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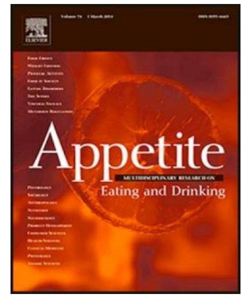

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Social modeling of food intake: The role of familiarity of the dining partners and food type

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Running title: Social modeling and food intake

Highlights:

- Modeling is observed in dyads composed of friends and dyads composed of strangers.
- Social modeling of food intake is similar whether eating partners are eating the same versus different high-energy snack foods
- Social modeling is a robust phenomenon

ABSTRACT

In a social eating context, people tend to model the food intake of their dining companions. In general, people tend to eat more when their dining companion eats more and less when their eating companion eats less. In the present paper we investigate 1) whether familiarity of dining partners affects modeling and 2) whether modeling is affected by whether familiar partners consume the same versus different foods. In both studies, female dyads completed a task together whilst having access to high energy dense snack foods. Modeling was observed regardless of the familiarity of the dining partners and food types consumed. These findings confirm that social modeling of food intake is a robust phenomenon that occurs even among familiar dining partners and when partners are consuming different types of snack food.

Introduction

Human eating is a highly complex behavior that is the outcome of the integration of many different inputs, including sensory, somatic, affective, contextual and socio-cultural information (Higgs 2005). Social factors have attracted significant interest recently and this is not surprising because food and eating are intertwined with our social lives (Robinson et al. 2013). It has been reported that individuals model the food intake of their eating companions, such that they tend to eat more when others eat more and less when others eat less (Herman, Roth, & Polivy, 2003). This phenomenon, known as social modeling of food intake, is so powerful that Goldman, Herman, and Polivy (1991) reported that participants ate minimally in the presence of a low-intake model, even when participants had been food-deprived for 24 hours.

The effects of modeling on food intake are well documented but the mechanisms underlying these effects remain unclear. Because many meals are eaten in a social context, even from early childhood, understanding the mechanisms underlying social influences on eating may be helpful in the development of new more effective strategies to promote healthy eating behaviors. Herman and colleagues (2003) proposed a normative model of social influence on eating, which suggested that external cues play a significant role in determining people's eating behavior. Thus, in a social context, people may use the intake of others as an example of appropriate eating and adjust their own food intake accordingly.

One motivation underlying modeling may be the desire to avoid the appearance of eating excessively (Herman et al. 2003). There are negative stereotypes associated with eating to excess (Vartanian et al. 2007), which may be avoided in a social situation if one does not eat more than do others. This desire to avoid looking like one is overconsuming may result in modeling of a companion's intake, especially in situations where there is uncertainty about what constitutes an appropriate amount to eat. The provision of clear normative information about the eating of others has been reported to provide a brake on consumption (Leone et al. 2007). Hence, there is evidence that when people are uncertain of how much they should eat, they model their eating companions to ensure that they do not appear to be eating too much.

It has also been proposed that modeling of food intake is driven at least in part by basic processes related to the links between perception and action (Robinson et al. 2011). This idea is based on the finding that perceiving another person's movements activates one's own motor programmes for the same movements, which promotes imitative actions (Iacoboni et al. 1999). It is possible that as people eat together, their movements become synchronized regardless of other salient goals or intentions (Cook et al. 2011) and this explains why dyadic partners model each other's eating. In support of this idea, video analysis of eating partners has confirmed a link between initiation of eating by one partner and a similar action by their eating companion (Hermans et al. 2012). Hermans and colleagues (2012) found that modeling was more likely within 10 seconds of a model picking up food, which is consistent with the suggestion that modeling effects may be driven in part by mechanisms linking perception with action (Chartrand & van Baaren, 2009; Dijksterhuis & Bargh, 2001).

Another factor that may underlie social modeling of food intake is that it serves to ease social interactions (Hermans, Engels, Larsen, & Herman, 2009; Robinson, Tobias, Shaw, Freeman, & Higgs, 2011; Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007). Hermans et al. (2009) found that participants modeled their dining partner's intake but only in the condition where the partner (a confederate of the experimenter) was acting in an unsociable manner, whereas in the situation where participants were exposed to a friendly confederate, no modeling was observed. Robinson and colleagues (2011) also found that in the presence of a high eating confederate, modeling decreased when participants were primed to feel socially accepted, suggesting that modeling is in part driven by affiliation concerns.

Most studies on modeling have been conducted with participants who do not know each other (e.g. Goldman et al. 1991; Hermans et al 2009, 2010; for a review see Cruwys et al. this issue) and only a small number of studies have examined modeling among both friends and strangers (Salvy, Vartanian, Coelho, Jarrin, & Pliner, 2008; Salvy et al. 2007). Research on children aged 5-11 showed that modeling of food intake was extremely high among strangers, but low and not significant among siblings (Salvy et al., 2008). In contrast, Salvy et al. (2007) did not find a difference in the degree of intake modeling in dyads of adult strangers and friends. Howland and colleagues (2012) have reported recently that a low intake norm set by friends resulted in the consumption of fewer cookies, both during a social interaction and immediately after, but the authors did not compare the responses of friends and strangers.

Our aim here is to further investigate modeling effects in dyads composed of friends versus strangers to shed more light on the role of dyad relationships in modeling effects and provide more insight about possible underlying mechanisms of social modeling. In Study 1, we compared the degree of modeling of food intake in natural dyads of friends and strangers using a free eating paradigm. If modeling of food intake is used as a strategy to gain social approval, then it might be expected that the degree of modeling would differ between friends and strangers because of the greater importance of ingratiation concerns when eating with a stranger than when eating with someone who knows one well (Jones & Pittman, 1982). On the other hand, if modeling is more motivated by concerns about avoiding eating to excess or is the result of behavioural mimicry, then we might expect to see no difference in modeling as a function of familiarity with an eating partner.

A question that has yet to be investigated is how modeling effects are influenced by the type of food consumed by dyadic partners. In modeling studies, the foods provided have been the same for both partners, but in real eating situations we may consume different foods than our dining companions do and it is unclear whether modeling would occur in this scenario. Although other studies have examined modeling of food choices where a number of foods are available for selection (Hermans et al. 2010; Robinson and Higgs, 2013), to our knowledge, there has been no examination of modeling of food intake when participants are provided with one food to consume but this is not the same food as that provided to their partners. If we use the intake of another as a specific guide to appropriate intake, then consumption of different foods should undermine modeling because what your partner eats is a less useful guide if she is eating something different. Alternatively, the food type may matter less if modeling is driven by a general rule about not eating excessively, as suggested in the normative model of eating (Herman et al. 2003).

In Study 2, we examined whether eating the same or different snack food influenced the degree of modeling of food intake in natural dyads of friends who had access to snack food whilst completing a problem solving task. To the best of our knowledge, this is the first study that examines whether food type is an important factor that can influence the levels of modeling of food intake. We hypothesized that the degree of modeling might be stronger between co-eaters who had access to the same food than between co-eaters who had access to different food because in this case the partner's eating would provide both a specific and general cue about appropriate consumption.

Study 1

Materials and methods

Participants

One hundred and ten female participants from the University of Birmingham were recruited in exchange for course credit (mean age = 18.8 yrs, s.d. = 1.0). BMI was within the normal range (mean BMI = 22.1 kg/m^2, s.d. = 3.1). We tested only female participants because our sample was taken from a largely female population (undergraduate psychology students). Participants gave informed consent and the study protocol was approved by the University of Birmingham Research Ethics Committee.

Design

The independent variable in the study was whether the dyad was made up of friends or strangers and the dependent variable was the degree of modeling of food intake. To reduce demand characteristics, the study was advertised as research examining mood and social interaction. Participants signed up for sessions online either with a friend or individually. Participants who signed up individually were paired with another participant by the experimenter to form the stranger dyads.

Snack food

Across both conditions, participants had access to the same snack food (chocolate minstrels) during the testing sessions. A bowl of 100g of minstrels was provided to each participant within a dyad (approximately 37 pieces of minstrels; 505 kcal per 100g), so that the bowl was close to being full.

Measures

The relationship between the eating partners was assessed through the use of a social interaction questionnaire [2 questions; ‘’How well do you know your partner in the study?’’(6-point Likert scale, possible answers: I have never seen her before, I recognize her but we have never spoken, We have spoken a few times, We sit together in lectures but do not socialize outside the lectures, We are friends, We live together), ‘’How comfortable did you feel around your partner?’’ (8cm long horizontal scale, anchors; ‘’Not at all’’ and "Extremely")].

Procedure

Sessions took place between 2pm and 6pm on weekdays. When the participants arrived at the reception of the lab facilities, they were greeted by the experimenter and were taken to a room where they were seated at opposite ends of a small table before being asked to complete demographic questionnaires and a mood/appetite questionnaire, the aim of which was to corroborate the cover story and provide a baseline measure of appetite. Mood and appetite items (calm, anxious, excited, upset, tired, hungry, thirsty, stressed) were rated using a 10 cm visual analogue line rating scale (VAS) with “Not at all” and “Extremely” as end anchors and the question “How…do you feel right now?” (centered above the line scale). The experimenter then returned and instructed participants that for the next part of the experiment they were each required to answer a set of questions related to a poster titled “A student’s guide to: Being green”. A copy of the poster and a question sheet were then provided to each participant and the experimenter asked participants to provide written answers to all the questions and then discuss their answers with each other. Before leaving, the experimenter placed two bowls of chocolate minstrels, one next to each participant, and informed the pair that they could eat during the task if they felt like it. Participants were left for ten minutes to complete the task.

On completion of the task, the experimenter removed the bowls of minstrels and the participants were asked to complete the same hunger and mood rating scales as described earlier as well as the Three Factor Eating Questionnaire, to check for differences in eating habits between groups (Stunkard & Messick, 1985), and a snack liking scale (8cm long horizontal scale, anchors; "Not at all" and "Extremely"), to check for differences in acceptability of the snacks. Finally, participants were asked to guess the aims of the study, before weight and height were measured using electronic digital scales and a stadiometer to calculate BMI. Intake was measured by weighing and then counting the remaining pieces of minstrels in the separate bowls.

Analysis

To examine overall intradyadic similarity (the degree of modeling of food intake within dyads) intraclass correlation coefficient (ICCs) were used. ICCs were computed using a one-way random model. Fisher r-to-z transformation was used to assess the significance of the difference in the degree of modeling between the two experimental conditions. T-tests were used to examine whether the two experimental groups were matched for hunger ratings at the start of the session (baseline hunger), BMI, age, cognitive disinhibition (TFEQ), cognitive restraint (TFEQ) and Hunger (TFEQ). The mean difference within dyads was calculated for the two experimental conditions. Any differences within the dyads for the liking of the snack foods were also assessed for the two experimental conditions. Statistical significance was set at $p<0.05$. Data were analyzed using SPSS version 20.0 software (SPSS Inc., Chicago, IL).

Results

Thirty-one pairs of friends and twenty-four pairs of strangers completed the study. Six participants indicated that they had guessed the aims of the experiment and so the data for those dyads were excluded from the final analysis. In total, data from twenty-nine pairs of friends and twenty pairs of strangers were analysed. On average, participants in the friends condition scored 4.23 on the six-point Likert scale for familiarity, whereas participants in the strangers condition scored significantly less 0.45 ($t(54)= -27.67$, $p<0.001$), suggesting that participants in the friend condition knew each other much better than did participants in the stranger condition. In addition, participants in the friends condition reported that they felt significantly more comfortable (7.0 ± 0.9) around their partner during the testing session than did the participants in the strangers condition (5.6 ± 1.2) ($t(88)= - 6.16$, $p<0.001$). Participants in the friends condition consumed on average 32 g of minstrels (s.d.= 23.6) (12 minstrels), whereas participants in the strangers condition consumed significantly less; 18.5 g of minstrels (s.d. = 15.8) (7 minstrels) [$t(96)= -3.1$, $p=0.002$]. Ten participants did not consume any of the snack food. Of these ten participants, seven non-eaters were in the stranger condition and three were in the friend condition.

Participant characteristics

Table 1 shows participant characteristics by experimental condition. These potentially confounding variables did not differ significantly between conditions. Specifically, a t-test showed that the difference between partners was similar across the two experimental conditions for BMI ($t(47)= -0.88$, $p = 0.39$), baseline hunger ($t(40)= 0.39$, $p = 0.70$), restraint ($t(47)= 1.84$, $p = 0.07$), disinhibition ($t(31)= 0.80$, $p = 0.43$), hunger ($t(47)= 1.22$, $p = 0.23$) and liking of the snack food ($t(38) = -0.2$, $p = 0.84$) (see Table 2). The age difference between the eating partners was significantly greater in the stranger condition than the friend condition although the actual difference was less than one year on average ($t(23)= 2.42$, $p = 0.024$). Insofar as age similarity is found among friends, it is to be expected that friends who signed up together to take part in the study would be closer in age than would participants who signed up individually and were paired with a stranger.

Modeling

The overall degree of modeling within dyads was high, with an intradyadic correlation of 0.86 (df = 49, $p < 0.001$). In the friends condition (n=29) the correlation was 0.82 (df = 29, $p < 0.001$), whereas in the strangers condition (n=20) the correlation was 0.92 (df = 20, $p < 0.001$). The difference these two correlations coefficients was not significant ($Z = -1.39$, $p =0.16$).

The presence of a non-eating observer has been reported to have an inhibitory effect on eating and so we re-ran the analysis with and without the non-eaters (Conger et al., 1980). When we removed the non-eaters from the analysis the pattern of the results did not change. The overall degree of modeling within dyads was high, with an intradyadic correlation of 0.82 (df = 43, $p < 0.001$). In the friends condition (n=27) the correlation was 0.79 (df = 27, $p < 0.001$), whereas in the strangers condition (n=16) the correlation was 0.89 (df = 16, $p < 0.001$). The difference between these two correlations coefficients was not significant ($Z = -1.02$, $p = 0.31$).

Study 2

Materials and methods

Participants

Eighty-two female participants (undergraduate students from the University of Birmingham) were recruited in pairs of friends in exchange for course credit (mean age = 19.4 yrs, s.d. = 0.1). BMI was within the normal range (mean BMI = 22.8, s.d. = 2.7). Participants gave informed consent and the study protocol was approved by the University of Birmingham Research Ethics Committee.

Design

A between-participants design was used, with participant pairs randomly assigned to one of two experimental conditions: partner eating the same food versus partner eating a different food. Across both conditions, pairs of friends were tested. Participants were informed that the study was investigating “The effect of food-type on problem solving”.

Snack foods

In the same food condition both participants had access to chocolate minstrels during the testing session, whereas in the different food condition one participant had access to chocolate minstrels and the other participant has access to mini-cheddars (a savory snack). The quantity of the snack foods provided was the same across both conditions and did not differ between the minstrels and the mini cheddars (30 items of snack food). The quantity was chosen to permit enough eating in the time frame of the ten minutes that the testing session was planned to last. These snack foods were chosen because they are widely liked and typically eaten as snacks. In addition, they have almost the same energy density (chocolate minstrels: 503 Kcal per 100g, mini-cheddars: 522 kcal per 100g) ensuring that any differences in food intake between the two participants within a pair are not due to differences in the energy density of the provided food items.

Measures

A familiarity questionnaire was administered to ensure that no strangers took part in the study [3 questions included; "How long have you known the other person taking part in the study?" (open question; no answers provided), "How often do you see the other person taking part in the study?'' (Possible answers: Every day, Once a week, Twice a week, Once a month, Occasionally, Rarely) "What is your relationship with the other person taking part in the study?" (Possible answers: Housemate, Close Friend, Friend, Acquaintance, Just go to lectures with them, Strangers)].

Procedure

Sessions took place between 10 am and 12 pm or 2 pm and 4 pm, when snack foods are typically eaten. Both participants were met in the reception of the lab facilities by the experimenter and were accompanied to two different rooms where they were asked to read an information sheet about the study. After reading the information sheet and completing demographics, participants completed the hunger rating scale and a set of 3 rating scales assessing mood e.g. “how relaxed do you feel right now” as a cover for the aims of the study (100mm horizontal scale, anchors; “Not at all” and “Extremely”).

Participants were then informed that they would complete the problem-solving task (the game called hangman) together and were led into a testing room with a desk and two chairs either side of the table to create a comfortable environment. Participants received instructions for the game and the experimenter also explained that this is a paper and pencil word guessing game in which one player tries to work out a word by guessing individual letters one at a time. Each participant in the dyad was given ten celebrity names, for example “Jennifer Aniston”, a pen and a sheet of A4 paper to write on and they were then informed that they had ten minutes to play as many games as they liked. The experimenter then left two bowls of the snack foods (one in front of each participant) in reaching distance only to that individual to avoid sharing. Each bowl was pre-weighed and contained 30 items of the snack food (either chocolate minstrels or mini-cheddars) so that the bowl was close to being full. Before leaving, the experimenter told the participant that if she felt like eating any she should feel free to do so from her own bowl.

After ten minutes the experimenter returned to the testing room and removed the hangman materials and the bowls. The intake of each participant was calculated by weighing the remaining snack food in their bowl. Participants were then again taken to separate rooms to complete the hunger and mood rating scales as described earlier. At this point, participants were also asked to complete the Three Factor Eating Questionnaire (Stunkard & Messick, 1985), ratings of the palatability of the snack foods (5 possible responses on a Likert scale; 1 = disagree strongly, 2 = disagree somewhat, 3 = neutral, 4 = agree somewhat, 5 = agree strongly) and the familiarity questionnaire. They were then asked separately what they believed the purpose of the experiment was. Finally, weight and height were measured, using electronic digital scales and a stadiometer to calculate BMI (kg/m^2).

Analysis

To examine overall intradyadic similarity (the degree of modeling of food intake within dyads) intraclass correlation coefficient (ICC's) were used. ICCs were computed using a one-way random model. Fisher r-to-z transformation was used to assess the significance of the difference in the degree of modeling between the two experimental conditions. t-tests were used to examine whether the two experimental groups were matched for hunger ratings at the start of the session (baseline hunger), BMI, age, cognitive disinhibition (TFEQ), cognitive restraint (TFEQ) and Hunger (TFEQ). The mean difference within dyads was also calculated for the two experimental conditions. Statistical significance was set at $p<0.05$. Data were analyzed using SPSS version 20.0 software (SPSS Inc., Chicago, IL).

Results

On average, participants answered that they had known their eating partner for almost 1 year (s.d. = 0.9). 85.4% of the participants reported that they see their eating partner on a daily basis and 14.6% once or twice a week. None of the participants reported any other of the possible answers (once a month, occasionally, rarely). 61% of the participants characterized their eating partner as a close friend, 33% as an acquaintance and 6% reported that their eating partner was a housemate. On average, participants ate 8 food items (s.d.= 5.8) in the same snack food condition and 10 food items (s.d. = 7.1) in the different snack food condition. Six participants did not consume any of the snack food. Of these six participants, three non-eaters belonged to the same snack food condition and three to the different snack food condition.

Participant characteristics

Table 3 shows participant characteristics by experimental condition. These potentially confounding variables did not differ significantly between conditions. Specifically, a t-test showed that the difference between partners was similar across the two experimental conditions for BMI (t(39)= -0.1, p = 0.91), age (t(39)= -1.4, p = 0.16), baseline hunger (t(39)= 1.8, p = 0.08), restraint (t(39)= 0.75, p = 0.46), disinhibition (t(39)= -0.42, p = 0.68) and hunger (t(39)= -1.4, p = 0.18) (see Table 4). Participants' palatability ratings of the snack foods differed more in the different snack food condition that in the same snack food condition (t(39) = -2.2, p = 0.04).

Modeling

The overall degree of modeling within dyads was moderate, with an intradyadic correlation of 0.67 (df = 41, $p < 0.001$). In the same snack food condition (n=19) the correlation was 0.52, which was only marginally significant (df = 19, p = 0.063), whereas in the different snack food condition (n=22) the correlation was 0.74 (df = 22, p = 0.002). The difference between these two correlation coefficients was not significant (Z = -1.1, p = 0.27).

When we removed the non-eaters from the analysis the pattern of the results did not change. However, the intradyadic correlation in the same snack food condition (n=16) became significant (r = 0.58, df = 16, p = 0.047). The overall degree of modeling within dyads remained moderate, with an intradyadic correlation of 0.66 (df = 35, p = 0.001). In the different food condition (n=19) the correlation was 0.67 (df = 19, p = 0.010). The difference between the degree of modeling in the two experimental conditions was not significant (Z = -0.4, p =0.69).

Discussion

Studies on social modeling of food intake have shown consistently that individuals tend to eat more when others eat more and eat less when others eat less (Herman et al., 2003). The aim of the present study was to investigate whether the type of relationship between co-eaters and the type of food consumed affects modeling. We found that young women modeled the food intake of their eating companion whether the companion was a friend or a stranger and whether that companion was eating the same or a different snack food. These findings are in agreement with the results of the other similar studies and taken together the data suggest that modeling of food intake is a robust phenomenon (Herman, Koenig-Nobert, Peterson, & Polivy, 2005; Herman et al., 2003; Robinson et al., 2011; Rosenthal & Marx, 1979; Rosenthal & McSweeney, 1979).

In Study 1, we found similar modeling effects regardless of whether the dyadic partners were familiar with each other or not. This result cannot be explained by the fact that we failed to recruit friends versus strangers, because the friend dyads were significantly more familiar with each other than were the stranger dyads. The groups were also matched on other characteristics and so it is also unlikely that factors such as age, BMI, dietary restraint and hunger masked any differences between the groups. However, we note that recruitment was different for friends and strangers. Friends signed up together in pairs, whereas strangers were paired by the experimenter. As a result of the recruitment process there could have been differences in the psychological characteristics of the dyads of friends and strangers that we did not assess, and these factors might have had a significant influence on modeling. For example, participants who signed up alone (strangers) might have been less concerned about impression management than participants who signed up in pairs (friends). It is possible that had we been able to randomly allocate participants to the friends versus strangers condition, differences between the two groups in modeling might have emerged. Although modeling effects have been reported to be stronger in siblings versus strangers, other studies have found similarly strong modeling in both friends and strangers (Salvy et al. 2007).

The lack of difference between the friends and strangers in modeling might be taken to suggest that affiliation concerns are not a main driver of modeling effects because affiliation concerns would be expected to be greater for strangers than for friends (Jones & Pittman, 1982). Our present results might suggest that processes such as behavioural synchronization play a more important role in social modeling of food intake than do affiliation concerns. Perhaps the participants were mirroring each other's eating actions because observation of these actions triggered activation in the motor neuron system of the observer and facilitated imitative behavior (Iacoboni et al. 1999; Rizzolatti & Craighero 2004). However, it is also likely that there was a degree of uncertainty about how much to eat in the experimental situation and so all participants, friends and strangers, looked to each other as a guide for appropriate eating (Herman et al. 2003).

In Study 2, modeling of food intake was found in the overall sample, which confirms that modeling is a robust phenomenon even among friends. However, no significant difference in the degree of modeling was found between eating companions who had access to the same type of snack food and those who had access to different snack foods. This result suggests that participants may use the eating of a partner as a general guide for appropriate eating even when the foods are not the same. These data are also consistent with the idea that the main motive in these eating situations is to avoid appearing to eat excessively rather than modeling the amount eaten of a specific food type (Herman et al.

2003). Modeling could arise if there is uncertainty about the appropriate portion size for a particular food. In this case, modeling should be specific to a food type. However, it may be that underlying modeling is a more general concern about not appearing to eat to excess, in which case, regardless of the food type, a person may follow a general eating norm that is set by their eating companion (e.g. consumption of a certain proportion of a serving of food or not having a second helping). Taken together, the results of Study 1 and Study 2 are supportive of the normative model of eating (Herman et al. 2003)

The finding that modeling effects are robust among friends suggests that they may occur in friendship groups outside of the lab, thus offering a mechanism for how friendship networks might influence weight (Christakis & Fowler, 2007). This suggests that modeling of healthy eating could be target for intervention to improve dietary habits even in groups of people known to each such as families and peers (Bevelander et al., 2012, 2013).

Some limitations of the present study should be noted. We assessed modeling in young women from the same social group in a setting involving completion of a secondary task, the purpose of which was to disguise the aims of the study. It would be informative to examine modeling effects in a wider range of participant groups and settings. In addition, it is possible that modeling effects are strong but variations in modeling due to factors such as familiarity with one's dining companion and the food types eaten are weak and much larger sample sizes are required to detect significant effects. Although the existing evidence does not support modeling of food intake in males (Salvy et al. 2007; Hermans, Herman, Larsen, and Engels 2010) the reasons for this are unclear. Men may have a greater drive for distinctiveness than women, which leads to nonconformity in eating (Cross & Madson, 1997). On the other hand, it might be that women may possess greater interests in facilitating positive social bonds than do men (Eagly & Carlie 1981). The foods used in Study 2 were both high energy dense snack foods and so we cannot rule out that less modeling would have occurred if participants were consuming very different food types e.g. high versus low energy dense items. It would be interesting for future studies to investigate whether individuals match their co-eater's food intake by choosing to consume the same type of food as their partner or whether it is the total amount of food consumed that is matched between eating partners. Future studies might benefit from using a modeling paradigm to examine social influence on food intake from a buffet, rather than from a single snack food. If modeling effects for fruit and vegetables are found to be as strong as modeling effects for energy-dense snacks, then new interventions could be developed to promote their consumption.

In conclusion, modeling of food intake was found across two studies. The fact that modeling was observed for both friends and strangers and regardless of the type of food that was available for consumption adds to the literature suggesting that it is a robust phenomenon.

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Table 1 Participant characteristics by experimental condition

	Friends condition (n=29)	Strangers condition (n=20)
	Mean ± Standard Deviation	Mean ± Standard Deviation
BMI (kg/m^2)	22.0 ± 3.0	21.9 ± 3.2
Age (years)	18.6 ± 0.8	18.9 ± 1.1
Baseline hunger (0-8cm scale)	3.7 ± 1.7	3.2 ± 2.2
Restraint (TFEQ) (0-21 scale)	8.3 ± 5.8	8.8 ± 5.7
Disinhibition (TFEQ) (0-16 scale)	6.9 ± 2.9	7.9 ± 3.3
Hunger (TFEQ) (0-14 scale)	6.5 ± 3.2	7.8 ± 3.7
Liking of snack food (0-8cm scale)	6.3 ± 1.5	5.9 ± 1.8

Table 2 Mean differences within dyads concerning potential confounding factors: Comparison between the two experimental conditions

	Friends condition (n=29)	Strangers condition (n=20)
	Mean Difference within dyads ± Standard Deviation	Mean Difference within dyads ± Standard Deviation
BMI (kg/m^2)		

	3.5 ± 3.1	2.7 ± 2.8
Age (years)	0.2 ± 0.4	0.8 ±1.0*
Baseline hunger (0-8cm scale)	1.9 ± 1.2	2.0 ± 1.2
Restraint (TFEQ) (0-21 scale)	4.8 ± 4.5	7.3 ± 5.2
Disinhibition (TFEQ) (0-16 scale)	3.5 ± 2.2	4.2 ± 3.3
Hunger (TFEQ) (0-14 scale)	2.7 ± 2.4	3.7 ± 2.9
Liking of snack food (0-8cm scale)	1.3 ± 1.1	1.2 ± 1.2

* Indicates significant difference between the two experimental conditions

Table 3 Participant characteristics by experimental condition

	Same snack food condition (n=19)	Different snack food condition (n=22)
	Mean ± Standard Deviation	Mean ± Standard Deviation
BMI (kg/m^2)	22.1 ± 2.7	22.6 ± 3.7
Age (years)	19.2 ± 1.0	19.5 ± 1.0
Baseline hunger (0-100mm scale)	39.9 ± 27.5	38.8 ± 24.8
Restraint (TFEQ) (0-21 scale)	9.6 ± 6.3	7.9 ± 5.2
Disinhibition (TFEQ) (0-16 scale)	5.9 ± 2.8	6.7 ± 3.4
Hunger (TFEQ) (0-14 scale)	5.6 ± 2.8	6.3 ± 3.5
Palatability of snack food (1-5 Likert scale)	4.1 ± 0.6	4.1 ± 0.8
Familiarity (years)	0.8± 0.8	1.1± 1.0

Table 4 Mean differences within dyads concerning potential confounding factors: Comparison between the two experimental conditions

	Same snack food condition (n=19)	Different snack food condition (n=22)
	Mean Difference within dyads ±	Mean Difference within dyads ±

	Standard Deviation	Standard Deviation
BMI (kg/m^2)	3.3 ± 2.5	3.4 ± 3.2
Age (years)	0.4 ± 0.5	0.7 ± 0.6
Baseline hunger (0-100mm scale)	33.5 ± 23.5	22.0 ± 17.4
Restraint (TFEQ) (0-21 scale)	7.1 ± 5.4	6.0 ± 4.4
Disinhibition (TFEQ) (0-16 scale)	3.5 ± 2.8	3.9 ± 3.0
Hunger (TFEQ) (0-14 scale)	2.9 ± 2.1	4.0 ± 3.1
Palatability of snack food (1-5 Likert scale)	0.6 ± 0.6 *	1.1 ± 0.8 *

* Indicates significant difference between the two experimental conditions