test, a gain-framed message ($M = 6.23$) had stronger effects on attitude after message than a loss-framed message ($M = 5.74$) ($t(87) = -2.718$, $p = 0.008 < 0.01$). This indicated that a gain-framed message might be more persuasive to change patients' attitudes toward rehabilitation than a loss-framed message.

This study hypothesized that for patients with prevention and promotion focus, a gain-framed message would be persuasive to prompt engagement in rehabilitation and produce stronger long-term behavioral change. The study performed an independent sample t-test to compare the communication effects. For patients with promotion focus, their attitude was higher when receiving a gain-framed message than a loss-framed

message ($F = 4.98$, $p = 0.03 < 0.05$). Patients with prevention focus had consistent results where a gain-framed message produced more favorable attitude ($F = 3.79$, $p = 0.06 < 0.1$) and higher behavioral intention ($F = 3.54$, $p = 0.07 < 0.1$) than a loss-framed message (Table 2). This indicated that a gain-framed message was more effective to change stroke patients' attitudes toward rehabilitation than a loss-framed message.

For long-term behavioral change, this study performed an analysis of covariance by controlling behavior frequency prior to the message and behavioral frequency at 1 month to examine whether framing by regulatory focus had an impact. Neither message framing ($F = 0.006$, $p = 0.94 > 0.1$) nor chronic regulatory focus ($F = 0.76$, $p = 0.77 > 0.1$) were related to 3-month behavioral frequency. This study further conducted two-way repeated measure ANOVA to investigate how behavior changed over time. The results showed that both framing and chronic regulatory focus had no effects again. However, as Figure 1 shows, the mean behavioral frequency continued to increase at 1 and 3 months after message exposure ($F = 182.743$, $p < 0.001$). By post hoc comparisons with a Bonferroni correction, 1-month behavioral frequency was higher than pre-message frequency ($p < 0.001$), and 3-month was higher than 1-month ($p < 0.001$). Moreover, a gain-framed message was more effective to motivate patients with promotion and prevention focus to engage in rehabilitation than a loss-framed message. Although the results didn't reach a significant level, it seemed that a gain-framed message was more effective in motivating both stroke patients with promotion and prevention focus to participate in rehabilitation and sustain long-term behavioral change.

DISCUSSION

Previous framing studies about health behavior seldom

investigated real treatment behavior. However, raising awareness of a patient-centered approach indicated that it was urgent for health care providers to deliver influential messages to prompt target patients to adhere to the treatment behavior such as medicine and rehabilitation. In line with this purpose, this study intended to identify the useful messages and examine how an individual's motivational style had an impact on the communication effects. Previous studies revealed that a gain-framed message was persuasive for an individual with promotion focus whereas a loss-framed message was effective to motivate an individual with prevention focus. This study had a different perspective and hypothesized that a gain-framed message was more likely to motivate both patients with promotion and prevention focus to engage in rehabilitation and sustain long-term behavioral change. The results of this study support the hypothesis.

According to self-regulatory theory and regulatory fit, the willingness to perform health-related behavior would increase if the framing matched the individual's chronic regulatory focus. Rehabilitation was considered as non-risky and had some certain outcome. Patients after stroke were obligated to receive rehabilitation to reach the desired goal, fulfill responsibilities and prevent recurrent stroke (Askim et al., 2010; Moore, Roth, Killian & Hornby, 2010). Hence, they were more likely to involve in rehabilitation when presented a gain-framed message, focusing on the benefits of taking action. The study findings revealed that a gain-framed message not only produced favorable attitudes change but long-term effectiveness for both groups. This suggested that in real treatment decisions, especially chronic illness, a gain-framed message might be the most effective communication strategy to persuade patients to adhere to the treatment.

Both framing and chronic regulatory focus had no

impact on long-term behavioral frequency but the behavioral frequency did increase continuously and was more positive from pre-message to 1-month when receiving a gain-framed message. This might be because patients felt that they were obligated to receive rehabilitation after stroke, their behavioral frequency increased positively during the first month. Studies have shown that the repetition of movement was positively related to functional outcome. Stroke patients had to perform the activity voluntarily (Klein and Jones, 2008; Wolf et al., 2006) to reach the desired effects. To investigate whether framing or regulatory focus had effects, further studies might try to record the actual exercise frequency rather than attendance.

Although a gain-framed message had positive impact on attitude after the message, it was slightly significant and the attitudinal change didn't predict the long-term behavioral change. Since this study only measured the attitude after message, it might be better to include attitude at 1- and 3-month to examine how attitudinal change affected behavioral change. Stroke patients in this study only received one-time exposure to a message, so it might be relatively easy to cause effects on attitude. However, to have an influence on behavior might be difficult (Wolburg, 2006). Further research might consider exposing messages to patients intensively to make strong impact.

The results of this study were consistent with Grady and his colleagues' study (Grady et al., 2011). A gain-framed message might be the most effective strategy to motivate patients with chronic illnesses such as stroke and diabetes to perform the health related behavior. To provide tailored messages, this study further discussed the effects of chronic regulatory focus. The results again showed that a gain-framed message might work better to prompt the recommended behaviors in spite of regulatory

focus.

Limitations

Although this study provided evidence that messages with chronic regulatory focus had an impact on attitude and long-term behavior, there were some limitations. First, all participants were stroke patients. Whether the results could be generalized to other patients with chronic illnesses was questionable. Second, this study only examined the influence of chronic regulatory focus. There were other dispositional or situational characteristics such as self-efficacy and consideration of future consequence might interact with framing. Future studies might want to investigate the intervening effects of those factors to provide customized messages. Third, for health care providers, besides the behavioral frequency, they might be more interested to see whether messages had an influence on patients' outcomes. Researchers might combine functional outcome measures such as Barthel Index and measures for activity of daily living to provide robust evidence.

CONCLUSIONS

A patient-centered approach has been increasingly valued by the health care providers. They had to incorporate research findings into communication practices. Message framing was found to be at low-cost and easily implemented. Health care providers need to have adequate knowledge and skills to design effective messages. This study used actual behavioral performance rather than behavioral intention to demonstrate behavioral increase over time after

presenting a gain-framed message. Health care providers might want to design gain-framed messages to motivate stroke patients to maintain health behaviors. This study added evidence of message framing on long-term treatment decisions that could be applied to other chronic illnesses such as cardiovascular disease and cancer.

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