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Testing the Empowerment Model of Behavior Change

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Abstract. Persuasion as a result of persuasive technologies can be for the good of the persuadee or against their own interests. Researchers have been asking the question for quite some time of what it takes to persuade people towards a positive direction? Some researchers have proposed the empowerment model as a solution. In this paper, we performed a pilot study to test that model. We chose a digital phone-based intervention to confront the obesity problem via different types of messages. We found that recipients were more willing to follow and accept messages, which they perceived to be motivating and aligned with their long-term goals. We have also found that empowering messages differ significantly from coercive and unpersuasive messages in terms of intentions to comply with the message and receive messages of the same nature.

Keywords: Persuasive technologies, empowerment model, persuasive message, coercive, misleading, unpersuasive, message framing, obesity, SMS.

INTRODUCTION

According to the World Health Organization (WHO) obesity is defined as “the abnormal or excessive fat accumulation that presents a risk to an individual’s health”. In 2014, WHO estimates that approximately 1.9 billion adults over the age of 18 were overweight worldwide. Of these, at least 600 million adults and 42 million children under the age of 5 were obese or overweight in 2013. Experts at the WHO further believe that if the current trends continue, by 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese. The most recent statistics from the Centers for Disease Control and Prevention reports that 78 million adults—more than a third of the U.S. population—are obese. Clearly, obesity has become an epidemic in the USA.

Several factors can engender obesity, but a study in the United Arab Emirates reported that obesity is mainly influenced by diet, lifestyle choices and education (Carter, Saadi, Reed, and Dunn, 2004). In fact, it is found that significant portions of chronic diseases (such as Diabetes, Congestive heart failure) are the result of lifestyle choices (WHO, 2005).

Through educating people to eat healthier food, exercise more, and change their sedentary lifestyle they can reduce obesity and become healthier. To do so, it is important to communicate to them in a certain way and to be able to reach them wherever they are and at any time.

One promising approach is using empowering messaging to influence people’s behavior in ways that contribute to weight loss. Nowadays, technology plays a huge role in our lives and is readily available (Chatterjee, and Price, 2009). This paper tests the empowerment model (Chatterjee, Csikszentmihalyi, Nakamura, and Patrick, 2010) to unveil the science of crafting empowering messages.

RELATED WORK

Persuasion is the “attempt of modifying behavior by verbal means, which sometimes includes coercive methods, all of which apply to reason and emotion” (Pelletier, Sharp, 2008). When technology is used to persuade it is called ‘persuasive technologies’ which can be defined as “computing systems, devices, or applications intentionally designed to alter a person’s attitudes or behavior in a predetermined way” (Fogg, 2003). The previous

definition, which is somewhat agreed upon in the persuasive technology literature, implies that persuasion can be at times coercive or at least not beneficial to the recipient's long-term goals. This has led a group of researchers to argue that persuasion has a negative connotation and that the way to eliminate the negative side is by adding a new word to the context, "that of empowerment" (Chatterjee et al., 2010). Empowering messages as conceived by (Chatterjee et al., 2010), are messages sent in good faith (for a good purpose), do not limit freedom of thought, aligned with the receiver's long-term goals, and are experientially rewarding and motivating (Figure 1). Chatterjee et al., 2010 proposed a taxonomy of persuasive communication by labeling messages as empowering (aligned with long term goals and motivating), misleading (motivating but not aligned with long term goals) unpersuasive (aligned with long term goals but not motivating) or coercive (neither aligned with long term goals nor motivating).

		Is the message in line with the Recipient's long-term goals?	
		Yes	No
Is the message motivating?	Yes	Empowering communication	Misleading communication
	No	Unpersuasive communication	Coercive communication

Figure 1. A model of different forms of persuasive communication (taken from Chatterjee et al., 2010)

Chatterjee et al., 2010 claimed that empowering messages are more persuasive and effective than other messages and that the "true gold standard for empowering technology would be a technology that can be used only to empower, and will fail if used to mislead". This claim is based on the assumption that tailored, personal and relevant messages are more persuasive than generalized ones. Other researchers have also stated that "tailoring messages according to proposed processes underlying behavior change (i.e., being aware of a problem, deciding what to do about it, and implementing a behavior) should make messages more effective by progressively increasing the level of self-determined motivation of the targeted population" (Pelletier, Sharp, 2008). BJ Fogg places tailoring as one of the types of persuasive technology tools. As he explains, "information provided by computing technology will be more persuasive if it is tailored to the individual's needs, interests, personality, usage context or other factors relevant to the individual" (Fogg 2003). Tailoring is one way of aligning a message to an individual's goals. The other route is to address the recipient's personal motivators. Research on motivation has yielded contradicting results on the best way to motivate people (Ryan, Deci, 2000). There are two schools of thought, Theory X and Theory Y. Theory X focuses on extrinsic values such as money while Theory Y focuses on intrinsic values such as enjoyment (Ryan, Deci, 2000).

A study on obesity supports the postulated empowerment model (Chatterjee et al., 2010) on the notion that empowering messages can be more persuasive and motivating than others when (Puhl, Peterson, Luedicke, 2012) reported that participants responded most favorably to messages that attempted, "to instill confidence and personal empowerment of one's health," and that "these messages were also rated by participants to be the most motivating". Variable oriented frameworks of persuasion emphasize the source of the message, the recipient of the message and the characteristics of the message itself. Our research addresses the interplay between the content of the message and the receiver's goals and expectations.

Approaches to message framing in the health context have either stressed the positive consequences of complying with the message or the negative ramifications of not doing so (Dillard, Pfau, 2002). Fear arousal messages that contain a solution are found to be more persuasive which intersects with negative framing (Dillard, Pfau, 2002). Dillard and Pfau, 2002 report on a number of studies, which found that messages encouraging personal responsibility are more persuasive than those that attribute responsibility to other sources. This study goes beyond message framing (gain or loss) to examine the correspondence between the alignment of the message with the recipient's goals and level of motivation on behavior change. By taking into consideration the related work and the empowerment model of Chatterjee et al., 2010 we hypothesize the following

H1: Recipients are more likely to follow the message when it's perceived as motivating and aligned with long-term goals.

H2: Messages rated as motivating and as aligned to one's long term goals will be predictive of a desire to receive similar messages in the future.

H3: Empowering messages will be significantly different from other types of messages in predicting the recipient's intention to change behavior.

H4: Empowering messages will be significantly different from other types of messages in predicting a desire to receive similar messages in the future.

RESEARCH DESIGN

13 subjects (some of them were obese) both male and female were sent a total of 8 messages via Short Message Service (SMS) over a four day period and asked to rate each message along 7 indicators: clarity, experiential rewards, alignment of the message to personal goals, motivation, persuasion, intention to follow the message, and the desire to receive similar messages in the future. Before receiving the messages, each subject was interviewed for 10-15 minutes by the researchers to talk about his or her long-term goals especially as they related to health, personal motivations and perceived barriers to reaching their goals. The study used a convenience sample of 13 participants that were recruited by the researchers from a pool of friends, colleagues and acquaintances. The researchers used the interview responses to individually tailor each message's level of motivation and alignment or misalignment to the person's healthy behavior goals.

For example, one of the subjects was obese but enjoyed playing video games especially a fitness game called 'Zumba'. The empowering message for this subject was "Play[ing] tennis or do[ing] Zumba with a friend will be mutually beneficial in terms of physical health, but more importantly, it will be more fun than exercising alone!." The previous empowering message is aligned with the subject's goals (lose weight) and is experientially rewarding (playing video games).

On the other hand, another subject had problems controlling her weight but we sent her a misleading message saying "Treat yourself right tonight! Enjoy a tasty dessert or beverage and savor the goodness it brings. You deserve it for working hard!" which persuaded her to do something not aligned with her goal.

In contrast, a third subject was focused on eating healthy food but the message sent lacked motivation. The following is an example of an unpersuasive message "Eat broccoli today to stay healthy."

On the contrary, the message "Do heavy weight lifting today for one hour to build muscles" is a coercive message sent to a subject who had no intentions of bodybuilding. In addition, the message was deficient in terms of motivation.

In total, 50% of the messages crafted were intended to be Empowering (motivating and aligned to goals), 25% Unpersuasive (not motivating but aligned to goals), 12.5% Misleading (motivating but not aligned to goals) and 12.5% Coercive (neither motivating nor aligned with goals). The participants were blind to the type of message they were receiving. The main goal of the study was to test the difference between empowering and non-empowering messages, thus half of the messages sent were empowering and the other half was divided between the other three types.

Smartphone technology permitted 13 users to provide immediate feedback about the message content by clicking the link and responding to the survey directly from their phone. Each researcher followed a standardized schedule of sending one empowering message and one non-empowering message. Over four days, we sent a total of 104 messages, broken down into four empowering messages, two unpersuasive, one misleading, and one coercive message per participant to test the empowerment model.

DATA ANALYSIS

Upon analyzing the subject's responses we discovered that the participants did not classify the messages always as we expected. Given that the participants were blind to the message type, research hypotheses, the fact that almost 27% of the messages were classified differently than what the research team expected and that independent coders were not used to evaluate the message types, we decided to analyze the data by classifying each message according to the participant's ratings (based on the participant answers after the message was sent and read) instead of the researchers.

To test H1, we used a repeated measures regression model. Results from table 1 reveal that feeling good (motivation) and alignment with goals are indicators of intentions to follow the messages ($R^2=.56$) and ($t < .001$).

Model	R	R Square	Adjusted R Square	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. Change
1	.749 ^a	.560	.545	.560	36.547	3	86	.000

a. Predictors: (Constant), Aligned, Clear, FeelGood

b. Dependent Variable: Follow

Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.249	.505		.494	.623
Clear	.092	.111	.077	.833	.407
FeelGood	.448	.110	.383	4.079	.000
Aligned	.422	.121	.390	3.489	.001

Table 1. Model summary of regression results for intentions to follow message

To test H2, we used a repeated measures regression model. Results from table 2 reveal that feeling good (motivation) and alignment with goals are indicators of the intention to receive similar messages ($R^2=.62$) and ($t < .01$).

Model1	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. Change
	.789 ^a	.622	.609	1.010	.622	46.714	3	85	.000

a. Predictors: (Constant), Aligned, Clear, FeelGood

b. Dependent Variable: Rfuture

Model1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-.981	.509		-1.926	.057		
Clear	.207	.111	.159	1.867	.065	.609	1.642
FeelGood	.525	.109	.422	4.803	.000	.577	1.734
Aligned	.394	.120	.338	3.266	.002	.415	2.408

Table 2. Model summary of regression results for intentions to receive similar messages

Table 3 demonstrates the means and percentiles each message type generated in terms of the intention to follow message type with higher scores meaning greater intentions to follow the message.

Descriptive Statistics								
	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Avg Overall EmpowerFollow	13	5.2516	.51572	4.43	5.83	4.8333	5.4000	5.7571
Avg Overall UnpersuFollow	6	3.5833	1.62532	2.00	6.00	2.0000	3.2500	5.2500
Avg Overall MisleadFollow	4	4.5000	1.29099	3.00	6.00	3.2500	4.5000	5.7500
Avg Overall CoerciveFollow	6	2.0333	.94163	1.00	3.20	1.0000	2.0000	3.0500

Table 3. Mean score of intentions to follow message for each message type

To test H3 and determine whether participants were more likely to follow messages they rated as “empowering” compared to messages they rated as unpersuasive, misleading, and coercive, three-Wilcoxon T analyses were performed. A Wilcoxon T test uses sum of ranks scores to test the differences between groups. Simply, a Wilcoxon T test is a non-parametric test that is analogous to a paired samples t-test.

Results revealed significant differences between empowering and unpersuasive messages ($Z = -1.75$, $p = .040$, one-tailed), and empowering and coercive messages ($Z = -2.20$, $p = .014$, one-tailed). We used one-tailed results because we were interested in testing whether empowering messages were more likely to be followed than other types.

Table 4 demonstrates the means and percentiles each message type generated in terms of their willingness to receive similar messages in the future, with higher scores meaning greater willingness to receive similar messages.

Descriptive Statistics								
	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Avg Overall EmpowerFuture	13	4.7275	1.20476	2.00	5.83	4.0536	5.0000	5.6571
Avg Overall UnpersuFuture	6	2.8333	1.94079	1.00	6.00	1.0000	2.5000	4.5000
Avg Overall MisleadFuture	3	3.6667	.57735	3.00	4.00	3.0000	4.0000	4.0000
Avg Overall CoerciveFuture	6	1.9833	1.21724	1.00	4.00	1.0000	1.7000	2.8750

Table 4. Mean score of intentions to receive similar messages for each message type

As in the previous analyses, three-Wilcoxon T analyses were performed to test H4 and determine whether participants rated a greater willingness to receive empowering messages in the future compared to messages they rated as unpersuasive, misleading, and coercive. Results revealed significant differences between empowering and unpersuasive messages ($Z = -1.99$, $p = .023$, one-tailed), and empowering and coercive messages ($Z = -2.20$, $p = .014$, one-tailed).

RESULTS

The current study was intended to test the validity of the empowerment model postulated by (Chatterjee et al., 2010). Our results offer support for the model, and highlight the importance of tailoring messages that are aligned with the recipient’s long-term goals and motivating.

We tested whether postulated message types (i.e., empowering, unpersuasive, misleading, and coercive) generated different behavioral intentions. The results offer partial evidence that messages which are high in alignment with individual’s long-term goals and motivating (empowering messages) were more likely to lead to willingness to comply to ‘healthier’ behavioral intentions. More specifically, messages high in all of the hypothesized empowering dimensions were related to a greater likelihood of receiving similar messages in the future than unpersuasive and coercive messages. Therefore, this suggests greater future commitment to specific health interventions for empowering message types.

More importantly, messages that are high in the hypothesized empowering dimensions were associated with greater compliance with behavioral intention. In other words, individuals’ reported that they would be more likely to follow empowering messages than unpersuasive and coercive messages. This provides at least partial support for the empowerment model in terms of the differences between empowering, unpersuasive, and coercive message types corresponding with different ratings on behavioral intentions. However, since we did not find a statistically significant difference between empowering and misleading messages further investigation is needed to assess the actual difference.

CONCLUSION

Taken together, sending tailored messages that are aligned with long-term goals and motivating are viable tools in looking at future health behavior interventions. Furthermore, pairing an understanding of an individuals’ unique motivations towards pursuing a particular goal and delivering crafted messages about this goal using

persuasive technology seems to be plausible. In the case of this obesity intervention, understanding individuals' motivations to achieve health goals and conveying these messages using simple SMS technology seems to be a practical pairing of tools to achieve a goal of mass empowerment, but further investigation is needed.

The results from this study illustrated that the initial interview is a critical component in establishing a partnership with participants and increasing the efficacy in developing empowering messages. This study revealed that tapping into individuals' long-term goals and personal motivations may be difficult, but investing the time during the interview process can make tailoring messages an extremely powerful tool. Future research can focus more on the optimal ways to extract this information for better crafting of empowering messages.

In this paper we tested the empowerment model (Chatterjee et al., 2010) and compared how participants perceived empowering messages versus non-empowering ones, including misleading, unpersuasive and coercive messages.

In sum, our research showed that there is much promise in using one's own motivation and interests to accomplish the goal of tackling obesity. Pairing individual's motivations and interests with empowering SMS delivery seems to be an initial plausible start in utilizing technology to battle obesity. This study was only the first step, and further investigations are vital to determine the degree and duration that is optimal in incorporating dimensions of empowerment.

Lastly, we only tested behavioral intentions in this study, and not if actual behavioral change occurred. Future studies should go beyond intentions to whether messages actually lead to behavior adherence.

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