Social modeling of food choices in real life conditions concerns specific food categories

Garcia, Armelle; Hammami, Alya; Mazellier, Lucie; Lagneau, Julien; Darcel, Nicolas; Higgs, Suzanne; Davidenko, Olga

DOI:
10.1016/j.appet.2021.105162

Social modeling of food choices in real life conditions concerns specific food categories.

Armelle Garcia[1], Alya Hammami [1,2], Lucie Mazellier[1], Julien Lagneau[1], Nicolas Darcel[1], Suzanne Higgs[2], Olga Davidenko[1]

[1] Université Paris-Saclay, AgroParisTech, INRAE, UMR PNCA,75005, Paris, France

[2]School of Psychology, University of Birmingham, Birmingham B15 2TT, United Kingdom

Abstract

The social context of eating has a profound effect on consumption choices. Social modeling, that involves using others' behavior as a guide for appropriate consumption, has been well documented for food intake, but less is known about social modeling of food choices. Moreover, social modeling has mainly been studied in laboratory settings. We conducted an observational study in a self-service canteen to examine whether the food choices of an individual were influenced by the choice of the person ahead in the queue. We recorded food choices of 546 individuals (333 men and 211 women) and those of the person in front of them in the queue along a linear buffet. Starters were sub-categorized into salads, mixed starters (e.g. avocado shrimp mayonnaise), and cold meat starters, and desserts were sub-categorized into fruits, dairy products and pastries. There was a significantly higher probability of taking a starter in general (OR=1.65, IC=1.06-2.57, p=0.03), a salad (OR= 1.78, CI= 1.08-2.93, p= 0.02), a mixed starter (OR= 2.98, CI= 1.42-6.05, p<0.01), but not a cold meat, if the person ahead in the queue also took one compared to when the person ahead did not take one. No significant modelling was found for desserts which may be because almost all participants took a dessert. These results highlight that social modeling influences food choices, and that this phenomenon can be observed in a real life setting. These data also suggest that some food categories, such as starters, could be more susceptible to social modeling than are others. Finally, we observed modeling both between familiar and unfamiliar participants, which suggests that social norms could be used to promote healthier eating in a range of settings including friendship groups.

Key words: social modeling, food choice

Introduction

Eating is a complex social event, and the social context during a meal can have multiple influences on food intake. For instance, it has been demonstrated that the quantity of food consumed increases when eating with familiar others compared to eating alone, which is known as the social facilitation of eating (de Castro & Brewer, 1992). However, not only the mere presence of others, but also their consumption can have an impact on intake. Indeed, it has been shown that individuals adjust the amount of food eaten to the quantities consumed by their commensals (Vartanian et al., 2015). This phenomenon is called social modeling and involves using others' eating behavior as a norm, for instance as an indicator of the appropriate amount of food to consume in a given situation. Social modeling appears to be very robust because it has been observed in both men and women (Cruwys et al., 2015) (with some evidence of a stronger effect for women (Herman & Polivy, 2010)), when eating with both familiar and unfamiliar partners (Cruwys et al., 2015; Kaisari & Higgs, 2015; Salvy et al., 2007; Vartanian et al., 2015), and independently of weight status (Rosenthal & Marx, 1979) and state of hunger (Goldman et al., 1991). Additional studies have demonstrated that social modeling can occur even in the absence of others, when participants are provided information regarding the quantity of food consumed by previous eaters ("remote confederate" studies) (Robinson, Benwell, et al., 2013; Vartanian et al., 2013). In such studies, a norm of consumption is established via descriptive norms, which can be indirectly conveyed, e.g. via the presence of empty packaging, or conveyed via messages that report the consumption patterns of a majority of individuals (social-norm based messages).

While social modeling of food intake is well established, less is known about social modeling of food choices. Two reviews (Cruwys et al., 2015; Robinson, Thomas, et al., 2013) examined the literature on the impact of social modeling on food intake and choices, and both concluded that the available data is insufficient to draw conclusions about the robustness of the effect on food choices. Indeed, among 69 studies reviewed by Cruwys, Bevelander and Hermans (2015) on social modeling, only 11 examined modeling of food choices, among which 8 succeeded in observing the phenomenon. However, 3 studies did not find significant modeling effect (Hendy & Raudenbush, 2000; Pliner & Mann, 2004). For instance, Pliner and Mann (2004) reported social modeling of food intake but not of food choices. These authors suggested that food choices may be less influenced by others' behavior than intake because individuals feel surer about their food likes and dislikes than the appropriate amount of food to consume in a given situation.

Pliner and Mann (2004) were also interested in the impact of food healthfulness on modeling, and they observed social modeling of intake for "unhealthy" (high energy density) cookies but not for "healthy" (low energy density) ones. To date, little is known about the strength of social modeling effects on "healthy" food items because the majority of studies have been done using high energy density food items and only a small number of studies have focused on modeling of low energy density food items. In a study by Hermans *et al.* (2009), social modeling of quantities of low energy density food (vegetables) was observed, but investigations of the social modeling of food choices of low *versus* high energy density food has been limited. Robinson and Higgs (2013) found that participants were less likely to choose low energy density food items when eating with a participant making "unhealthy" choices, than when eating alone or in the presence of a participant making "healthy" choices (Robinson & Higgs, 2013). Thus, social modeling of food choices was observed, but this influence was only present in the "unhealthy" condition. In another study conducted by Burger and colleagues, participants were led to believe that previous participants took either a "healthy" or an "unhealthy" snack through the provision of a descriptive norm (empty packaging) before having to make their own choice. Participants were more likely to choose the snack they believed others had chosen, both in the "unhealthy" and "healthy" norm conditions (Burger et al., 2010).

One feature of these studies is that they were conducted in a laboratory setting, which leaves open the question of whether the modeling of food choices occurs in real-life situations. To date, one study investigated modeling of choices in real life conditions, but this study was focused on modeling of vegetarian versus non-vegetarian dishes (Christie & Chen 2018). Further research is needed to better characterize the effect of social modeling of food choices in real-life conditions, especially for meals composed of a broad range of food items including low and high energy density food items. In addition, there are other factors which could impact modeling effects in real life settings that are often not present in laboratory studies. For instance the majority of studies conducted in the laboratory included subjects paired with strangers, whereas in real life situations people are likely to eat with familiar others. To date, only a few studies have examined modelling among familiar participants, but the results suggest that modeling may occur both with familiar and unfamiliar individuals (Cruwys et al., 2015; Kaisari & Higgs, 2015; Salvy et al., 2007; Vartanian et al., 2015). Further investigations are needed to confirm these preliminary results and examine whether familiarity moderates modeling observed in real life settings.

The aim of the present study was to determine whether modelling of food choices can be observed in a real-life setting (a university self-service restaurant), examine whether modelling exists across a range of food categories (defined using consumer perception of the nutritional quality of the items) and whether familiarity with the person that serves as a model moderates any effects.

Methods

Restaurant Venue

The study took place at the employee restaurant of a university campus (Paris, France). The restaurant serves almost 500 clients per day for lunch service. Ethical approval for the study was obtained from the ethics committee of Paris-Saclay University (registration number CER-Paris-Saclay-2019-016). Data collection took place on two Thursdays (one of the busiest days of the week) during spring, from 12pm to 2pm. Clients were able to choose a main dish plus two additional items for their meal, meaning they could choose one starter and one dessert, or two starters or two desserts. The price of the meal remained the same, no matter which items were chosen. Food choices varied from day to day but were always structured in the same way. Starters included a variety of raw vegetables, mixed salads (such as pasta or potato salads with cheese), meat or fish, and cold meats. The desserts included a variety of items including dairy products (different types of yoghurts, dairy desserts and cheeses), but also fresh fruits, fruit salads, fruit compotes and different type of pastries. Finally, the main dish offered usually included a choice between fish or meat and one or two types of sides (starches and vegetables). We decided to focus our analysis on the choices of starters and desserts only, because these courses offered a higher diversity and choice than the main dishes at the restaurant.

We sub-categorized starters into salads, mixed starters, and cold meats, and desserts into fruit, dairy products and pastries (more details about food items included in subcategories are available in supplementary file 1). These food categories were decided upon according to their perceived healthiness by consumers. This perceived healthiness was assessed via an online questionnaire completed by 118 individual (mean age of 42 years old). Participants were asked to rate each item from 0 (unhealthy) to 8 (healthy). Detailed results are available in supplementary file 2.

Data collection procedure

Upon arrival at the restaurant, clients had to follow a linear queue along the buffet to choose their lunch items. This linear configuration of the buffet was a crucial criterion for the choice of venue for the study because it ensures that each client had to follow the same person all along the buffet. The clients first had to choose a starter, then a dessert, and last the main dish. Two experimenters were positioned at the cash register, behind the cashier, from where they had a clear view of the meal trays, but were not seen by the clients in the queue so as not to influence their choices. The choices of each client were recorded by the two experimenters. A third experimenter distributed individual questionnaires to each client after the cash register. The aim of these questionnaires was to collect demographic and contextual information from the clients. Finally, a fourth experimenter collected individual questionnaires at the exit of the restaurant. An identification number was associated with each client so that their food choice could be paired to the individual questionnaire, as well as to identify who was following who. We did not record data on the clients who did not follow anyone in the line (which typically happened at the very beginning and the very end of the lunch service).

Questionnaires

Two questionnaires were used during data collection. First, a food choice questionnaire was completed by the experimenters for each client upon their check out at the cash register. This questionnaire contained all food item options that were on sale the day of each data collection session. Second, the individual questionnaire was distributed to the clients for self-assessment after they paid for the meal. The individual questionnaire included questions about age, gender and Body Mass Index (BMI) of the participant, and contextual information: whether or not they knew the person ahead in the queue, whether they ate with that person, whether they were following a specific diet involving food exclusions, and what were their usual food choices at the canteen (whether they usually take a starter, a dessert, or both), and finally whether they thought that others' choices influenced their own choices.

Study population

The food choices of 797 clients were collected over two days of data collection separated by one and a half months. We excluded 110 individuals who reported following a specific diet involving food exclusions e.g. vegetarian. We also excluded observations of 141 individuals who did not return the individual questionnaires, or returned incomplete questionnaires. The final sample comprised 546 individuals.

<u>Statistical analysis</u>

The choice of each food item, sub-category and category was coded as a binary variable (chosen as 1, not chosen as 0). Binary logistic regressions were used to analyze whether the probability of choosing an item from a specific food category or subcategory was associated with the choice of the person ahead in the queue for this same food category or subcategory.

The models were adjusted for the age, sex, and BMI of individuals. The models were also adjusted for contextual factors such as declared usual food choices at the self-service restaurant. We controlled for habitual choices because this is a powerful predictor of eating behavior (Riet et al., 2011). Finally the models were adjusted for the familiarity (whether individuals stated that they knew the person ahead of them in the queue). This allowed us to investigate modeling, independently of the relation of individuals with the previous person and to investigate if the familiarity could impact individuals' choices, independently of the choices of the person ahead in the queue.

Finally, the possible moderating effect of the familiarity between subjects on modeling has been tested in other models, through the investigation of interactions between the familiarity and the choice of the person ahead.

R Studio version 1.1.463 (RStudio Team, 2016) was used for data analysis.

Results

Descriptive analysis

Population characteristics

Of the 546 individuals observed, 333 (61%) were men and 211 (39%) were women (2 individuals did not give their sex). The mean age was 40.2 +/- 13.1 years old and the estimated mean BMI was 23.5 +/- 3.5 kg/m^2. The sample was composed of university employees including PhD students (21%), permanent research staff (44%) and administrative and support employees (27%) (8% of the sample did not state their profession).

Food choices

We observed that 39% of the population chose at least one starter, 93% chose at least one dessert, and 35% chose both starter(s) and dessert(s). This compares with 54% of the sample who stated that they usually take a starter, 90% a dessert, and 44% both (Table 1). Only 2% (14 individuals) of the sample took more than one starter while 30% (169 individuals) took more than one dessert.

	Starter(s)	Dessert(s)	Starter(s) + Dessert(s)
Observed Choices	212 (39%)	510 (93%)	188 (35%)
Declared usual choices	290 (54%)	478 (90%)	236 (44%)

Table 1: Numbers and percentages of observed choices compared to declared usual choices.

Among starters, salads were the most frequently chosen category, representing 57% of starter choices, with mixed starters accounting for 28% of choices and cold meats accounting for 16% of choices. Among desserts, fruit were the most chosen category with 43% of choices, then came pastries with 32% of choices and last dairy products with 25% of choices.

Relationship with the person ahead in the queue

65% of the sample reported they knew the person ahead in the queue, and 62% declared that they ate at the same table. Among the 65% of individuals who declared knowing the person ahead in the queue, 93% also declared that they ate with this same person. Due to the high association between two variables, we only used the knowledge of the person ahead in the queue as a covariate in the model.

Awareness

The vast majority of the population (91%) reported that in making their own choice, they were not influenced by the previous person's choice, while only 5% reported that they were influenced. Due to the unequal distribution of this variable, we decided not to use it as a covariate in order to adjust our models.

Social modelling of food choices

Starters

There was a significantly higher probability of taking a starter if the person ahead in the queue also took one compared to when the person ahead in the queue did not take one (OR= 1.65, CI= 1.06-2.57, p= 0.03). Regarding subcategories of starters, individuals had a significantly higher probability of taking a salad (OR= 1.78 CI= 1.08-2.93, p= 0.02), or a mixed starter (OR= 2.98, CI= 1.42-6.05, p<0.01) if the person ahead in the queue also took one, which was not the case for cold meats (OR= 1.89, CI= 0.42-6.19, p= 0.34).

Desserts

The probability of taking a dessert was not significantly related to whether the person ahead in the queue did or did not take one (OR= 1.28, CI= 0.26-4.64, p= 0.73). Regarding desserts subcategories, none of the choices was significantly influenced by the choices of the person ahead in the queue for those subcategories (fruit: OR= 0.97, CI= 0.69-1.38, p=0.88; dairy products: OR=1.26, CI= 0.84-1.87, p=0.27; pastries: OR= 1.42, CI=0.97-2.07, p= 0. 07).

Other variables explaining food choices

Declared usual choices was the most significant variable explaining individuals' choices for starters and all starters' subcategories, and for desserts in general as well as for fruits and pastries. Complete statistical results of each model are available in supplementary files 3 for starters and 4 for desserts.

Familiarity and modeling

We found no significant interaction between the familiarity and the choice of the person ahead in the queue in any of the categories and subcategories (Table 2).

Food categories	Familiarity*Choice of the person ahead (p-value)
Starters	0.49
Salads	0.96
Mixed starters	0.59
Cold Meats	0.99
Desserts	0.50
Fruits	0.75
Dairy Products	0.08
Pastries	0.64

Table 2: Moderating effect of familiarity on modeling. Interactions are tested using binary logistic regressions.

Discussion

We observed that choice of starters, but not desserts, was influenced by the choice of the person ahead in a queue in a restaurant setting. We also found that whether or not participants knew the person ahead in the queue had no influence on whether or not modelling was observed. These results are significant because they demonstrate social modeling of food choices in a real-life restaurant setting, which has only been observed in one previous study of food choices of vegetarian versus non-vegetarian main dishes (Christie & Chen, 2018). Taken together, these findings suggest that modeling of food choices is a robust phenomenon that exists outside of the laboratory.

We observed a modeling effect for starters and two of the starter subcategories (salads and mixed starters), but not for desserts and none of the dessert subcategories. One reason why modeling was observed for starters but not desserts may be that 93% of participants reported that they usually take a dessert whereas only 54% reported usually taking a starter. In situations where people have clear eating routines and/or strong pre-established preferences, social modelling is less likely to be observed (Cruwys et al., 2015). Pliner and Mann (2004) observed social modeling for intake of palatable/unhealthful cookies but not for unpalatable/healthful cookies. In addition, these authors did not observe any influences of informational social norms on choice of cookies (participants chose the palatable over the unpalatable cookies regardless of social information). These authors suggested that one reason for these findings might have been because the participants were sure of their preference for cookies and so did not look to others to guide their choices. In the present study it is possible that choice of dessert was less susceptible to social influence than was choice of starter because the participants were sure of their preference for these items. An additional explanation why choices of starters were modeled, but not choices of dessert, may be the fact that the starter was the first item to be chosen and this may have made the starter more visible on the tray of the person ahead in the queue as it was the only item added on it. In addition, because the starter was the first item to be chosen, choice of starter was not restricted by already having chosen other items. The choice of the dessert (which was the second item to be chosen) may have been in part influenced by the choice of the starter for the sake of having a balanced complete meal and makes it less susceptible to external influences.

For the choice of starters, we observed social modeling of choice of the salads and mixed starters but not for the cold meats. There are at least two potential reasons for this finding: 1) the cold meat starters were not chosen very often and so it may be that there were insufficient observations for modelling to be evident but it is also possible that 2) the participants were also more sure of their preference for the cold meats than they were of their preference for the salads/mixed starters and so while choice of the latter was susceptible to social influence the former was not.

Regardless of the specific explanation for this pattern of results, we did observe modelling of lower energy “healthier” items (salads). This is significant because to date, the majority of studies on social modeling have examined modelling of high energy foods and the effect of social context on the choice of low versus high energy food items during a meal remains poorly studied. Robinson and Higgs (2013) reported findings that differ somewhat from the present results. They found that participants choosing from a buffet in the presence of an ‘unhealthy’ eating partner were significantly less likely to choose and consume a low-energy-dense food item than when choosing alone or in the presence of a ‘healthy’ eater, suggesting that the presence of an ‘unhealthy’ eating partner may undermine intentions to consume low-energy-dense foods (Robinson & Higgs, 2013). This study was conducted in a laboratory setting and the fact that the participants knew they were taking part in an experiment may have affected their responses. As argued by Robinson and Higgs (2013), it may have been that in the ‘choosing-alone’ condition and the ‘healthy’ confederate condition, there was a social norm operating to encourage the choice of at least some healthier items (perhaps because they thought their food intake was being monitored), but this this norm may have been undermined in the ‘unhealthy’ confederate condition, leading participants to abandon the ‘healthy’ choice. The present results are encouraging in suggesting that modeling could have a positive impact on healthier food choices in a real life setting.

Social modelling of starter choice was unaffected by whether or not the participant reported knowing the model. In other words, we observed modelling of food choices both under conditions of familiarity with the model and when the model was not known to the participants. This is an important finding because the majority of studies to date on modelling have involved testing of strangers. Reviews by Cruwys and colleagues (2015), and Vartanian and colleagues (2015) found modeling in studies of children eating with familiar models such as parents or teachers but to date only a few studies have reported social modeling in pre-existing friendship groups of adults (Howland et al., 2012; Kaisari &

Higgs, 2015; Salvy et al. 2007). Taken together, these data support the suggestion that that modelling within friendship networks may underlie the social transmission of food choices (Pachucki et al., 2011).

Ninety-six percent of our population reported that they were not influenced by others' choices in making their own choices. Other research has found that people generally report being unaware of social influence when it comes to food choices, although it may be that people are aware of social influence under some circumstances, but are motivated to deny it (e.g. Spanos et al., 2014; Vartanian et al., 2008, Robinson & Field, 2015). One explanation for a lack of awareness is that social influence on eating could be operating on an automatic level. Indeed it has been argued that an automatic mimicry process may underlie modelling at least in part (Bevelander et al., 2013; Hermans et al., 2012; Higgs & Thomas, 2016; Huh et al., 2014). In their review, Cruwys and colleagues (2015) concluded that the evidence suggests that while modeling can be automatic, it is also accessible to conscious control. For example modeling has also been observed in studies using descriptive social norm-based messages, which is unlikely to be explained by automatic mimicry process (Cruwys et al., 2015). More research is needed to better understand mechanisms underlying social modeling.

This study has some limitations. Our study was observational and did not involve manipulation of food choices, and so we cannot draw conclusions about causal effects in relation to modelling. Moreover, the potential role of confounding factors cannot be ruled out, such as the order of choice of the different items for example as discussed above. However, observational studies yield complementary data and lend external validity to evidence obtained from laboratory studies conducted under controlled conditions. Another point is that we recorded food choices, but we did not measure the quantity of food actually consumed. Future work could examine whether modelled foods are more or less likely to be wasted than are non-modelled foods.

This research has implications for interventions on healthy eating behavior. For example, it may be possible to encourage choice of healthier menu items using social influence. Studies have already succeeded in increasing the purchase of vegetables/salads in restaurants (Mollen et al., 2013, Thomas et al., 2017) through the use of descriptive social norm messages and there is some evidence that social-norm-based messages may be more effective than health-based messages (Collins et al., 2019; Robinson et al., 2014), especially when using descriptive norms (information about what others are eating) rather than injunctive norms (information about others approve of) (Mollen et al., 2013; Robinson et al., 2014; Stok et al., 2014). Future studies could examine whether social-norm-based message can also be applied to a wider range of healthier items and in a wider range of field settings.

In conclusion, we observed modelling of food choices in a real life setting but our data suggest that choices in some food categories, such as starters, may be more susceptible to social modeling than others, such as desserts, possibly because choice of dessert is habitual. Finally, we found that modeling occurs both between familiar and unfamiliar participants, which suggests that social norms could be used to promote healthier eating in a range of settings including friendship groups.

Acknowledgements

This study was funded by the French National Agency for Research (ANR) [ANR-18-CE21-0008]. The authors thank the Crous of Jussieu University that did accept to welcome us in their administrative restaurant. The authors thank David Blumethal for his helpful assistance with the data analysis.

Author Contributions

Armelle Garcia was responsible for the study design, data collection and analysis, and writing of the manuscript. Nicolas Darcel, Suzanne Higgs and Olga Davidenko were responsible for the study design and writing of the manuscript. Alya Hammami, Lucie Mazellier and Julien Lagneau participated to assist with the data collection. All the authors approved the final manuscript.

The authors declare that they have no conflicts of interest.

References

Bevelander, K. E., Meiselman, H. L., Anschütz, D. J., & Engels, R. C. M. E. (2013). Television watching and the emotional impact on social modeling of food intake among children. *Appetite*, *63*, 70–76. https://doi.org/10.1016/j.appet.2012.12.015

Burger, J. M., Bell, H., Harvey, K., Johnson, J., Stewart, C., Dorian, K., & Swedroe, M. (2010). Nutritious or Delicious? The Effect of Descriptive Norm Information on Food Choice. *Journal of Social and Clinical Psychology*, *29*(2), 228–242. https://doi.org/10.1521/jscp.2010.29.2.228

Christie, C. D., & Chen, F. S. (2018). Vegetarian or meat? Food choice modeling of main dishes occurs outside of awareness. *Appetite*, *121*, 50–54. https://doi.org/10.1016/j.appet.2017.10.036

Collins, E. I. M., Thomas, J. M., Robinson, E., Aveyard, P., Jebb, S. A., Herman, C. P., & Higgs, S. (2019). Two observational studies examining the effect of a social norm and a health message on the purchase of vegetables in student canteen settings. *Appetite*, *132*, 122–130. https://doi.org/10.1016/j.appet.2018.09.024

Cruwys, T., Bevelander, K. E., & Hermans, R. C. J. (2015). Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite*, *86*, 3–18. https://doi.org/10.1016/j.appet.2014.08.035

de Castro, J. M., & Brewer, E. M. (1992). The amount eaten in meals by humans is a power function of the number of people present. *Physiology & Behavior*, *51*(1), 121–125. https://doi.org/10.1016/0031-9384(92)90212-K

Goldman, S. J., Herman, C. P., & Polivy, J. (1991). Is the effect of a social model on eating attenuated by hunger? *Appetite*, *17*(2), 129–140. https://doi.org/10.1016/0195-6663(91)90068-4

Hendy, H. M., & Raudenbush, B. (2000). Effectiveness of teacher modeling to encourage food acceptance in preschool children. *Appetite*, *34*(1), 61–76. https://doi.org/10.1006/appe.1999.0286

Herman, C. P., & Polivy, J. (2010). Sex and Gender Differences in Eating Behavior. In J. C. Chrisler & D. R. McCreary (Eds.), *Handbook of Gender Research in Psychology* (pp. 455–469). Springer New York. https://doi.org/10.1007/978-1-4419-1465-1_22

Hermans, R. C. J., Larsen, J. K., Herman, C. P., & Engels, R. C. M. E. (2009). Effects of social modeling on young women's nutrient-dense food intake. *Appetite*, *53*(1), 135–138. https://doi.org/10.1016/j.appet.2009.05.004

Hermans, R. C. J., Lichtwarck-Aschoff, A., Bevelander, K. E., Herman, C. P., Larsen, J. K., & Engels, R. C. M. E. (2012). Mimicry of Food Intake: The Dynamic Interplay between Eating Companions. *PLOS ONE*, *7*(2), e31027. https://doi.org/10.1371/journal.pone.0031027

Higgs, S., & Thomas, J. (2016). Social influences on eating. *Current Opinion in Behavioral Sciences*, *9*, 1–6. https://doi.org/10.1016/j.cobeha.2015.10.005

Howland, M., Hunger, J. M., & Mann, T. (2012). Friends don't let friends eat cookies: Effects of restrictive eating norms on consumption among friends. *Appetite*, *59*(2), 505–509. https://doi.org/10.1016/j.appet.2012.06.020

Huh, Y. E., Vosgerau, J., & Morewedge, C. K. (2014). Social Defaults: Observed Choices Become Choice Defaults. *Journal of Consumer Research*, *41*(3), 746–760. https://doi.org/10.1086/677315

Kaisari, P., & Higgs, S. (2015). Social modelling of food intake. The role of familiarity of the dining partners and food type. *Appetite*, *86*, 19–24. https://doi.org/10.1016/j.appet.2014.09.020

Mollen, S., Rimal, R. N., Ruiter, R. A. C., & Kok, G. (2013). Healthy and unhealthy social norms and food selection. Findings from a field-experiment. *Appetite*, *65*, 83–89. https://doi.org/10.1016/j.appet.2013.01.020

Pachucki, M. A., Jacques, P. F., & Christakis, N. A. (2011). Social network concordance in food choice among spouses, friends, and siblings. *American Journal of Public Health*, *101*(11), 2170–2177. https://doi.org/10.2105/AJPH.2011.300282

Pliner, P., & Mann, N. (2004). Influence of social norms and palatability on amount consumed and food choice. *Appetite*, *42*(2), 227–237. https://doi.org/10.1016/j.appet.2003.12.001

Riet, J. van’t, Sijtsema, S. J., Dagevos, H., & De Bruijn, G.-J. (2011). The importance of habits in eating behaviour. An overview and recommendations for future research. *Appetite*, *57*(3), 585–596. https://doi.org/10.1016/j.appet.2011.07.010

Robinson, E., Benwell, H., & Higgs, S. (2013). Food intake norms increase and decrease snack food intake in a remote confederate study. *Appetite*, *65*, 20–24. https://doi.org/10.1016/j.appet.2013.01.010

Robinson, E., Fleming, A., & Higgs, S. (2014). Prompting healthier eating: testing the use of health and social norm based messages. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *33*(9), 1057–1064. https://doi.org/10.1037/a0034213

Robinson, E., & Higgs, S. (2013). Food choices in the presence of ‘healthy’ and ‘unhealthy’ eating partners. *British Journal of Nutrition*, *109*(04), 765–771. https://doi.org/10.1017/S0007114512002000

Robinson, E., Thomas, J., Aveyard, P., & Higgs, S. (2013). What Everyone Else Is Eating: A Systematic Review and Meta-Analysis of the Effect of Informational Eating Norms on Eating Behavior. *Journal of the Academy of Nutrition and Dietetics*, *114*. https://doi.org/10.1016/j.jand.2013.11.009

Rosenthal, B., & Marx, R. D. (1979). Modeling influences on the eating behavior of successful and unsuccessful dieters and untreated normal weight individuals. *Addictive Behaviors*, *4*(3), 215–221. https://doi.org/10.1016/0306-4603(79)90030-3

RStudio Team. (2016). *RStudio: Integrated Development Environment for R*. RStudio, Inc. http://www.rstudio.com/

Salvy, S.-J., Jarrin, D., Paluch, R., Irfan, N., & Pliner, P. (2007). Effects of social influence on eating in couples, friends and strangers. *Appetite*, *49*(1), 92–99. https://doi.org/10.1016/j.appet.2006.12.004

Spanos, S., Vartanian, L. R., Herman, C. P., & Polivy, J. (2014). Failure to report social influences on food intake: Lack of awareness or motivated denial? *Health Psychology: Official Journal of the*

Division of Health Psychology, American Psychological Association, *33*(12), 1487–1494. https://doi.org/10.1037/hea0000008

Stok, F. M., Ridder, D. T. D. de, Vet, E. de, & Wit, J. B. F. de. (2014). Don't tell me what I should do, but what others do: The influence of descriptive and injunctive peer norms on fruit consumption in adolescents. *British Journal of Health Psychology*, *19*(1), 52–64. https://doi.org/10.1111/bjhp.12030

Vartanian, L. R., Herman, C. P., & Wansink, B. (2008). Are we aware of the external factors that influence our food intake? *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *27*(5), 533–538. https://doi.org/10.1037/0278-6133.27.5.533

Vartanian, L. R., Sokol, N., Herman, C. P., & Polivy, J. (2013). Social Models Provide a Norm of Appropriate Food Intake for Young Women. *PLoS ONE*, *8*(11). https://doi.org/10.1371/journal.pone.0079268

Vartanian, L. R., Spanos, S., Herman, C. P., & Polivy, J. (2015). Modeling of food intake: a meta-analytic review. *Social Influence*, *10*(3), 119–136. https://doi.org/10.1080/15534510.2015.1008037

Supplementary file 1: Detailed composition of food categories

Starters		Desserts	
Salads	-Salads (grated carrots, beetroots, endives, cucumber and tomatoes etc) -Grapefruit	Fruit	-Fresh Fruit - Canned fruit - Canned fruit salad - Fruit compote
Mixed starters	-Potato salad with ham and nuts - Salad and goat cheese - Mackerel - Salmon - Mimosa eggs (mayo) - Salmon pasta salad - Potatoes salad whith bacon - Corn and chicken salad - Tabbouleh	Dairy	-Plain yoghurt - Sweetened and flavored yoghurt - Full fat yoghurt - Dairy dessert - Cheese
Cold meat	Small plates with a variety of cold meat with butter	Pastries	-Traditional Basque cake - Fruit crumble - Custard pie - « Ile flottante » (whipped egg white with custard sauce and caramel) - Chocolate mousse - « Paris-Brest » (choux pastry filled with hazelnut flavored custard cream). - "Religieuse" (cream puffs with caramel) - Cherry pie - Lemon pie - Chocolate pie - Coconut pie - Apple pie - « Tarte tatin » (apple pie with caramel)

Supplementary file 2: Perceived healthiness of food items (rated from 0 (unhealthy) to 7 (healthy))

Food categories	Mean perceived healthiness	Standard Deviation
Starters	4.60	1.97
Salads	6.58	0.75
Mixed starters	4.57	0.76
Cold Meats	2.64	0.61
Desserts	4.09	1.26
Fruits	5.22	1.56
Dairy Products	4.32	1.44
Pastries	2.73	0.46

An online questionnaire filled by 118 individuals with a mean age of 42 years old (which fit with our population). They were asked to rate from 0 (unhealthy) to 7 (healthy) each items that were proposed during our data collection.

Supplementary file 3: Results of binary logistic regression for starter and starters' subcategories.

Variables	OR	CI 97,5%	p-value
Starter			
Choice of the person ahead	1.65	1.06-2.57	0.03
Age	0.97	0.96-0.99	< 0.01
Sex	1.35	0.85-2.13	0.21
BMI	1.22	0.49-2.12	0.70
Familiarity	0.97	0.60-1.56	0.91
Usual choices			
Starter	12.19	6.05-25.20	< 0.01
Starter + Dessert	18.75	11.32-32.22	< 0.01
Raw Vegetables			
Choice of the person ahead	1.78	1.08-2.93	0.02
Age	1.01	0.99-1.02	0.69
Sex	0.80	0.50-1.31	0.38
BMI	0.74	0.27-1.86	0.53
Familiarity	1.05	0.64-1.74	0.84
Usual choices			
Starter	10.75	4.48-26.11	< 0.01
Starter + Dessert	17.38	9.02-37.12	< 0.01
Mixed Starters			
Choice of the person ahead	2.98	1.42-6.05	< 0.01
Age	0.94	0.91-0.96	< 0.01
Sex	1.16	0.63-2.21	0.64
BMI	1.26	0.34-3.80	0.70
Familiarity	1.29	0.67-2.61	0.46
Usual choices			
Starter	5.09	1.84-14.00	< 0.01
Starter + Dessert	4.83	2.37-10.75	< 0.01
Cold Meats			
Choice of the person ahead	1.89	0.42-6.19	0.34
Age	1.00	0.97-1.03	0.84
Sex	2.43	1.05-6.37	0.05
BMI	1.64	0.36-5.34	0.47
Familiarity	0.57	0.27-1.21	0.14
Usual choices			
Starter	5.24	1.39-19.82	0.01
Starter + Dessert	4.69	1.87-14.29	< 0.01

OR: Odd Ratios, CI: Confidence Intervals

Supplementary file 4: Results of binary logistic regression for dessert and desserts' subcategories.

Variables	OR	CI 97,5%	p-value
Dessert			
Choice of the person ahead	1.28	0.26-4.64	0.73
Age	1.01	0.98-1.05	0.56
Sex	2.28	0.99-5.36	0.05
BMI	1.80	0.30-35.75	0.60
Familiarity	0.77	0.28-1.92	0.59
Usual choices			
Dessert	18.31	6.91-54.92	< 0.01
Entrée + Dessert	12.73	4.97-35.70	< 0.01
Fruits			
Choice of the person ahead	0.97	0.69-1.38	0.88
Age	1.01	0.99-1.02	0.41
Sex	0.71	0.50-1.03	0.07
BMI	1.27	0.57-2.20	0.56
Familiarity	0.89	0.60-1.30	0.54
Usual choices			
Dessert	2.18	1.17-4.18	0.02
Entrée + Dessert	2.65	1.41-5.11	< 0.01
Dairy Products			
Choice of the person ahead	1.26	0.84-1.87	0.27
Age	1.02	1.00-1.03	0.02
Sex	0.81	0.55-1.20	0.29
BMI	1.83	0.81-4.05	0.14
Familiarity	1.33	0.88-2.04	0.19
Usual choices			
Dessert	1.48	0.76-3.06	0.27
Entrée + Dessert	1.38	0.70-2.97	0.37
Pastries			
Choice of the person ahead	1.42	0.97-2.07	0.07
Age	0.98	0.97-0.99	< 0.01
Sex	2.34	1.58-3.50	< 0.01
BMI	0.57	0.21-1.37	0.23
Familiarity	1.39	0.92-2.10	0.12
Usual choices			
Dessert	4.60	2.14-11.13	< 0.01
Entrée + Dessert	3.29	1.52-7.96	< 0.01

OR: Odd Ratios, CI: Confidence Intervals