



## Examining the effects of remote-video confederates on young women's food intake

Roel C.J. Hermans<sup>a,\*</sup>, Sarah-Jeanne Salvy<sup>b</sup>, Junilla K. Larsen<sup>a</sup>, Rutger C.M.E. Engels<sup>a</sup>

<sup>a</sup> Behavioural Science Institute, Radboud University Nijmegen, P.O. Box 9104, 6500 HE Nijmegen, The Netherlands

<sup>b</sup> Rand Cooperation, 1776 Main Street, Santa Monica, CA 90401-3208, United States

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### ABSTRACT

One's decisions about eating are at times, largely based on the observations of other people's eating behavior. Previous studies have shown that modeling of eating is a robust effect.

The current research examined the impact of a video remote confederate on young women's food intake. Experiment 1 examined the effect of an eating or non-eating video confederate. Participants ( $N=77$  female undergraduate students,  $M$  age = 20.29) were exposed to a same-sex video confederate (i.e., a 25 year old woman) who was modeling eating (i.e., 4 winegums; pastille-type sweets) or not eating (i.e. no food visible). Results indicated that participants exposed to the eating confederate did not eat more than participants exposed to the non-eating confederate. Experiment 2 was conducted to address some of the limitations of Experiment 1. In this experiment, participants ( $N=51$ ,  $M$  age = 20.43) were exposed to one of three intake conditions: No-eating (i.e. food visible but not consumed), Small portion-size condition (i.e., 8 M&Ms) or Large portion-size condition (i.e., 20 M&Ms). The same video confederate as in Experiment 1 modeled these three conditions. Results indicated that participants did not adjust their intake to that of a video model. The current findings provide preliminary evidence for the assumption that modeling only exists if people have clear indications about how much others have consumed in the same context (as was the case in previous modeling studies). Future research is needed to further examine this proposition.

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### 1. Introduction

There is little doubt that an individuals' eating behavior is influenced by others (Herman & Polivy, 2008). One way in which social influences operate on food intake is in determining what is socially appropriate to eat. An anecdotal observation of this effect, for instance, is that one is less likely to order dessert if no one at the table orders dessert. Socially-derived norms often prevail over one's desire to consume palatable food. This is reflected in the main tenet of the normative framework put forth by Herman and colleagues, which posits that in the presence of palatable food, and in the absence of inhibitory forces (such as satiety), people continue to eat indefinitely unless clear norms of appropriate eating are in place (cf., Herman, Roth, & Polivy, 2003). What constitutes "appropriate eating" (and not excessive eating), however, is quite ambiguous and situationally dependent, so people often engage in social comparison (Herman & Polivy, 2005). That is, they look at the intake of others as a guideline to adjust their own level of intake. This concern with eating appropriately is not misguided, and in particular not for women (Bock & Kanarek, 1995), because eating excessively often elicits negative stereotypes such as being deficient in self-control or being seen as unattractive and heavy (see Vartanian, Herman,

& Polivy, 2007 for a review). People are also motivated to conform to others' eating because of the expectations that conformity leads to social acceptance or approval (Deutsch & Gerard, 1955; Roth, Herman, Polivy, & Pliner, 2001).

Several studies have examined the effects of eating norms on food intake by using an experimental design, in which naïve participants are exposed to experimental confederates instructed to eat different amounts of food. People are likely to eat more or less when these confederates eat more or less (see Herman et al., 2003 for a review). The ubiquitous effect of social influences is substantiated by the research indicating that modeling of food intake occurs in men and women (e.g., Conger, Conger, Costanzo, Wright, & Matter, 1980; Rosenthal & Marx, 1979), children and adults (Bevelander, Anschutz, & Engels, 2011; Hermans, Engels, Larsen, & Herman, 2009), obese and normal-weight individuals (Conger et al., 1980; Nisbett & Storms, 1974), and hungry or satiated individuals (Goldman, Herman, & Polivy, 1991).

One might argue that the influence of others is especially powerful when other eating companions are physically present. This contention, however, is undermined by research indicating that modeling of eating also occurs in situations in which the model is not actually present (i.e., remote-confederate design). Roth et al. (2001) exposed participants to a fictional list of how much prior participants had consumed in the same context and found that people modeled the eating pattern as described on the list. Pliner and Mann (2004) and Leone, Pliner, and Herman (2007) also found clear modeling effects using this fictional list. Recent evidence even demonstrates that remote models might

\* Corresponding author at: Behavioural Science Institute, Radboud University Nijmegen, P.O. Box 9104, 6500 HE Nijmegen, The Netherlands. Tel.: +31 243615787; fax: +31 24 3612776(secretariat).

E-mail address: r.hermans@bsi.ru.nl (R.C.J. Hermans).

produce a similar effect to live models (Feeney, Polivy, Pliner, & Sullivan, 2011), underscoring the power of social norms over individuals' food intake. Another paradigm to examine the effect of remote-confederates on food intake was used by Romero, Epstein, and Salvy (2009). They "incidentally" exposed pre-adolescent female participants (8–12 years old) to a video in which a same-sex female (alleged participant) consumed either a small or large serving of cookies. It was found that girls exposed to the large portion-size condition consumed more cookies than girls exposed to the small portion-size condition, suggesting that a video model is also effective in producing eating conformity/modeling.

The current research examined the impact of a remote-confederate on young women's food intake using the video modeling manipulation used by Romero et al. (2009). Because adhering to socially-derived norms with regard to eating may be more important for women than for men, due to women's heightened body image and eating concerns (Chaiken & Pliner, 1987; Vartanian et al., 2007), we restricted our study to female university students. Two experiments were conducted to examine whether young women would model the eating behavior of a same-sex video model. In Experiment 1, participants were randomly exposed to one of two conditions involving a 25-year old female confederate presented on video. In the first condition, the confederate ate snack food (Eating condition; confederate eating 4 candies); in the second condition, the confederate engaged in alternative activities (No-eating condition; no food visible). Based on the study of Romero et al. (2009), we hypothesized that participants exposed to the Eating condition would eat more than participants exposed to the No-eating condition. To further investigate our hypotheses, we set up Experiment 2. This time, however, the video confederate modeled one of three eating conditions: (1) No-eating (i.e., food visible but not consumed), (2) Small portion-size (8 candies, 7.2 g) or (3) Large portion-size condition (20 candies, 18 g). Because this design was more similar to other modeling studies using remote confederates (e.g., Leone et al., 2007; Roth et al., 2001), we hypothesized that participants would adjust their level of eating to the confederate's intake (i.e., eating more in the Large portion-size condition than in the Small portion size and the No-eating conditions).

## 2. Experiment 1

### 2.1. Method

#### 2.1.1. Design and participants

A single factor (Eating condition versus No-eating condition) between-subjects design was used to examine whether young women's intake was influenced by the eating behavior of the video confederate (see description below). Participants were randomly assigned to one of two conditions. We received approval from the ethics committee of the Faculty of Social Sciences, Radboud University Nijmegen.

Ninety-five women volunteered for this study. All participants were recruited through an Internet sign-up program of the Behavioural Science Institute (BSI) of the Radboud University Nijmegen. This system is used by all researchers of the BSI and participants could self-register for studies that might be of interest to them. Participants received course credit or five euro for their participation. Thirty-two participants were excluded afterwards: 10 overweight ( $BMI = kg/m^2, >25$ ) participants, 4 participants with missing BMI scores, 4 participants who reported an allergy to peanuts and therefore could not eat the available test food, and 14 participants who became aware of the actual aim of the study. The final sample, then, consisted of 63 female undergraduate students with a mean age of 20.32 ( $SD = 2.03$ ) and a mean BMI of 22.05 ( $SD = 1.86$ ).

#### 2.1.2. Video confederate

A 25-year old average-weight woman ( $BMI = 22.04$ ) modelled the eating and no-eating conditions (see description of her actions below).

In the Eating condition, the model ate four winegums (i.e., pastille-type sweets); whereas in the No-eating condition, the model did not eat. The model was instructed to eat one candy immediately at the beginning of the video and the other three at equal time intervals throughout the 15-min video exposure (i.e., one candy every 4 min).

#### 2.1.3. Procedure

Under the pretext of a study on observational strategies, participants were asked to watch a 15-min video of a female student performing various work-related tasks in a university office (i.e., working on a computer, reading, highlighting a textbook and stapling papers together). This was a cover story to prevent the participants from becoming aware of the true aim of the study. Participants were tested individually on weekdays between 11.00 and 17:00. All sessions took about 30 min in total.

Upon arrival at the laboratory, the participants were accompanied to the experimental room where the procedure of the study was explained to them (see Hermans et al., 2009 for a detailed description of this room). Participants were asked to watch a 15-min video of a female student performing various study-related tasks (i.e., working on a computer, reading, highlighting a textbook and stapling papers together). Under the rationale of making the task more pleasant, participants could help themselves to chocolate-coated peanuts (M&Ms©, Mars Netherlands BV, Veghel) and they were provided with a glass of water (200 ml). Participants were told that they could eat as much or as little as they wanted. These instructions were identical across conditions. The experimenter then started the video clip and left the room. Participants' food intake while watching the clip was recorded using an unobtrusive camera hidden in the corner of the room. After the 15-min task, participants were asked to complete a series of questions to assess their level of hunger prior to the study session, liking of the test food, dietary restraint, their perception of the video confederate's food intake, and their awareness of study aims. After the participant completed this questionnaire, the experimenter measured her weight and height. Briefing took place after the data collection for the entire experiment was completed.

#### 2.1.4. Measures

**2.1.4.1. Food intake.** The content of the bowl of M&Ms was weighed with a digital scale (Kern440, Kern & Sohn GmbH, Balingen, Germany) immediately before and after the video in order to determine the amount of test food (in grams). The dependent variable, then, was the total amount of M&Ms consumed in grams. We also measured the mean weight of a single M&M by weighing 10 M&Ms and dividing this by ten (mean = 2.1 g). This measure was used to compare the number of candies eaten by the video confederate and participants.

**2.1.4.2. Height and weight.** The experimenter measured each participant's height and weight following standard procedures (Lohman, Roche, & Martorell, 1998). Height was measured to the nearest 0.5 cm using a stadiometer (Seca 206, GmbH & co., Hamburg, Germany) and weight was measured to nearest 0.1 kg using a digital scale (Seca Bella 840, Seca GmbH & co, Hamburg, Germany).

**2.1.4.3. State hunger.** Hunger was measured on a 140 mm visual analogue scale, ranging from 0 (not hungry at all) to 140 (very hungry). Although the best option to control for individual variations in hunger is to ask participants to refrain from eating for a certain period of time before the experiment (Polivy, Heatherton, & Herman, 1988), we assumed that this requirement would have disclosed the actual aim of the study and thereby distorted participants' natural eating behavior. To avoid this bias, we measured participants' pre-experimental hunger retrospectively at the end of the experimental session (see also Anschutz, Engels, Becker, & van Strien, 2008; Hermans, Herman, Larsen, & Engels, 2010a).

**2.1.4.4. Liking of test food.** Participants reported their liking of the available chocolate-coated peanuts on a 10-point scale from 0 'did not like it at all' to 10 'like it very much.'

**2.1.4.5. Dietary restraint.** Restrained eating was measured by the dietary restraint subscale of The Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986). Cronbach's  $\alpha$  was 0.93.

**2.1.4.6. Awareness of the video model's intake.** To measure participants' awareness of the video model's intake, we asked them to indicate how many candies the model had eaten.

### 2.1.5. Analytic plan

Before analyzing the effects of confederates' intake on participants' food intake, we examined whether participants differed with respect to potential confounding variables. BMI, dietary restraint, and participants' liking of the test food did not correlate with food intake (all  $p > 0.1$ ) and therefore were not included in the model as potential confounds. However, hunger  $r_{(63)} = 0.37, p < 0.01$ , was significantly correlated with food intake and was entered into our model as covariate. Analyses of variance (ANOVAs) were performed on these variables to determine whether there were baseline differences between the two conditions. Also,  $t$ -tests were used to assess whether participants in the two conditions differed in their estimations of the model's intake. An ANCOVA was used to examine the main effect of the video confederate's intake on participants' intake. Further, to examine whether there were differences in the amount consumed between participants who chose to initiate eating, a final ANCOVA was performed only on the participants who ate some of the food.

## 3. Results and discussion

### 3.1. Participants' characteristics and manipulation checks

Participants in the two conditions did not differ in their subjective hunger level, BMI, liking of the test food and dietary restraint (all  $p > 0.10$ , see Table 1).

Participants estimated the video confederate's intake as higher ( $M = 3.74, SD = 1.05$ ; 95% CL = 3.37–4.10) in the eating condition than in the no-eating condition ( $M = 0.00, SD = 0.00$ ;  $t_{(63)} = 19.07, p < 0.001$ ).

### 3.2. Food intake data

No significant difference in the total amount consumed (in grams) was found between conditions. Participants in the eating condition ( $M_{(\text{in grams})} = 10.55, SE = 2.56$ ; approximately five M&Ms) did not eat significantly more than participants in the no-eating condition ( $M_{(\text{in grams})} = 9.16, SE = 2.86$ ; approximately four and a half M&Ms),  $F_{(1, 60)} = 0.14, p = 0.71$ . No between-condition difference was found in the total amount consumed (in grams) among those who initiated eating,  $F_{(1, 30)} = 0.61, p = 0.44$ .

## 4. Discussion

Contrary to our hypothesis, participants exposed to the eating video confederate did not eat more than participants exposed to the

no-eating video confederate. In both conditions, participants ate around five M&Ms. Although participants clearly perceived that the confederate was eating four candies or was not eating, they did not adjust their level of eating to conform to the confederate's intake. There is evidence that modeling does not always occur when participants are exposed to ambiguous eating patterns or norms (Leone et al., 2007). In other words, when the eating norms as to what is appropriate to eat are not salient, participants rely on other cues or on their own experiences to determine how much they should eat. In our study, the video confederate in the "eating condition" was consuming four candies in 15 min while engaging in a series of alternative activities, whereas in the no-eating condition no food was visible. Consequently, the "eating or no-eating" in the video was possibly not salient enough to influence participants' intake. Although the number of candies in the eating condition was based on studies in which real-life confederates were used (e.g., Brunner, 2010; Hermans, Larsen, Herman, & Engels, 2008) this amount might have been too small to induce an effect among young women in a remote-video confederate design. Next, the fact that the participants in our study had access to a different type of snack food than the video confederate, may also explain why participants' intake was not affected by the eating condition. The present findings suggest that participants were eating according to their own desire and might have relied on other cues to determine how much they should eat. Whether the lack of a modeling effect is due to the factors mentioned above, or whether video-modeling is not apparent among young women is not clear from Experiment 1. Therefore, we set up Experiment 2 in which participants were offered the same food as shown in the video and made the eating norms more salient by using the same conditions as in the classical modeling studies (i.e., no-eating with food visible, small portion-size, and large portion-size manipulations).

## 5. Experiment 2

### 5.1. Method

#### 5.1.1. Design and participants

A between-participants design was employed with three experimental conditions in which female participants were exposed to a video confederate who was instructed to eat nothing (No-eating condition; with food visible), 8 M&Ms (i.e., 7.2 g; Small portion-size condition) or 20 M&Ms (i.e., 18 g; Large portion-size condition).

A total of 58 young women participated in this study. Seven participants were excluded from further analyses because they were overweight/obese ( $n = 6$ ) or were lactose intolerant and therefore could not eat the test food ( $n = 1$ ). The final sample, then, consisted of 51 female undergraduate students with a mean age of 20.43 ( $SD = 2.44$ ) and a mean BMI of 21.99 ( $SD = 1.90$ ).

#### 5.1.2. Video confederate

The same video confederate was used as in Experiment 1. To increase the ecological validity of the video, the confederate was shown in a real-life living room setting, where she was seen watching television, reading and writing in her agenda and having a telephone call with her alleged boyfriend. In the No-intake condition, she was seen not eating. In the eating conditions, the confederate was instructed to reach for M&Ms, two at a time, on different occasions. In the Small portion condition, the model consumed 8 M&Ms (i.e., reached four times), whereas in the Large portion condition she consumed 20 M&Ms (i.e., reached ten times).

#### 5.1.3. Procedure

The procedure was identical to that of Experiment 1 with two exceptions: (1) we ensured that none of the participants from Experiment 1 could register for Experiment 2, (2) participants and video confederate were offered the same snack food (i.e., milk-chocolate

**Table 1**  
Participants' characteristics providing mean  $\pm$  SD (data derived from Experiment 1).

	No-eating condition ( $n = 29$ )	Eating condition ( $n = 34$ )
Age (in years)	20.38 $\pm$ 1.93	20.26 $\pm$ 2.14
BMI	22.45 $\pm$ 1.74	21.71 $\pm$ 1.91
Hunger level	58.86 $\pm$ 35.48	66.91 $\pm$ 38.74
Dietary restraint	2.53 $\pm$ 0.83	2.55 $\pm$ 0.75
Liking of M&Ms	6.83 $\pm$ 2.85	7.74 $\pm$ 1.31

M&Ms). Unfortunately, we could not use the same type of snack food as in Experiment 2 (i.e., M&Ms with peanuts or winegums), because the video confederate was allergic to peanuts. We chose not to offer winegums, because the number of candies consumed may be easy to monitor and therefore increases the possibility of consumption-monitoring (which in turn might suppress participants' intake).

## 6. Results and discussion

### 6.1. Participants' characteristics and manipulation checks

There was no difference in terms of hunger level, BMI, dietary restraint (Cronbach's  $\alpha$  was 0.94) and liking for the test food across conditions (all  $p > 0.20$ , see Table 2). However, there was an effect of hunger  $r_{(51)} = 0.63$ ,  $p < 0.001$ , and liking for the test food,  $r_{(51)} = 0.29$ ,  $p < 0.05$ , on food intake. Consequently, hunger and liking were entered as covariates in the analyses.

Participants exposed to the Large portion-size condition reported that the confederate reached more often to pick food ( $M = 5.00$ ,  $SD = 1.86$ ; confederate reached ten times) than the confederate in the Small-portion condition ( $M = 3.16$ ,  $SD = 1.34$ ,  $p < 0.01$ ; confederate reached four times) or No-eating condition ( $M = 0.50$ ,  $SD = 0.89$ ,  $p < 0.001$ ),  $F_{(50)} = 40.77$ .

### 6.2. Food intake data

This study assessed whether participants adjusted their eating behavior to the level of eating of a video confederate. Results indicated no main effect of eating condition on participants' food intake,  $F_{(2,46)} = 0.44$ ,  $p = 0.65$ . Participants in the Large portion-size condition did not eat more ( $M_{(\text{in grams})} = 15.45$ ,  $SE = 4.29$ ; approximately 17 M&Ms) than participants in the Small portion-size condition ( $M_{(\text{in grams})} = 20.57$ ,  $SE = 3.94$ ; approximately 23 M&Ms) or No-eating condition ( $M_{(\text{in grams})} = 19.91$ ,  $SE = 4.32$ ; approximately 22 M&Ms).

No differences were found between conditions for amount eaten by those participants who initiated eating,  $F_{(2,28)} = 0.05$ ,  $p = 0.95$ .

## 7. Discussion

Experiment 2 was set up to further investigate whether young women's food intake is affected by the eating behavior of video confederates. Some of the limitations of Experiment 1 were remediated in the current experiment. First, we provided the participants with the same food as the one consumed by the confederate and second, we used three levels of eating: no eating, small portion-size, and large portion-size. It was found that participants' food intake was not influenced by the video manipulation, as participants' intake did not significantly differ across conditions. Participants ate an average of 20 M&Ms regardless of the experimental condition in which they were randomized. These results suggest that female university students' intake is not affected by the eating norms induced by a same-sex video confederate.

One weakness of Experiment 2, however, is that participants in the large portion-size condition did not perceive that the video confederate reached for M&Ms on ten different occasions. That is, participants' estimations of the number of times the confederate reached

for M&Ms (mean was 5) was half of the confederate's actual number of reaches (i.e., 10 times). Therefore, we cannot be entirely sure that the large-eating video confederate was also perceived as a same-sex peer eating a large amount of snack food. The fact that the video confederate was performing a series of other activities while eating from the bowl of snack food (i.e., watching television, reading and writing in her agenda, and having a phone call with her alleged boyfriend) might have drawn the participants' attention away from the confederate's eating, and therefore the confederate's eating behavior might have been not salient enough to influence the participants' behavior. It should be noted, however, that participants' perceptions of the confederate's amount eaten in this large portion-size condition still significantly differed from the other eating conditions. To ensure that the results of the current experiment are not due to the issues mentioned above, it would be necessary to replicate this study using a video in which the intake of the video-confederate is more salient. To make the confederate's eating more salient, future studies could zoom in close on the confederate's hand and mouth when reaching for and eating the food. Making the eating too salient, however, may also increase participants' awareness of the study aims which consequently interferes with their natural eating behavior.

## 8. General discussion

These studies examined the impact of a remote confederate (a video model) on young women's food intake. The results of both studies indicated that participants did not eat according to the prediction put forward by previous modeling studies. More specifically, participants did not eat more or less when the confederate ate more or less.

These results were unexpected considering the extensive literature on modeling of food intake (see Herman et al., 2003 for a review of these studies) and a recent study that suggests that remote models might produce similar effects to live models (Feeney et al., 2011). However, the present findings may not be so surprising when considering the peculiarities of the designs used compared to traditional modeling studies and other modeling studies using remote-confederates. In traditional modeling studies, the participants were tested in the presence of an alleged participant (an experimental confederate whose level of eating was pre-determined by the experimenter). In studies using remote-confederates, it was implied that the confederates were also participants involved in the same study as the participant (Romero et al., 2009; Roth et al., 2001). For example, in the "fictional list" manipulation, participants were lead to believe that they were seeing the intake of previous subjects completing the same experiment. In the same video-manipulation used by Romero et al. (2009), participants were "incidentally" exposed to a participant performing the same task, with the same food, and in the same room as the participants. Therefore, the confederate's behavior in these studies was clearly indicative of what "others" were doing in the same context (i.e., a clear descriptive norm, Christensen, Rothgerber, Wood, & Matz, 2004). In our studies, however, the context in which participants were eating was clearly different from the situation and environment depicted in the video. As a result, the participants may have seen the model's intake as irrelevant to gauge their own food intake, and therefore modeling was less likely to occur. Unfortunately, based on our data, we cannot unequivocally conclude that contextual differences moderated modeling of food intake. In order to test this contention, one would need to directly manipulate the context in which the confederate and participant are eating (e.g., similar vs. different contexts). Based on the current findings, however, it seems reasonable to assume that modeling effects only exist if people have clear indications about how much others have consumed in the same context (as was the case in previous modeling studies).

**Table 2**  
Participants' characteristics providing mean  $\pm$  SD (data derived from Experiment 2).

	No-eating condition ( $n = 16$ )	Small portion-size condition ( $n = 19$ )	Large portion-size condition ( $n = 16$ )
Age (in years)	20.31 $\pm$ 1.58	21.00 $\pm$ 3.59	19.88 $\pm$ 1.09
BMI	22.20 $\pm$ 1.51	21.92 $\pm$ 1.74	21.87 $\pm$ 2.08
Hunger level	72.38 $\pm$ 44.70	61.16 $\pm$ 40.69	62.69 $\pm$ 43.84
Dietary restraint	2.83 $\pm$ 0.82	2.68 $\pm$ 0.91	2.71 $\pm$ 0.86
Liking of M&Ms	7.69 $\pm$ 1.49	7.32 $\pm$ 1.30	7.31 $\pm$ 1.74

Another noticeable difference between our study and the Romero et al. (2009) study is the age of the participants. Our study involved undergraduate female students, whereas Romero's participants were pre-adolescent girls. It has been described that the environment of a food-choice event includes not only one's expectations, but also one's prior experiences and habits (Bell & Meiselman, 1995). Regardless of the social norm manipulations, participants ate approximately five chocolate-coated peanuts in Experiment 1, whereas they ate approximately 20 milk-chocolate candies in Experiment 2. It is possible that participants' personal norms (i.e., 5 or 20 M&Ms) or snack habits might have made them less susceptible to the normative information conveyed by a video-confederate. Hermans et al. (2010b) suggested that the effect of modeling on food intake in female university students would be weaker in eating contexts in which scripts or routines are available to guide their eating behavior. Although the influence of personal norms on modeling was not directly tested in the present experiments, the findings are consistent with this proposition.

Finally, both studies also differed with respect to the amounts of food consumed by the video confederate. Our video confederate was consuming 8 milk-chocolate M&Ms in the small portion-size condition and 20 M&Ms in the large portion-size condition (i.e., reached for M&Ms 4 or 10 times, respectively). In the Romero et al. study (2009) the model consumed 10 Mini Oreo Bite-Size cookies (i.e., the recommended serving size) in the small portion-size condition and 77 bite-size cookies in the large portion-size condition (i.e., 20 regular-size Oreo cookies). Conceivably, the larger portions in both conditions may have removed the possibility of a ceiling effect and push upward the amount of food that was "appropriate to eat".

A few limitations should be mentioned. A first limitation pertains to the absence of an eating alone condition. In absence of such condition, it is not possible to determine whether participants were eating more or less than they do in their natural environment. Second, this study involved young highly-educated (Caucasian) women. The homogeneity of our sample obviously limits the generalizability of our findings to other populations (e.g., male and other demographics). Third, our samples were limited to normal-weight women. If we consider the exposure to the eating behavior of others and the availability of palatable food as external cues that might stimulate intake, there might be large individual variation in the intensity of responsiveness to these food-related cues. For example, Salvy, Coelho, Kieffer, & Epstein (2007) have found that social context differently impacts the eating behavior of overweight and normal-weight youths. They found that overweight children ate more when they were alone than when they were with peers, whereas non-overweight children ate more with other children than when alone. It has also been suggested that overweight females are more responsive to external food-cues than are non-overweight females (Tetley, Brunstrom, & Griffiths, 2009).

Despite these limitations, our results highlight the importance of contextual cues when considering the effects of social influences on eating. Although previous studies have indicated that modeling effects on snack intake are rather robust (Herman et al., 2003), this study did not find these modeling effects when young women were exposed to a same-sex eating individual on screen. These findings provide preliminary evidence for the proposal that remote and live models may not be equally effective in determining young women's food intake when model and observer eat in different contexts. It should be acknowledged that most studies focusing on social influences have isolated the effects of others from environmental factors. Although social influences have been shown to be very powerful, it is important to note that these factors are most likely part of an intricate web of complex relations involving individual characteristics and other physical and environmental factors, such as the frequent exposure to energy-dense, heavily advertised, inexpensive, highly accessible foods (Hill & Peters, 1998). The current studies suggest interesting lines of research examining the interactions between social and physical/environmental factors and how these forces co-operate to determine food intake.

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#### Contributors

The author's responsibilities were as follows: RCJH, JKL, and RCME designed the study; RCJH was involved in the acquisition of the data; RCJH was responsible for the analysis and interpretation of the data; RCJH wrote the first draft of the manuscript and all authors (JKL, SJS and RCME) contributed to and have approved the final manuscript.

#### Conflict of interest

All authors declare that they have no relevant financial interests in the manuscript. Furthermore, they certify that there is no personal financial disclosure/conflict of interest.

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