

## Short communication

## Food for thought. What you eat depends on your sex and eating companions

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## ABSTRACT

In a naturalistic study, we investigated the influence of gender, group size and gender composition of groups of eaters on food selected for lunch and dinner (converted to total calories per meal) of 469 individuals (198 groups) in three large university cafeterias. In dyads, women observed eating with a male companion chose foods of significantly lower caloric value than those observed eating with another woman. Overall, group size was not a significant predictor of calories, but women's calories were negatively predicted by numbers of men in the group, while the numbers of women in the group had a marginally significant positive impact on calorie estimates. Men's calorie totals were not affected by total numbers of men or women. This study supports previous investigations, but is unique in making naturalistic observations.

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Meals are social events, and companions affect both the choice and quantity of food consumed (e.g., Herman, Roth, & Polivy, 2003; Vartanian, Herman, & Polivy, 2007). According to diary studies, Americans eat more with their spouses, relatives and friends than when alone, and consumption increases with group size (e.g., deCastro, 1994, 1997; deCastro & Brewer, 1991). In experimental studies, British university students and staff ate more from a buffet with two same-sex companions than when alone (Hetherington, Anderson, Norton, & Newson, 2006); children aged 6–10 years consumed more pizza while playing video games with other children than while playing alone (Salvy, Coelho, Kieffer, & Epstein, 2007); and preschoolers ate more Graham crackers when seated in groups of nine than when in threesomes (Lumeng & Hillman, 2007).

There is more going on in these studies than mere social facilitation of eating (*sensu* Zajonc, 1965), however. For example, while most children in the Salvy, Coelho, et al. (2007) study ate more when in groups, overweight children ate less. Also, in the Hetherington et al. (2006) study, watching a television show (alone) had the same effect on consumption as eating with friends.

Several factors may mediate the effects of companions on ingestion (Herman et al., 2003), including the affect and arousal elicited by social interaction and distractions reducing the salience of satiety cues, and the effects may therefore vary in relation to

such factors as familiarity with one's companions and attraction to them. Moreover, Salvy, Jarrin, Paluch, Irfan, and Pliner (2007), note that it is considered polite to conform to the amount eaten by table-mates, and that such conformity is especially likely when one is with unfamiliar companions. More specifically, presence of an unfamiliar opposite-sex confederate has been found to reduce consumption by both sexes, with women, but not men, additionally affected by the confederate's "social desirability" (Mori, Chaiken, & Pliner, 1987; Pliner & Chaiken, 1990). Salvy, Coelho, et al. (2007) and Salvy, Jarrin, et al. (2007), furthermore reported that men, but not women, ate more with a same-sex friend than with a stranger; that the sex difference in intake disappeared when subjects were with their romantic partners; and that women, but not men, ate significantly less when with opposite-sex strangers than with their romantic partners.

At least in North America, perceptions of people are influenced by what they are (supposedly) eating; in particular, women are deemed more attractive and more feminine when portrayed as eating fewer calories (e.g., Barker, Tandy, & Stookey, 1999; Basow & Kobryniewicz, 1993; Bock & Kanarek, 1995; Chaiken & Pliner, 1987; Martins, Pliner, & Lee, 2004; Mooney & Lorenz, 1997; Oakes & Slotterback, 2004–2005; Vartanian et al., 2007). Furthermore, other positive characteristics are attributed to attractive individuals of both sexes by both sexes (e.g., Dion, Berscheid, & Walster, 1972; Eagly, Ashmore, Makhijani, & Longo, 1991; Feingold, 1992; Wheeler & Kim, 1997). Finally, because low weight for height is deemed attractive in young women (e.g., Swami, Miller, Furnham, Penke, & Tovée, 2008), and because physical attractiveness affects women's "sex appeal" more than it does men's (e.g., Buss, 1989),

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social effects on food intake may be especially strong in young women engaged in impression management in the presence of potential romantic partners.

Are the results of laboratory experiments, with highly constrained food choices and somewhat contrived social circumstances, indicative of social influences on eating in natural settings? Diary studies of eating with self-selected companions and menus go some way towards answering this question. deCastro (1994) analyzed the diary reports of over 500 U.S. men and women, and found that, as in the laboratory, men ate more than women and both sexes ate more when with companions (of either sex) than when alone. Surprisingly, however, he also reported that women ate more in the presence of men than they did with women. Since these analyses aggregated family, friend, and co-worker companions, further research is needed to clarify any context-and-sex-specific effects, and of course it is also possible that inaccuracies in diaries are not random but biased.

Here, we report naturalistic observations of university students in cafeterias, with a wide choice of foods and possible companions, a setting in which concerns with impression management while forging new friendships or romantic relationships are likely to be prevalent. We hoped to show that the foods selected by men and women would be differentially affected by group size and composition, anticipating that men would generally select foods of higher caloric value, but that women would select even lower calorie options in the presence of a man, and might also show a further effect of additional men in the group if more men provide a greater incentive or opportunity to transmit a “signal” of femininity.

## Methods

### Participants

We observed students at meal times in three cafeterias at McMaster University in Hamilton, Ontario, Canada. A total of 469 individuals in 266 groups were unobtrusively observed sitting down at tables alone or with others.

### Procedure

People were observed from a distance of at least 10 meters during lunch (between 11:30 and 13:30) and supper times (between 17:30 and 20:00) for 4 weekdays over the course of 1 week. Food selection areas and eating areas were separate in all cases. Viewing was unobstructed: observations were made from a mezzanine in two cafeterias, and the third was not densely populated. Tables could readily accommodate up to six people. Four observers initially recorded data in pairs to establish a reliable protocol before continuing to make observations independently. Researchers scan-sampled all occupied tables as people were sitting down to dine, and recorded all food items in front of each person, not including beverages. Whether food was consumed was not recorded. Typical foods included pizza, pasta, salad, hamburger, fries, and fruit.

### Measurement

The scan-sampling technique involved a one-time scan of each table, recording each person's gender and food items. The possibility of others joining or leaving the group later was not investigated. Food items were converted to caloric equivalents, obtained from the management of each cafeteria, for analysis. For the few occasions that caloric information was not provided, we used [www.thecaloriecounter.com](http://www.thecaloriecounter.com) to estimate the caloric

value of standard food items without knowing actual weights or volumes.

### Data analysis

Multiple regression was used to assess whether gender, cafeteria, and mealtime (lunch vs. dinner) were significant predictors of total calories per person per meal. For dyads of same- or opposite-sex persons, total calories of men's meals and women's meals were compared using Analysis of Variance. How group size and composition affected calories per meal was assessed by multiple regression with sex, group size, group type (same-sex or mixed-sex), and numbers of females and males as predictors. In order to avoid pseudo-replication in analyses of groups differing in size, the mean caloric value for males and females in each group was calculated and used as the dependent variable for regression analysis.

## Results

Descriptive statistics are presented in Table 1. Total calories were significantly higher for men's meals than for women's (males:  $716.8 \pm 246.2$  SD; females:  $609.7 \pm 272.7$  SD ( $F(1,467) = 19.5$ ,  $p < .001$ )). The three cafeterias did not differ, and lunches contained slightly more calories than suppers (lunch:  $692.9 \pm 268.7$  SD; supper:  $642.8 \pm 264.2$  SD ( $F(1,467) = 3.5$ ,  $p = .06$ )). Calories per meal did not differ by group size. The most common group size was two, and fewer than 8% of those observed ate alone.

### Dyads

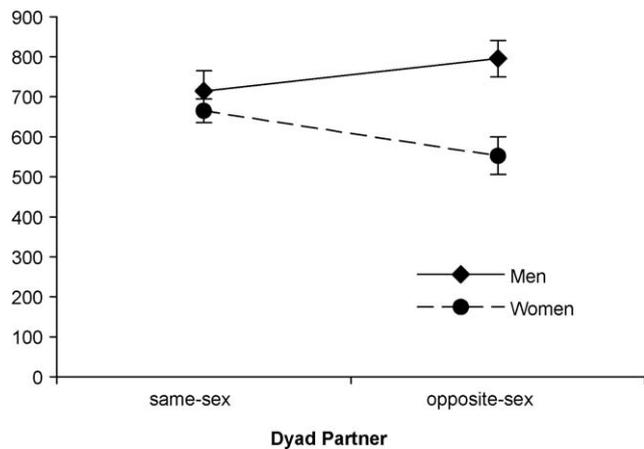
Food selection in dyads was examined in relation to the pair's gender composition. There was a main effect of gender, with women selecting foods with fewer calories (males:  $755.0 \pm 32.0$  SEM calories, females:  $609.0 \pm 27.9$ ;  $F(1,184) = 11.68$ ,  $p < .001$ ). There was no main effect of dyad type, but a significant interaction was found between gender and dyad type ( $F(1,184) = 5.1$ ,  $p < .05$ ).

*Post hoc* analyses indicated that females chose foods with significantly fewer calories when eating with men rather than women (female eating with a male:  $552.7 \pm 47.1$  SEM; with another female:  $665.3 \pm 29.7$ ,  $F(1,112) = 4.31$ ,  $p < .05$ ); men exhibited no such effect (Fig. 1). In same-sex dyads there were significant positive correlations of total calories for the two parties (men:  $r = 0.63$ ,  $N = 19$ ,

**Table 1**

Average and standard deviation (SD) and number of observations of total caloric value of food items per person, according to gender, cafeteria, mealtime, and group size.

	Mean	±SD	Number
Eater			
Male	716.8	±246.2	210
Female	609.7	±272.7	259
Location			
A	680.9	±303.7	85
B	662.1	±296.1	193
C	642.7	±211.6	191
Mealtime			
Lunch	692.9	±268.7	139
Dinner	642.8	±264.2	330
Group size			
1	646.0	±283.2	37
2	678.6	±286.2	188
3	617.2	±264.3	117
4	696.9	±200.7	80
5	645.4	±273.3	35
6	531.8	±224.8	12

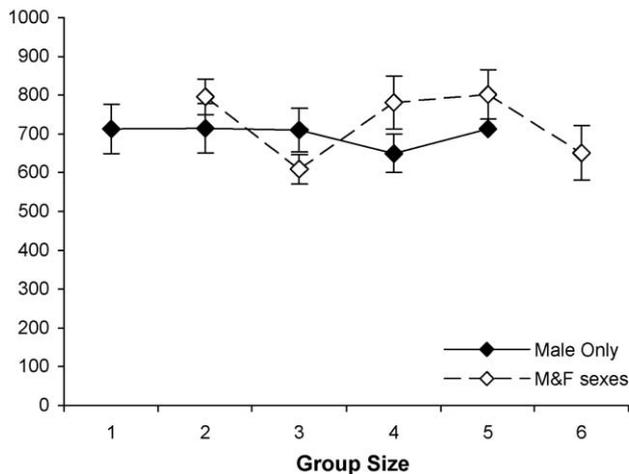
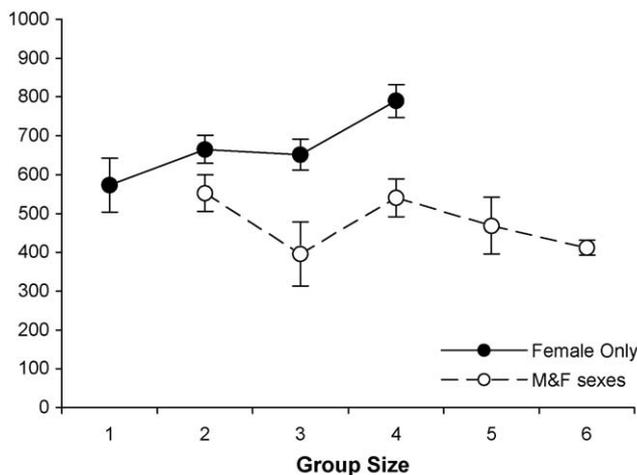


**Fig. 1.** Average calories per meal in dyads, according to gender composition. Error bars represent standard error of the mean.

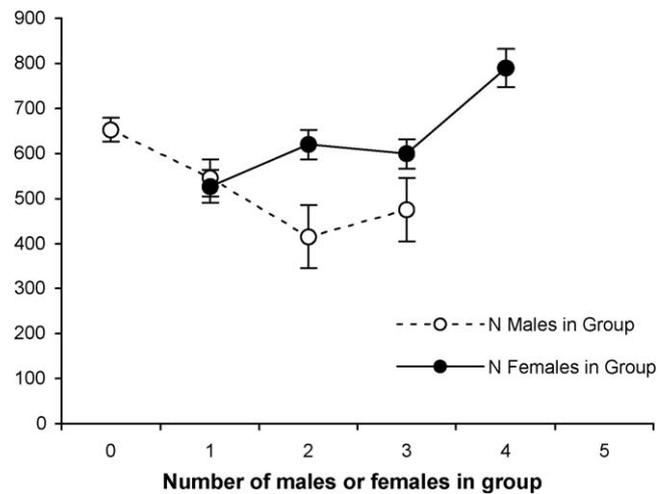
$p < .01$  and women:  $r = 0.68, N = 19, p < .01$ ), but this was not the case for mixed-sex dyads ( $r = 0.10, N = 19, p > .05$ ).

*All observed groups*

For analysis of all observed groups, the mean caloric value of foods chosen by all women and by all men in each group were used



**Fig. 2.** Average calories per meal for women (upper panel) and for men (lower panel) in relation to group size (1–6) and whether meal companions are of the same-sex or both sexes. For groups of two persons or more the mean values depicted are based on the sex-specific group averages. Error bars represent standard error of the mean.



**Fig. 3.** Average calories per meal for women in relation to the total number of females and males at the table. For groups of two persons or more the mean calorie values depicted are based on the female-specific group averages. Error bars represent standard error of the mean.

as the outcome variables in regression analyses. An analysis of effects of group size and type (same-sex vs. mixed-sex) on total calories food selections reveals that type of group was a significant predictor of mean calories chosen by women (regression  $F(2,143) = 6.42, p < .005$ ; standardized  $\beta = -.295, t = -3.45, p < .005$ ), but group size was not a significant predictor ( $\beta = .026, t = 0.31, p > .05$ ). Neither type of group, nor group size was a significant predictor of the mean caloric value of foods chosen by men (regression  $F(2,118) = .60, p > .05$ ; Fig. 2).

Since women were significantly influenced by whether eating companions were only other women or both sexes (Fig. 2), we examined the impact of number of male and female persons in the group (Fig. 3). The number of men was a significant negative predictor of calories selected (regression  $F(2,143) = 8.87, p < .001$ ; standardized  $\beta = -.264, t = -3.23, p < .005$ ), whereas the number of women was a non-significant positive predictor ( $\beta = .145, t = 1.77, p = .079$ ).

In contrast, neither the number of women nor men in the group was a significant predictor of men’s total calories per meal.

**Discussion**

In these university cafeterias, eating is a social activity; fewer than 8% ate alone. In dyads, women selected foods with lower caloric value if their companion was male than if with another woman, whereas men’s choices were not affected by partner’s sex. Also, we found a significant positive correlation between the partners’ calorie totals in same-sex dyads, but not in opposite-sex dyads, in contrast to Salvy, Coelho, et al. (2007) and Salvy, Jarrin, et al. (2007)’s experimental results, in which opposite-sex dyads of both familiar and unfamiliar persons exhibited significant concordance in intake. Our results suggest that the role of conformity in food choice and consumption may be situationally specific; it is perhaps most relevant for relatively unacquainted persons engaged in impression management, and less so when eating with potential romantic partners. This conjecture jibes with evidence that women’s food consumption affects their feelings of femininity and their own and others’ impressions of their attractiveness (e.g., Vartanian et al., 2007). Further research will undoubtedly reveal other qualifications to the social conformity account of social eating.

In our naturalistic study, women’s total calories were not just reduced in the presence of a male, but also decreased further as a function of the number of male companions (and tended to show a

reverse effect of female companions). No such pattern was observed for men. These results challenge the argument that consumption varies merely as a function of the social facilitation effect of increasing numbers of eating companions (e.g., deCastro, 1997). At least in a university cafeteria setting, such social facilitation must be qualified by gender and group composition: other women were apparently facilitators of women's eating, but men were not. There is a large literature suggesting that women, in particular, adjust their eating to accord with consumption stereotypes, specifically that smaller eaters are viewed more favorably (e.g., Vartanian et al., 2007). The women we observed adjusted food selection not so as to match men, but perhaps in accordance with beliefs about what men find attractive. In these university cafeterias, people select their food before they are seated and perhaps before they know with whom they will eat, but given the observed differences, it seems likely that particular social groupings were anticipated at the time of food selection. However, in the absence of within-subject data, it remains possible that the lower intake of women who were eating with men reflects a difference between categories of women, rather a response to male presence.

What ones eats and how much can affect people's impressions of one's habits, world-views, social appeal, and attractiveness (e.g., Barker et al., 1999; Basow & Kobrynowicz, 1993; Bock & Kanarek, 1995; Mooney, DeTore, & Malloy, 1994; Oakes & Slotterback, 2004–2005; Stein & Nemeroff, 1995; Vartanian et al., 2007). Perhaps, university women are particularly concerned about attractiveness, and believe that men find women who eat less more attractive. The diet industry targets female consumers (e.g., George & Johnson, 2001) and product advertisements typically depict very slim models rather than average or overweight female models (Halliwell & Dittmar, 2004).

In our study, men's food selections were not substantially affected by the number or gender of their companions. Total calories per meal were somewhat higher in the presence of a female companion versus another man, but not significantly so. There is scant evidence that men eat more to impress women. Women rate mesomorphic men more attractive than endomorphs (e.g., Provost, Kormos, Kosakoski, & Quinsey, 2006), but social status and wealth affect men's romantic appeal to women more than physical attractiveness (e.g., Buss, 1989; Maner, DeWall, & Gailliot, 2008). It would be interesting to see if men choose costlier foods when eating with women, as a signal of means.

What and how much one eats may affect developing social relationships, as is suggested by studies of person perception in relation to amount and types of food eaten (e.g., Vartanian et al., 2007). In our study, degrees of acquaintanceship are unknown, but presumably many persons were casual acquaintances or relatively new friends, and perhaps same-sex dyads were more closely acquainted than people in mixed-sex groups. Further research on social eating of young adults needs to take into account the social "marketplace" where impressions may be quickly formed with relatively lasting reputational consequences (e.g., Amiraian & Sobal, 2009). We also need to understand why women's foods differ in the presence of male versus female meal companions. Experiments are powerful for isolating relevant variables, but must be complemented with more naturalistic studies of social eating to ensure that their results have ecological validity.

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