

Investigating Gender-Specific Preferences for Persuasive Strategies in a Behaviour Change Game for Healthy Eating

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Abstract

Persuasive games for health have become increasingly relevant in promoting positive behaviours in various health domains, such as healthy eating. An important aspect of designing persuasive games is understanding how persuasive strategies within such games may vary across user characteristics such as gender. In a study of 124 participants, we investigated the gender preferences for four persuasive strategies (reward, competition, praise, and suggestion) in a persuasive game for healthy eating. The results showed that all the persuasive strategies were perceived as significantly effective across genders, highlighting their potential to influence healthy eating behaviours across both genders. However, there was only one notable gender-based difference, with the praise strategy being significantly more preferred by females than males. We conclude by discussing some considerations for the design of persuasive games tailored for male and female audiences.

Keywords

Gender, persuasive games, behaviour change, persuasive strategies, serious games.

1. Introduction

Research has consistently demonstrated the efficacy of persuasive games in driving behaviour change in diverse domains, such as environmental sustainability [1], personal wellness, disease management [2], physical activity[3], healthy eating [4], and substance abuse [5]. This has led to a growing investment in designing games to address challenges across these diverse domains.

However, acknowledging the inherent diversity among individuals, it becomes imperative to tailor these persuasive games to accommodate different user characteristics. Gender, being one such characteristic, has been identified through research as influencing user reactions to stimuli. Therefore, understanding how persuasive strategies resonate with different genders of players is important for the effective design and implementation of persuasive games. This would help persuasive game designers to either properly tailor their designs based on gender-specific preferences or develop designs that can be broadly applied across genders, especially when creating games to promote healthy eating.

To understand these gender-specific preferences in the domain of healthy eating, we explored how various genders respond to four distinct persuasive strategies—*reward*, *competition*, *praise*, and *suggestion* in a persuasive game for promoting healthy eating. In a study of 124 participants, we explored the following research questions:

R1: For each gender, how effective are the persuasive strategies implemented in a healthy eating persuasive game?

R2: Comparatively, are there any significant differences in the perceived effectiveness of the persuasive strategies across genders?

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2. Literature Review

Previous research have shown varying insights on the impact of gender on the effectiveness of persuasive strategies. Ndulue et al. [6] investigated the effectiveness of persuasive strategies in a COVID-19 awareness persuasive game tailored for the African audience. They found no significant differences in the effectiveness of all the strategies implemented across the genders. Alternatively, Oyibo [7] investigated the influence of age and gender on persuasive technology, discovering that males were more influenced by reward and competition strategies compared to females. In a related study, Orji et al. [8] investigated gender differences in responses to persuasive attempts, utilizing Cialdini's persuasion strategies, and found that females were generally more responsive to most of these strategies than males.

Building on previous research, our research explores gender preferences for persuasive strategies in the context of a persuasive game designed to promote healthy eating. By narrowing our focus to this domain, we contribute to the evolving understanding of how gender may shape the reception and impact of persuasive elements, particularly within the domain of health-focused gaming interventions.

3. Method

In this section, we provide an overview of the game design, study design, measurement instruments, participant demographics, and data analysis methodology.

3.1. Game Design

Our game is an adaptation of the popular Pac-man game concept, tailored to promote healthy eating. A maze is filled with both healthy food items like fruits and vegetables and unhealthy food items like candies and junk food, all in constant motion around the maze. Players must control the Pac-man to consume all the healthy items while simultaneously avoiding the unhealthy ones, within a specified time limit. They gain points for every healthy food item consumed. However, if Pac-Man encounters an unhealthy food item, points are deducted, and player's life is lost. The game creates a dynamic and challenging gameplay experience where players must make quick decisions to balance collecting points through healthy food consumption and avoiding penalties by steering clear of unhealthy foods. This actively encourages players to prioritize healthy choices, fostering a balanced and health-conscious gameplay approach. Figure 1 shows a screenshot of the gameplay.

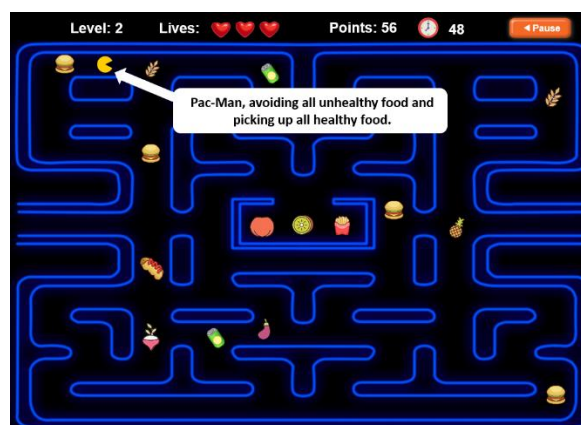


Figure 1 - Screenshot of the Gameplay for the Pac-man for Healthy eating.

3.2. Study Design

In this study, our main objective was to investigate possible gender-specific differences in the effectiveness of persuasive strategies in a persuasive game for healthy eating. To achieve this, we

implemented four persuasive system design (PSD) model strategies: *Reward*, *Competition*, *Praise*, and *Suggestion* [10] in a persuasive game for promoting healthy eating. Figure 2 shows screenshots of the persuasive strategy implementations while Table 1 shows a description of all the persuasive strategies and their implementations.

Table 1. Persuasive strategies and their implementations

Strategy	Implementation
Reward	Badges and points for completing in-game achievements. (Figure 2A).
Competition	A leaderboard of points earned in-game. Players are ranked according to the points accumulated while playing the game (Figure 2B).
Praise	Image and textual positive feedback for completing in-game achievements (Figure 2C).
Suggestion	Random pop-up tips about healthy eating or unhealthy eating practices. (Figure 2D).

To evaluate the effectiveness of the persuasive strategies implemented in the game, we recruited 124 participants, who installed the game and played it daily for at least 15 minutes over three days. After the gameplay period, participants provided feedback on the perceived effectiveness of the persuasive strategies.

Table 2 shows the demographic distribution of the participants. To achieve this, we utilized a scale adapted from Thomas et al. [9] and Drodz et al. [10]. This scale, a well-established measure for evaluating the perceived persuasiveness of system features, has been employed in various persuasive technology-related research studies [11][12][2]. To mitigate potential bias resulting from question order, we developed four survey versions, each containing the same questions but arranged in a randomized sequence. We measured these questions on a 7-point Likert scale ranging from “1 = Strongly disagree” to “7 = Strongly agree” for each strategy. The scale consisted of the following questions:

- i. “This feature would influence me to eat healthily.”
- ii. “This feature would convince me to eat healthily.”
- iii. “This feature would be personally relevant to me.”
- iv. “This feature would make me reconsider my eating habits.”
- v. “The feature would make or motivate me to use the game.”

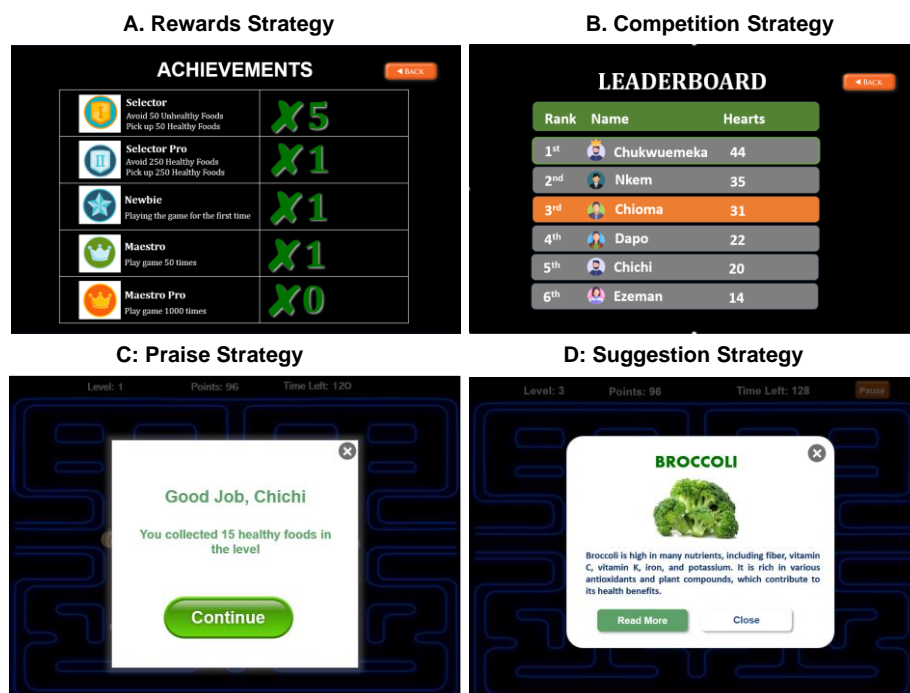


Figure 2 - Some screenshots of each strategy implemented in the game.

Table 2. Demographic distribution of the participants

Demographics	Participants
Gender	Female = 31 (25%), Male = 93 (75%).
Age	18-25 = 29 (23%), 26-35 = 64 (52%), 36-45 = 31 (25%)
Education	Bachelor's = 78 (63%), Master's = 32 (26%), High school = 7 (5.5%), College diploma = 7 (5.5%).

3.3. Data analysis

To accomplish our research objectives, we carried out the following analysis:

- i. We checked the reliability of the responses collected with the scale using Cronbach's alpha. The reliability analysis showed that all the scales were internally consistent, with a combined Cronbach's alpha value of 0.72 which is an acceptable level of reliability [13].
- ii. We conducted a one-sample t-test on the mean ratings of each persuasive strategy to verify their perceived effectiveness for each gender.
- iii. We conducted an independent samples t-test on the mean ratings of each persuasive strategy with gender as the grouping factor to identify the difference between the two genders.

4. Results

In this section, we present the results of the data analysis according to our research questions.

In addressing R1 (For each gender, how effective are the persuasive strategies implemented in a healthy eating persuasive game?), we conducted one-sample t-tests on the mean scores of user ratings for the persuasive strategies. These tests were conducted with a reference to the neutral rating of 4 on a 7-point persuasiveness scale. The results showed that all persuasive strategies were perceived as significantly effective for both genders, with competition ($t(92) = 6.04, p < .001$) and reward ($t(30) = 6.04, p < .001$) showing the highest perceived effectiveness for males while competition was the highest for females ($t(30) = 6.10, p < .001$). Table 3 and Figure 3 show the results for all persuasive strategies in each gender.

Table 3. One-sample t-tests of the mean values of the persuasive strategies implemented grouped by gender. (All means were significant at $p < .001$, test value = 4).

Strategies	Male df = 92				Female df = 30			
	M	SD	t	p	M	SD	t	p
Reward	6.04	.83	23.49	.001	6.03	.92	12.37	.001
Competition	6.04	.77	25.53	.001	6.10	1.07	10.85	.001
Praise	5.49	.90	15.89	.001	5.95	.59	18.29	.001
Suggestion	5.69	.72	22.70	.001	5.72	.97	9.89	.001

Furthermore, to address R2 (Comparatively, are there any significant differences in the perceived effectiveness of the persuasive strategies across genders?), we carried out an independent samples t-test on the mean scores of user ratings for the persuasive strategies with gender as the grouping variable. Our finding indicated that the reward strategy showed no significant differences in effectiveness across genders ($t(122) = .012, p = .990$). Similarly, the competition strategy showed no significant difference in the effectiveness across genders ($t(122) = .077, p = .939$). Additionally, the suggestion strategy also exhibited no significant difference between the genders ($t(122) = -.172, p = .864$). This result implies that the perceived effectiveness of reward, competition, and suggestion strategies is consistent across genders.

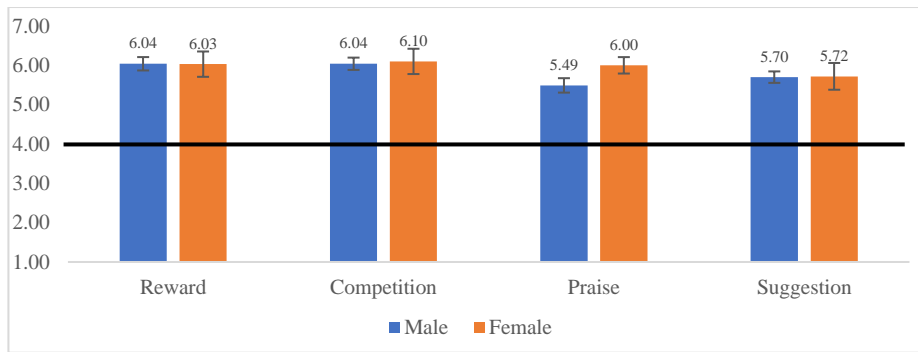


Figure 3 - A bar chart showing the perceived effectiveness of the persuasive strategies across genders.

On the other hand, the praise strategy showed a significant difference in perceived effectiveness across genders ($t(122) = -2.67, p = .009$). Upon comparing the mean scores for praise between genders, we found that the praise strategy was perceived as significantly more effective for females ($M=5.948, SD=.5932$) than for males ($M=5.486, SD=.9019$).

5. Discussion

In this section, we briefly discuss some implications of the result. While our results revealed the effectiveness of the praise strategy for all genders, a notable gender-based difference emerged, with females expressing a significantly stronger preference for this strategy than males. This preference for the praise strategy aligns with existing research indicating gender differences in communication styles, where females tend to value elaborate communication [14], emphasizing emotional expression and positive reinforcement. Praises, as a form of positive affirmation, resonate with individuals valuing emotional connections, eliciting strong positive emotions and fostering a sense of connection between players and the persuasive game. Given females' tendency to prioritize emotional experiences [15], persuasive game designers are encouraged to incorporate praise phrases with emotionally resonant words in persuasive games targeted at females.

However, it's crucial to note that our study found no significant gender differences in the preferences for the reward, competition, and suggestion strategies. This contrasts with previous work by Oyibo et al. [7], which observed gender-based distinctions in the reward and competition strategy preferences. However, it's important to note that their study did not centre around persuasive games and was not directed at any specific domain. In contrast, our research focused on persuasive games specific to the domain of healthy eating, emphasizing the importance of tailoring persuasive game elements to factors such as users, domains, and technology. This is important as the effectiveness of these elements may vary or may be the same across these diverse dimensions, emphasizing the need for design approaches for diverse audiences.

6. Conclusion

In conclusion, this study in the domain of persuasive health for healthy eating revealed some significant insights into gender-specific preferences for persuasive strategies. The stronger preference for the praise strategy among females further emphasizes the importance of tailoring persuasive game design to resonate effectively with diverse audiences. As the field of persuasive games continues to evolve, these findings underscore the necessity of considering gender-specific preferences in the development of interventions, promoting not only healthier lifestyles but also a more inclusive and personalized approach to health-oriented gaming experiences. The implications discussed provide valuable considerations for future research and the ongoing refinement of persuasive games that aspire to inspire positive behaviour changes across genders.

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