Exploring the Persuasiveness of Behavior Change Support Strategies and Possible Gender Differences

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Abstract. There is need to investigate the persuasiveness of various health behavior promoting strategies that are commonly employed in behavior change interventions design with respect to possible gender effect. Behavior change researchers have advocated the need to adapt persuasive approaches to various user characteristics. Gender has been identified to influence behavior in many domains. Therefore, this paper presents a comparative study investigating the perceived persuasiveness of health behavior promotion applications depicting ten commonly employed behavior change strategies. The population of interest are males and females and the purpose of the study is to investigate differences in persuadability and the perceived persuasiveness of behavior change strategies overall. To achieve this, we conducted a large-scale study on 1108 participants (575 males and 533 females) to examine the persuasiveness of ten strategies that are commonly employed in health behavior change intervention design. We also examined possible gender effects on the persuasiveness of various strategies. The results of the analysis show that some of the strategies studied are highly persuasive overall, while others were rated low in persuasiveness. The results also suggest that males and females differ significantly in persuadability – with females being more receptive to most of the behavior change strategies. Some strategies are more suitable for persuading one gender than the other. We therefore conclude that gender-dependent approaches would generally be more appropriate for designing behavior change support systems that will effectively promote health behavior change than the one-size-fits all approach.

Keywords: Persuasive Technology, Behavior Change, Gender, Persuasive Strategies, Persuasiveness, Health Behavior, PSD, health intervention, mhealth, health.

1 Introduction

Recent years have witnessed an increasing number of lifestyle-related health problems. Research has shown that adoption of healthy behavior can prevent or at least reduce the risk of many diseases, including obesity, heart disease, and type 2 diabetes [34]. It is, therefore, not surprising that interventions aimed at modifying health behavior have been identified as a major solution to these health conditions

[16]. As a result, research on how to design technology to motivate behavior change is a key area of inquiry of Behavior Change Support Systems (BCSSs) research within the Persuasive Technology (PT) community. Research has shown the potential of behavior change support systems to motivate healthy behavior – help people achieve personal wellness, manage diseases, and engage in preventive behaviors [6,11,14,22] using several persuasive strategies.

Over the years, several persuasive strategies have been developed [9,20]. However, many of these strategies are conjecture and their effectiveness have not been validated on a large-scale study while few of them have only been qualitatively evaluated – with systematic validation. As a result, most of the BCSSs assume a one-size-fits-all approach with respect to their choice of behavior change strategies to employ in their intervention design. This is based on the assumption that the strategies are equally persuasive and would similarly motivate people to change their behavior. However, people differ in motivation; a strategy that motivates one type of person to change her behavior may actually deter behavior change for another type of person [15]. Therefore, designing a technology that will inspire a positive user experience and effectively motivate health behavior change requires adapting the strategies based on the knowledge of their persuasiveness. Research has shown that tailoring behavior change strategies would increase the effectiveness of behavior change support systems in the domain of health [15]. According to Berkovsky et al. [2], tailoring persuasive strategies has a "huge untapped potential to maximize the impact of persuasive applications". The success of different BCSSs will be partly dependent on the persuasiveness of the strategies employed in their design and the appropriateness of the strategies for the target users or user group. However, research on tailoring behavior change strategies based on the knowledge of their persuasiveness is just beginning.

In choosing approaches for group-based tailoring, research has shown that gender is a reliable approach [26]. Research has also established gender differences in many areas including the perception of different behavior determinants [26], gameplay, and health behavior [7]. However, whether or not gender influences the persuasiveness of various behavior change strategies as highlighted by the Persuasive System Design (PSD) framework [20] has not been examined. Investigating the persuasiveness of these strategies and how they are perceived by different gender group is necessary to aid tailoring BCSS to the various gender groups to increase their effectiveness at achieving their intended objective of motivating behavior change.

Therefore, this paper investigates the persuasiveness of various behavior change strategies and possible gender differences in the persuasiveness of the strategies. We achieve this by comparing the effectiveness of ten PT strategies – *competition, comparison, cooperation, customization, personalization, praise, simulation, Self-monitoring* and *Feedback, suggestion,* and *reward* (from Fogg [9] and Oinas-Kukkonen [20]) – within and across the gender groups. The results of a large-scale study of 1108 participants (575 males and 533 females) suggest that males and females differ significantly in persuadability – with females being more receptive to most of the PT strategies. The study also provides a quantitative validation of the persuasiveness of the strategies overall. Some of the

strategies are perceived as highly persuasive by the participants overall, while others were scored low in persuasiveness with respect to their efficacy to motivate healthy behavior change. Yet, some of the strategies are intermediately persuasive.

2 Background

Over the years, a number of strategies for designing behavior change support systems have been developed. For example, Fogg [9] developed seven persuasive tools, and Oinas-Kukkonen [20] built on Fogg's strategies to develop 28 persuasive system design principles. These strategies are often applied in combinations when incorporated in actual software [13]. Therefore, it is common practice for researchers in persuasion to select a combination of strategies from various authors to inform their design. The choice of the strategies based on their persuasiveness and their suitability for particular users or user group are often based on a designer's own intuition, making it difficult to tailor strategies to users or user groups.

Considering that the large number of PT strategies in existence today cannot be exhausted in a studio, in this paper, we adopt 10 strategies (from Fogg and Oinas-Kukkonen). *Personalization* offers system-tailored contents and services to its users, tailoring content and functionality to a particular user's need based on a user's characteristics. For a detailed discussion of the strategies see [20]. *Simulation* provides the means for a user to rehearse the behavior and to observe the cause-and-effect linkage of their behavior. It is one of the rarely employed strategies in health game design. *Self-monitoring* allows people to track their own behaviors, providing information on both past and current states. It is one of the most common strategies for healthy eating and physical activity motivating applications [3,32]. The *Suggestion* strategy suggests certain tasks (for achieving favorable behavior outcomes) to users during system use. *Praise* applauds the user for performing the target behavior via words, images, symbols, or sounds as a way to give positive feedback to the user (for example in [1,30]). *Reward* offers virtual rewards to users for performing the target behavior. It is one of the commonly employed strategies [25]. *Competition* allows the user to compete with others. *Comparison* provides a means for the user to view and compare his/her performance with the performance of other user(s). Competition, and Comparison are included among the commonly used strategies. *Cooperation* requires users to cooperate (work together) to achieve a shared objective and rewards them for achieving their goals collectively. *Customization* is a strategy that provides the user an opportunity to adapt a system's contents and functionality to their needs or choices. These strategies have been employed in the design of several health behavior change support systems (for examples, see [3,15,25,30]).

3 Study Design and Methods

For the purpose of this study, we chose to focus on common application of behavior change technology to ensure uniformity: behavior change technology

for encouraging healthy eating behavior. Through a review of related work in designing behavior change support systems, we established a comprehensive list of persuasive strategies and how they have been operationalized in behavior change support systems. Storyboards provide a common visual language that individuals from diverse backgrounds can read and understand [18]. Considering that we cannot exhaustively study the large number of behavior change strategy from the literature, we selected 10 commonly employed – *competition, comparison, cooperation, customization, personalization, praise, simulation, Self-monitoring* and *Feedback, suggestion,* and *reward* (from Fogg [9] and Oinas-Kukkonen [20]). Recent reviews also identified these strategies among the commonly used PT strategies in persuasive systems design [17,35]. However, it is important to note that these ten strategies are not more important than the rest and may not be representative of all strategies.

To collect data for our model, we follow the approach described by Halko and Kientz [12]. Specifically, we represented each behavior change strategy in a storyboard. Although we could implement the individual strategies and then evaluate their persuasiveness in actual BCSS, we chose to use storyboards because actual implementation may create additional noise as it involves many other design decisions and the results can easily be biased by specific implementation decisions. The storyboards show a character and his/her interactions with a persuasive application for promoting healthy eating. The ten storyboards were drawn by an artist and were based on storyboard design guidelines by Truong et al. [31]. Figure 1 shows examples of two of the ten used persuasive strategies, *reward and self-monitoring*. Prior to assessing the persuasiveness of the various strategies, we ensured that the participants understood the strategy depicted in each storyboard by asking them two comprehension questions – first, to identify the illustrated strategy from a list of ten different strategies; and second, to describe what is happening in the storyboard in their own words. To elicit feedback on the persuasiveness of the strategies, each storyboard was followed by a validated scale consisting of four questions for measuring perceived persuasiveness, adapted from Drozd et al. [8]. Specifically, we asked participants the following questions after they have successfully answered the comprehension questions that show that they understood the strategy depicted in the storyboard:

Imagine that you are using the system presented in storyboard above to track your daily eating, on a scale of 1 to 7 (1-Strongly disagree and 7-Strongly agree), to what extend do you agree with the following statements:

a. The system would influence me.

b. The system would be convincing.

c. The system would be personally relevant for me.

d. The system would make me reconsider my eating habits.

The questions were measured using participant agreement with a 7-point Likert scale ranging from "1 = Strongly disagree" to "7 = Strongly agree".

To eliminate possible bias due to the ordering of the storyboards in the survey, we used a Latin Square to balance the order of presentation of the persuasive strategies. We created ten surveys that varied the position of each strategy and randomly assigned participants to one of the ten surveys.

We recruited participants for this study using Amazon's Mechanical Turk (AMT). AMT has become an accepted method of gathering users' responses [19]. It allows access to a global audience at a relatively low cost, and ensures efficient survey distribution, and high quality results [4,19]. We followed the recommendations for performing effective studies on the AMT by Mason and Suri [19], and used a similar approach to the one described by Halko and Kientz [12]. The study took an average of an hour to complete. Before the main study, we conducted pilot studies to test the validity of our study instruments.

A total of 1384 participants responded to our study. A total of 1108 valid responses were retained and included in the analysis. The participants demographic information is summarized in Table 1. In general, our participants are fairly distributed across the gender groups. With respect to age and education level attained, we have a diverse population.

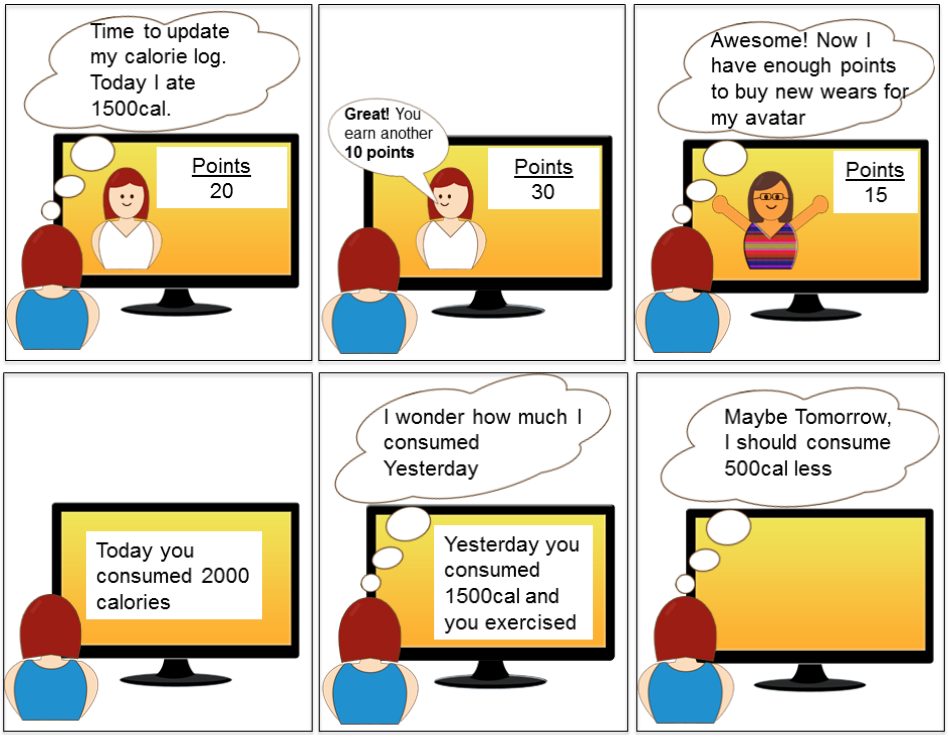


Figure 1: Storyboard illustrating reward and self-monitoring strategy

Table 1: Participants' demographic information

Total Participants = 1108	
Gender	Females (533, 48%), Males (575, 52%)
Age	18-25 (418, 38%), 26-35 (406, 37%), 36-45 (168, 15%), Over 45 (116, 10%).
Education	Less than High School (12, 1%), High School Graduate (387, 35%), College Diploma (147, 13%), Bachelor's Degree (393, 35%), Master's Degree (141, 13%).

4 Data Analysis and Results

We begin our analysis by validating our study instrument. First, to ensure that participants understood the intended persuasive strategy in each of the storyboards, we ran chi-squared tests on the participants' responses to the multiple-choice questions that required them to identify the represented persuasive strategy for each of the storyboards. The results for all the strategies were significant at $p<.001$. Second, we determined the consistency of the scale using Cronbach's alpha (α). The α for the strategies were all greater than 0.70 showing that the scales have good internal consistency. Third, to determine whether responses to each strategy were unique in our data, we performed Exploratory Factor Analysis (EFA), which showed that self-monitoring and suggestion loaded into one factor and competition and comparison loaded into one factor as well. Hence, the total number of factors examined in this study was reduced from ten to eight. Next, we examine the persuasiveness of the strategies.

Alongside examining the differences in perceived persuasiveness between males and females, validating the overall persuasiveness of the individual strategies for promoting healthy behavior is of interest. To achieve this, we performed one-sample t-test separately on the data for males and females and on the combined data – to obtain an overall persuasiveness of the strategies. We compared this data against a neutral rating for the perceived persuasiveness scale of 4. Figure 2 and Table 2 present the details of the overall persuasiveness of the individual strategies.

In general, participants perceived most of the strategies as persuasive. Specifically, all the strategies apart from reward and customization were perceived as persuasive. Customization is significantly below the neutral rating of 4 making it the least persuasive among all the strategies studied, Table 2. On the other hand, personalization and simulation emerged as strategies that are perceived as most persuasive (capable of motivating health behavior change) with mean ratings quite high and well above the neutral rating of 4, with mean differences close to 1 – see Figiure 2 and Table 2.

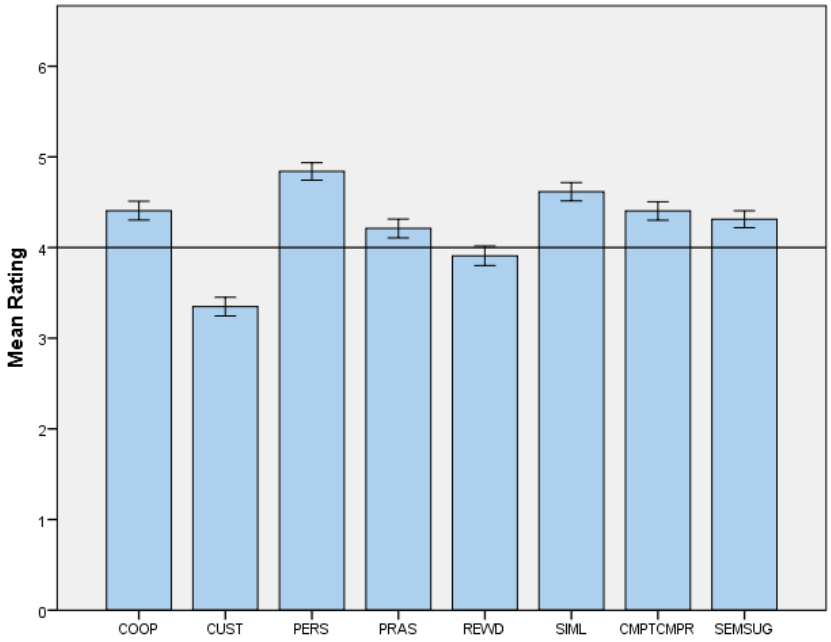


Figure 2: A bar graph of the mean of individual strategies showing their overall persuasiveness. Error bars represent a 95% confidence interval.

Table 2: Mean and Standard Deviations (SD), Mean Difference (MD), t-values (t_2), and significant levels for the individual strategies on a scale from 1(low) to 7(high) for overall persuasiveness.

	N = 1108				
	Mean	SD	MD	t_2	p
COOP	4.40	1.76	0.41	7.69	<.0001
CUST	3.35	1.75	-0.65	12.38	<.0001
PERS	4.84	1.64	0.83	17.04	<.0001
PRAS	4.22	1.75	0.21	4.01	<.0001
REWD	3.91	1.82	-0.09	1.67	<.0960
SIML	4.62	1.72	0.62	11.88	<.0001
CMPTCMPR	4.40	1.72	0.40	7.81	<.0001
SEMSUG	4.31	1.59	0.31	6.57	<.0001

With respect to gender differences, males and females perceived most of the strategies as persuasive, see Figure 3 and Table 3. Similar to the general group, personalization and simulation emerged as the most persuasive strategies that is capable of motivating health behavior change for both males and females. Customization is significantly below the neutral rating of 4 – making it the strategy that is perceived as least persuasive for both males and females. Reward on the other hand is a borderline strategy – that is exactly equal to the neutral rating of 4 – for females while it is below the neutral rating of 4 for males and therefore listed among the least persuasive together with customization for males – Figure 2 and Table 2.

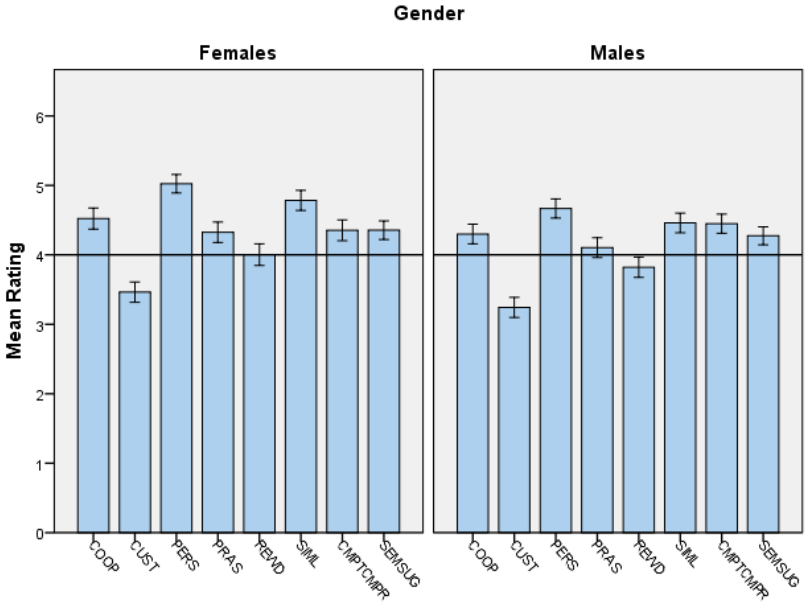


Figure 3: A bar graph of the mean of individual strategies showing their persuasiveness for males and females. Error bars represent a 95% confidence interval.

Table 3: Means and Standard Deviations (SD), Mean Difference (MD), t-values (t_2), and Significant levels (p) of the persuasiveness rating of the ten strategies on a scale from 1 (low) to 7 (high) for females and males separately.

	N = 533					**N = 575**				
	Females					**Males**				
	Mean	SD	MD	t_2	p	Mean	SD	MD	t_2	p
COOP	4.52	1.79	0.52	6.73	<.000	4.30	1.73	0.30	4.16	<.0001
CUST	3.46	1.71	-0.54	7.25	<.000	3.24	1.78	-0.76	10.19	<.0001
PERS	5.02	1.57	1.03	15.04	<.000	4.66	1.68	0.67	9.52	<.0001
PRAS	4.33	1.74	0.33	4.31	<.153	4.10	1.75	0.10	1.43	<.0001
REWD	4.00	1.84	0.00	0.041	<.017	3.82	1.79	-0.18	2.39	<.967
SIML	4.78	1.70	0.78	10.62	<.000	4.46	1.73	0.46	6.39	<.0001
CMPTCMPR	4.35	1.76	0.36	4.64	<.000	4.45	1.68	0.45	6.42	<.0001
SEMSUG	4.36	1.59	0.35	5.17	<.000	4.27	1.59	0.27	4.15	<.0001

COOP = cooperation, CUST = customization, PERS = personalization, PRAS = praise, SIML = simulation, REWD = reward, CMPTCMPR = competition and &comparison, SEMSUG = self-monitoring and suggestion.

4.1 Interaction Between Gender and Behavior Change Strategies

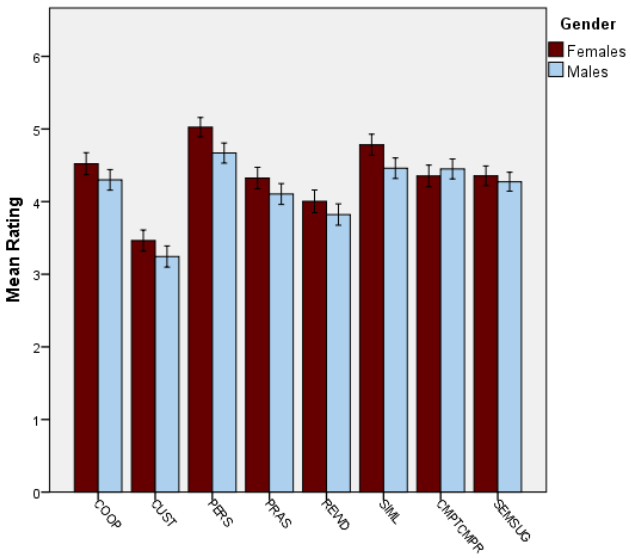
From the t-test, we established that both males and females perceive some strategies as highly persuasive (e.g., personalization and simulation) while other strategies (e.g., customization) scored low in the persuasiveness scale. However, the magnitudes of persuasiveness rating for the individual strategies were different, suggesting possible differences in the persuasiveness of the strategies for males and females – Table 3. To explore for significant differences between males and females with respect to the persuasiveness of various strategies, we performed the Repeated-Measure ANOVA (RM-ANOVA) on our data. Specifically, we examine the effect of gender on the persuasiveness of the various PT strategies using RM-ANOVA in SPSS 21. The analysis was performed after validating our data for ANOVA assumptions, with no violations. When the sphericity assumption was violated, we used the Greenhouse-Geisser method of correcting the degrees of freedom. Pairwise comparison used the Bonferonni method of adjusting for multiple comparisons.

The results of the RM-ANOVA show significant main effects of strategy ($F_{6.05,6687.58}$=184.718, p≈.000, η^2=.143) and gender ($F_{1,1106}$= 5.331, p≈.021, η^2=.005) on persuasiveness (see Table 4 and Figure 4). Overall, females rated the strategies as more persuasive than males, however; there was also a significant strategy by gender interaction on persuasiveness ($F_{6.05,6687.58}$=4.463, p≈.000, η^2=.004). Pairwise comparisons show that females found five out of the eight strategies significantly more persuasive than males: personalization ($F_{1,1106}$=13.153, p≈.000, η^2=.012); simulation ($F_{1,1106}$=9.831, p≈.002, η^2=.009); cooperation ($F_{1,1106}$=4.418, p≈.036, η^2=.004); customization ($F_{1,1106}$=4.386, p≈.036, η^2=.040); and praise ($F_{1,1106}$=4.428, p≈.036, η^2=.004).

Table 4: Mean and Standard Deviations (SD) for the strategies by gender. Bolded means are significantly different across males and females.; p<. 05.

Strategies	**CMPT/ CMPR**	**COOP**	**CUST**	**PERS**	**PRAS**	**SEM SUGG**	**SIML**	**REWD**
	mean(SD)	mean(SD)	mean(SD)	mean(SD)	mean(SD)	mean(SD)	mean(SD)	mean(SD)
Males	4.45(1.68)	**4.30(1.73)**	**3.24(1.79)**	**4.67(1.68)**	**4.10(1.75)**	4.27(1.58)	**4.46(1.73)**	3.82(1.79)
Females	4.35(1.76)	**4.52(1.79)**	**3.46(1.71)**	**5.02(1.57)**	**4.33(1.74)**	4.36(1.59)	**4.78(1.70)**	4.00(1.84)
COOP = cooperation, CUST = customization, PERS = personalization, PRAS = praise, SIML = simulation, REWD = reward, CMPTCMPR = competition and &comparison, SEMSUG = self-monitoring and suggestion.								

Figure 4: Paired mean of individual strategies by gender group. Error bars represent a 95% confidence interval.



5 Discussion

This study presents the results of a large-scale evaluation of ten persuasive strategies that are commonly employed in developing behavior change support systems. Many of these strategies are conjecture and their effectiveness have not been validated in a large scale study while few of them have only been qualitatively evaluated – with systematic validation. The study presented in this paper provides a quantitative validation of the persuasive strategies and the influence of gender on the persuasiveness of the strategies. To achieve this we represented the individual strategies in a storyboard showing persuasive application for promoting healthy eating and collected quantitative measures from 1108 participants – 533 females and 575 males – using the storyboard. The results of analysis of the data show that as expected, most of the strategies are perceived as highly persuasive by the participants overall, while others were scored low in persuasiveness with respect to their efficacy to motivate healthy behavior change.

5.1 Comparing the Persuasiveness of the Strategies by Males and Females

The results show that males and females differ with regard to their perceived persuasiveness of five out of the eight strategies examined in this paper. Surprisingly, females perceive five strategies: cooperation, customization, personalization, praise, and simulation as being more persuasive than males –

Table 4 and Figure 4. Below, we discuss these results with respect to the persuasiveness of the strategies.

Personalization and Customization: Personalization and customization represent two different ways of tailoring from literature. Both personalization and customization emphasize tailoring system contents to the user group. However, in personalization the system initiates and control the tailoring to users based on user characteristics – system-controlled tailoring – while in the customization, the user initiates and controls the tailoring – user-controlled tailoring. Although customization strategy is not explicitly included in the PSD model as a persuasive strategy, research has identified it as strategy different from the popular personalization strategy that is listed in the PSD model [27,28]. The result from our study also confirmed that they are in fact different.

While personalization emerged as the most persuasive strategy for both males and females from our study, customization emerged as the least persuasive strategy that may not motivate meaningful behavior change. A possible explanation while customization is perceived as less persuasive than personalization is that most users tend to use only the default system features [29] and tend to dislike systems that require a lot of input from them [24] – customization. Therefore, although, most people would prefer systems that tailor their contents to them, they would prefer a system that does that automatically (personalization) to a system that requires their input – customization. Therefore, behavior change support systems should be designed to require minimal user input for tailoring purposes. This suggests a need for various ways of tracking and sensing users' behaviors automatically to aid system adaptation – personalization.

Fortunately, personalization is among the strategies that are moderately employed in health behavior change systems design [17]. Interestingly, although males and females perceive personalization as highly persuasive, personalization is also a differentiator of males and females. Females perceive both personalization and customization as more persuasive than males.

Simulation: Simulation strategy which deals with providing users opportunity to rehearse their behavior and to observe the cause-and-effect linkage of their behavior emerged as the second highly persuasive strategy that is capable of motivating health behavior change for both males and females. Although simulation is not among the commonly employed persuasive strategies in health behavior promoting applications, the persuasiveness score stresses a need for behavior changing application to include some features that allows people to rehearse and observe the simulated impact of their behaviors both in short and long-term. This is important because the intangible and the gradual nature of achieving the benefit of adopting healthy behaviors are often barriers to adopting healthy behavior. Adopting healthy behavior is a lifestyle than spans over a lifetime with no quantifiable benefit [22], therefore, simulation strategy that allows users to view both immediate and projected impacts of their health behavior may bridge this gap and make the benefit of adopting health behavior more visible and tangible. Similar to personalization and customization, females perceive simulation as more persuasive than males.

Cooperation: According to the PSD framework, "a system can motivate users to adopt a target attitude or behavior by leveraging human beings' natural drive to cooperate."[20]. From the results of our study, females found cooperation more persuasive than males and therefore will be motivated to change their behavior by any behavior change system that employs the cooperation strategy. This is probably because females are more susceptible to social influence, social facilitation [9], and social support [20] and therefore, more inclined to performing the target behavior when they are working together with others than males. This result is in line with research in other domain that found that females generally cooperated and their cooperation unlike males are largely unconditional [33]. Our study is also in line with previous studies that found that social influence is a contributing factor that influence how females perceive their weight and how it affect their behavior [23,26], while it is not significant for males. Unfortunately, cooperation strategy is rarely used in health intervention design [17]. However, cooperation is the third strategy that is perceived as persuasive (after personalization and simulation) for females and therefore should be employed in designing behavior change systems especially those targeting healthy behaviors.

Competition and Comparison: Competition and Comparison are listed as two separate strategies by the PSD model [21]. However, according to our analysis, they belong together. This is understandable considering that in most situations; competition is often a by-product of comparison. Competition/comparison is among the strategy that is frequently used in health behavior change intervention. The results from our study show that competition/comparison is moderately persuasive. According to previous research, males are more inclined to competition and can even be motivated to cooperate to win a competition than females [33]. The results from our study support this finding by showing that competition/comparison is the only strategy that is perceived as more persuasive by males than females (although the difference is not significant). This suggests that employing competition strategy in the design of a behavior change system will motivate behavior change in males than females.

Self-monitoring and Suggestion: Self-monitoring and suggestions are listed as two separate strategies by the PSD model [21]. However, according to our analysis, they belong together. This is understandable considering that effective suggestion would require context awareness (that is often achieved through monitoring) to determine the opportune moments.

Self-monitoring is among the most frequently employed persuasive strategies, especially those aimed at promoting healthy eating behaviors [17]. However, from the results of our study, self-monitoring is intermediately persuasive. This is probably because of the labour intensive nature of current (diet) self-monitoring systems that often requires some level of input from the user to be effective. Self-monitoring is equally persuasive for both males and females.

Praise: According to the PSD model, systems that applaud users for performing the target behavior are more likely to motivate them to adopt healthy behavior [20]. Praise is intermediately persuasive and therefore, can moderately motivate behavior. It is infrequently used in behavior change motivating systems [17]. Males and females differ with respect to the persuasiveness of praise. Females

perceive praise as more persuasive than males. This is probably because females are more inclined to respond to strategies that appeal to emotions than males.

Reward: Reward is the least persuasive strategy after customization. This is probably contrary to popular expectations. Many behavior change systems offer one type of reward or the other to the users to encourage them to perform the behavior. The use of any form of reward to motivate behavior change has been a subject of debate because of the tendency of reward to trivialize the benefit of adopting healthy behavior and make it extrinsically motivated [5,10]. The results from our study show that reward is not all that important a strategy for motivating behavior change and therefore, can be excluded. There is no difference between males and females with respect to the persuasiveness of the reward strategy.

6 Limitation

This study examined the perceived persuasiveness using the storyboards implementation of the strategies, however, actual persuasiveness may be different when implemented and used in actual behavior change support system. Although we use the application for motivating healthy eating as a sample in our storyboards, the storyboards were drawn at a high enough level that it does not encapsulate much of a specific application domain. However, further work is needed to establish the applicability of our result in other domains.

7 Conclusion and Future Work

The study validated that the persuasiveness of various persuasive strategies in use today (which have not been validated in large-scale studies). The results suggest that these strategies could be employed to design behavior change support systems to motivate healthy behavior change overall. We also establish that gender influences the persuasiveness of the strategies. Specifically, males and females differ with regard to the perceived persuasiveness of five out of the eight strategies examined in this paper. Surprisingly, females perceive five strategies: cooperation, customization, personalization, praise, and simulation as being more persuasive than males. This implies that females can be more easily persuaded using these strategies. It also suggests that females are more persuadable than males with respect to the influence of the strategies on their behavior. The gender-related differences across a number of strategies also suggest that gender-dependent approaches would generally be more appropriate for designing behavior change support systems that will effectively promote health behavior change than the one-size-fits all approach.

In general, regardless of gender, personalization and simulation emerged as the most persuasive (significantly different from all other strategies), whereas reward and customization were the least persuasive (also significantly different from all others). The rest of the strategies – competition/ comparison, cooperation, self-monitoring, and praise – were in the middle with competition/comparison and cooperation leading the group.

Future work should examine the applicability of our result in other domains by examining the persuasiveness of the strategies using application from other domains. Research should also design and compare the effectiveness of behavior change support systems designed using strategies that are listed as highly persuasive (personalization and simulation) with those that are scored low in the persuasiveness scale (e.g., reward and customization).

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