I Am What You Eat: Effects of Social Influence on Meal Selection Online*

Maria D. Molina
Penn State University
State College, PA, USA
mdm63@psu.edu

ABSTRACT

The availability of mHealth technologies has increased exponentially, particularly fitness and calorie tracking applications. Recent studies and anecdotal evidence has highlighted the potential of these technologies to serve as tools of bad eating behavior due to its focus on self-monitoring and calorie counting. The current research investigates on the potential of using social-orienting features of technology, specifically bandwagon and identity cues, to incentivize food-based nutrition (FBN) rather than a calorie-only approach. For this purpose, a 2 x 2 mixed factorial online experiment was conducted with bandwagon cue as a within-subject factor and identity cue as a between-subject factor. Results reveal that 67.6% of participants selected high bandwagon cue meals, regardless of its nutritional value. Bandwagon perception was the only significant predictor of meal selection, indicating that an increase in one unit improved the odds of an individual choosing a high bandwagon meal by 69%.[1]

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KEYWORDS
mHealth; fitness tracking; calorie tracking; bandwagon cue; identity cue; social-orienting features

Figure 1: Sample website stimulus illustrating a high bandwagon, high FBN conditions (left) and high bandwagon, low FBN (right). Conditions followed a Latin-Square procedure.

1 INTRODUCTION

In the United States, most people do not meet the dietary recommendations proposed by the Department of Health and Human Services (HHS) [12]. As a result, approximately 36.5% of U.S. adults are obese [4]. In an effort to reduce this number, health interventions using mHealth technologies have been invested into counteracting obesity, typically focusing on a reduction of caloric intake, while rejecting the importance of overall nutrition. Such fitness and calorie tracking technologies are typically grounded on the idea that self-monitoring motivate behavioral change.

Nevertheless, the HHS emphasizes the importance of a balanced food-based nutrition (FBN) and the importance of high-quality food consumption over quantity [12]. Furthermore, the increase in self-monitoring applications have raised a concern -- the potential of using such fitness and calorie tracking devices as tools or triggers of bad eating behavior by focusing on a calorie-only approach [6]. The aim of the current research is to investigate on ways that features of technology can be used to encourage good eating decisions focusing on nutritional values and recommended intake rather than a calorie-count only approach.

One way to accomplish this is through the use of social-orienting features of technology. Because individuals tend to use other's eating behavior as a guide to their own eating behavior [3], it is possible that online social features will inspire users into a more holistic approach to nutrition. To this effect, a 2 x 2 mixed factorial online experiment was conducted to assess the relationship between social influence and meal choice in online settings.

2 LITERATURE REVIEW

Social influence strategies have been widely researched in a variety of contexts including eating behavior. Social-modeling, or the tendency for people to use other's eating behavior as a guide to what to eat and how much to eat has long been recognized [1,3]. This type of social influence occurs because food consumption is often done around people leading to a desire for affiliation by using others as a point of reference. Importantly, the effects of modeling are stronger when the reference point is someone similar to the individual, or someone he/she feels identifies with.

Social modeling has been successfully translated into the virtual world. For example, social-orienting features can provide group reinforcement and empower users through positive upward social comparison achieved by comparing oneself with others. The present study will specifically focus on bandwagon and identity cues, two types of social confirmation cues that could play a role in user's meal selection online.

2.1 Bandwagon cues.

The bandwagon effect posits that users trust online sources, messages, or products, if others agree with them [10]. Thus, the effect of bandwagon cues, such as star ratings, occurs depending on the user's bandwagon perceptions, or how much the user thinks others would agree or like the product [7]. In the present study, because one of the primary motives of modeling in nutrition is a desire for affiliation and the use of others as a reference point [1], it is expected that bandwagon' heuristic will trigger social influence giving the sense of 'if others are eating healthy, then I should

Table 1: Manipulation Check Measures

Variables	*Sample Items*
Liking of meal (α= .83-.86) for the four meals.	"This meal is tasty," "I would prepare this meal for myself."
Perceived caloric intake.	"This meal has a lot of calories."

Table 2: List of Control Variables

Variables	*Sample Items*
Interest[8] (*M*= 5.7, *SD*=.99 α= .95).	"unimportant-important," "worthless-valuable"
Previous mHealth use (*M*= 3.39, *SD*=2.7, α =.88)	How frequently do you use: "fitness tracking wearable device," "fitness tracking applications," "calorie tracking applications."
Eating disorder symptomatology[2] (*M*= 4.3, *SD*=.94, α= .85).	"Have you been deliberately trying to limit the amount of food you eat to influence your weight or shape?"

too. Thus, this research posits that:

H1: In the presence of bandwagon cues, participants will choose meal options with a high-star rating compared to low-star ratings.

H2: The relationship between bandwagon cues and chosen meal will be predicted by bandwagon perception.

2.2 Identity heuristics.

Identity cues, on the other hand, trigger a sense of identification and similarity with the content being presented [10]. Thus, the identity cue can trigger a sense of affiliation when a recommendation is provided by a similar other. Likewise, modeling of food consumption is stronger "when individuals desire to affiliate with the model or perceive themselves to be similar to the model" [1]. Thus, the following hypotheses are proposed:

H3: In the presence of identity cues, participants will be more likely to select highly rated meals than when the identity cue is not present.

H4: The effect of identity cues on meal selection will be predicted by perceived similarity.

3 METHOD

The current experiment used a 2 (bandwagon cue: high vs. low) x 2 (identity cue: presence vs. not present) mixed factorial design with bandwagon cues as a within-subject factor and identity cue as a between-subject factor.

3.1 Participants

A total of 151 students from a large northeastern university were recruited to participate in the experiment for extra credit in a communications course. After eliminating incomplete questionnaires and participants who reported being vegetarian, 108 participant responses were utilized for analysis. The majority of participants were female (63%) and the age ranged from 18-24 (*M*=20.24, *SD*= 1.02).

3.2 Procedure and Stimuli

Participants received an invitation to participate in the study with the link to the questionnaire. Upon consenting to participate, they were asked questions about their interest in nutrition and previous use of mHealth devices and applications. Following, participants were presented with four different meal choices created based on the standards of ChooseMyPlate.gov, half of high caloric value, but healthy in terms of FBN and half of low caloric value, but unhealthy in terms of FBN. One chicken and one beef meals were chosen and paired up with a carbohydrate and vegetable to reflect a high FBN dish. To create the low FBN, the photos were edited and the carbohydrates were taken out (see Figure 1). Half of the participants received the high FBN meals with high bandwagon cue and low FBN in low bandwagon cue, and half the other way around. A Latin-Square design was used creating a set of four different combinations of websites. Additionally, half of the participants were told that meals were rated by other members of their university and half were told that the rating

Table 3: List of Mediating Variables

Variables	*Sample Items*
Bandwagon perception [9] (*M*= 5.22, *SD*=.94, α =.79)	"how likely are other people to pick the meal you picked," "how likely are other people to recommend this meal?"
Perceived similarity [5,11] (*M*= 4.36, *SD*=1.19, α =.92)	"I think users of this app have ideas and thoughts similar to mine," "users of this app and I seemed to have similar personalities"

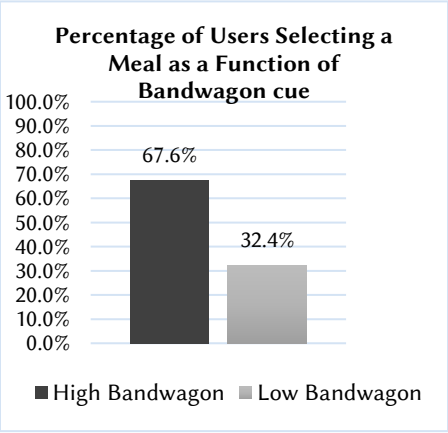

Figure 2: Meals selection as a function of bandwagon cues illustrating that bandwagon effects can successfully persuade people when it comes to making meal selection decisions, χ^2 (1, N=108) = 13.37, p = .001

was done by other users of the app, creating a total of 8 websites.

Upon entering the system, participants were asked to select a meal they would like to eat for dinner. After making their selection, they were redirected to the remaining of the questionnaire.

3. 3 Measures

3.4.1 Manipulation Check. Participants were asked to identify who recommended the meals in the platform: the university community or other users of the app. Participants were also asked about their perceived liking and caloric values of each meal (See Table 1).

3.4.2 Control Variables. Interest in nutrition, previous mHealth use, and eating disorder symptomatology were entered as control variables (See Table 2).

3.4.3 Mediating Variables. Bandwagon perception and perceived similarity were tested as mediating variables (See Table 3).

4 RESULTS

4.1 Manipulation Check

To test the identity cue manipulation, a 2 x 2 Chi-square was employed. Only those who passed the manipulation check (N=67) were used for analysis related to this cue.

Two univariate repeated measures ANOVA were conducted to assess liking of meals and perceived calories. Difference in liking was only between meals that used a different protein (chicken vs. beef) and not between high and low FBN. Similarly, high FBN (of both meal options) were ranked as having higher calories than low FBN meals.

4.2 Hypothesis Testing

Chi-square tests were employed to test the main effects of bandwagon and identity cues. First one-sample Chi-square was run to test the proportion of users who selected meals with high versus low bandwagon cues. Results supported hypothesis one indicating that 67.6% of participants chose meals high in bandwagon compared to 32.4% who selected low bandwagon meals, (see Figure 2). Then, a Chi-square test was conducted to assess the choosing of meals as a function of bandwagon cues and FBN. Results indicate no significant difference (see Figure 3).

Next, a 2 x 2 Chi-square was employed between identity cue and bandwagon selection for participants who passed the manipulation check. Results revealed no significant difference between condition, χ^2 (1, *N=67) = .84, V* = .02, p = .84.* Thus, hypothesis three was unsupported.

To assess hypotheses two and four, a logistic regression was employed by entering the dichotomous variable bandwagon selection (coded high=1 and low=0) as the dependent variable. Previous interest in nutrition, mHealth experience, eating disorder symptomatology, and gender were entered as control variables in the first block. Bandwagon perception and perceived similarity were entered as predictors in the second block and third block, respectively. Analysis revealed that

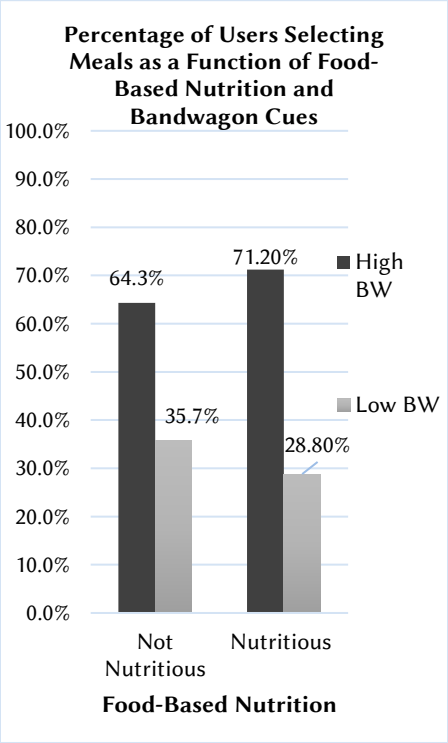

Figure 3: Meal selection as a function of FBN and bandwagon cues. This figure shows that bandwagon effects can persuade people despite the nutritious value of the meals they are associated with, χ^2 (1, N=108) = .58, V* = .07, p = .45

bandwagon perception significantly predicted bandwagon choice, thus hypothesis two was supported (see Table 4). Perceived similarity was not a significant predictor.

5 DISCUSSION

This study investigates on the potential of using social modeling in online contexts to trigger nutrition-related behavioral outcomes and reveals that social-orienting features of technology were successful at influencing participants meal selection. However, this only held true for bandwagon cues and not identity cues. Bandwagon cues already trigger social influence affording users a sense of security in the selected meal because "if others are rating this meal as high, then it must be good." As such, receiving the ratings from a similar other did not add to that feeling of comfort when selecting a meal. This is further justified by the logistic regression indicating that the only significant predictor of bandwagon choice was bandwagon perception.

The second reason for the higher success of bandwagon cues might be the nature of social modeling in the food consumption context itself. It is important to remember that social modeling is motivated by goals of affiliation [1]. Thus, it may be that participants in this study opted for social modeling and followed the bandwagon due to a desire to affiliate with others in the group. In other words, affiliation is a consequence of social modeling and not a precursor.

Interestingly, the bandwagon cue was a successful predictor of meal selection, regardless of the nutritional value of the meal. In other words, bandwagon cues can be a double-edged sword. However, in a system designed to encourage good eating habits, incorporating bandwagon cues that allow users to rate meals in their platform can be successful at eliciting behavioral intentions.

6 LIMITATIONS AND FUTURE RESEARCH

The present research has important limitations to consider. First, this research indicates behavioral intentions, but it is limited in predicting actual behavioral outcomes. Secondly, the research goal of this study was on participants' choice when the healthy meal was in high versus low bandwagon conditions. Thus, the design of this study only reflected this intention and did not include a condition where a healthy and an unhealthy meal were both rated highly or both rated negatively.

Finally, although analysis was only conducted with those who passed the identity cue manipulation check, 38% of participants did not pass. It might be that the ingroup and outgroup comparison necessary to elicit the identity cue were not as evident. Although a calorie-focus approach is negative for the population at large, it is particularly problematic for individuals susceptible to eating disorders. A next step would be to analyze if findings of this study can be replicated on participants with eating disorders, who might have other characteristics that influence their meal selection.

There are several opportunities for future research that stem from the findings of the current research. Furthermore, future research should incorporate bandwagon cues in actual interventions to see if behavioral intentions can be translated into outcomes outside the experimental setting and if outcomes vary based on the type of intervention. It might be possible that these features play a

Table 4: Predictors of Bandwagon Selection

	Wald χ^2	Exp (β)	R^2 Change
Controls	-	-	.059
Interest Nutrition	.219	.897	
mHealth Experience	.759	.902	
EDE-QS	.691	.754	
Gender	2.396	1.976	
Predictor 1	-	-	.055
Bandwagon Perception	4.272*	1.688	
Predictor 2	-	-	0
Perceived Similarity	.008	.980	

different role when interventions target eating disorders such as anorexia and bulimia than when the target is obesity interventions.

Given the limitations that might have ensued on our identity manipulation, future research should assess this cue and its interaction with bandwagon effect further. Social modeling research does suggest that imitation is stronger when others are perceived as similar, thus it might be that a different identity manipulation or making it more visible might change how the cue is perceived.

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