

Internal and External Cues of Meal Cessation: The French Paradox Redux?

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Abstract

WANSINK, BRIAN, COLLIN R. PAYNE, AND PIERRE CHANDON. Internal and external cues of meal cessation: the French paradox redux? *Obesity*. 2007;15:2920–2924.

Objective: Our objective was to investigate whether people who use internal cues of satiation when eating a meal are likely to weigh less than people who instead rely on external cues. In addition to exploring the role that internal and external cues play in meal cessation, this study raises an overlooked explanation of the French paradox.

Research Methods and Procedures: A demographically-matched student sample of 133 Parisians and 145 Chicagoans completed a brief survey on meal cessation that asked the extent to which they agreed with statements associated with internal cessation cues and statements with external cessation cues. Their answers to these were compared across BMI levels and across countries.

Results: Normal-weight people indicated that they were more likely to be influenced by internal cues of meal cessation ($p = 0.043$), while overweight people indicated that they were more influenced by external cues ($p = 0.005$). Similarly, while the French were influenced by internal cues of meal cessation ($p < 0.001$), Americans were more influenced by external cues ($p < 0.001$).

Discussion: This research revisits Schachter's externality hypothesis and suggests that one's over-reliance on external cues may prove useful in offering a partial explanation of why BMI might vary across people and potentially across cultures. Relying on internal cues for meal cessation, rather than on external cues, may improve eating patterns over the long term.

Key words: disordered eating, environmental factors, psychosocial behavior, sociology, hunger

Introduction

Through an ingenious series of studies in the 1960s, Stanley Schachter and his colleagues first suggested that the food environment might have a more biasing influence on overweight people than on normal-weight people (1,2). These studies manipulated the salience of food, perceived time, and effort to show that overweight people over-relied on these external cues (compared with normal-weight people) when determining when to start and stop eating (3–5). Over the years, these findings have been qualified and absorbed into newer theories of self-restraint and intake regulation (6–9). A recent resurgence of interest in environmental (external) cues and weight gain suggests that an internal/external orientation toward food might have renewed relevance (10,11). In addition to helping explain a possible contributor to BMI, it may also be a missing part of the discussion as to why eating behavior and BMI vary across cultures.

Consider what some have perhaps overdramatically referred to as the “French Paradox”: French men and women eat relatively more seemingly indulgent foods than American men and women, yet have lower levels of obesity (12–14). This has generally been attributed to a large number of factors, including greater amounts of exercise (walking) and smaller predetermined portion sizes (12). One unexamined factor, however, is whether people who are from a more involved food culture, such as France (15), might have a stronger orientation to internal cues of satiation than external ones. We examine the impact that responsiveness to internal and external cues has on weight and how it might be related to country of origin.

Research Methods and Procedures

A demographically-matched (college education, age, gender) sample of 131 Parisian and 145 Chicagoan students were recruited at college campuses in Paris and Illinois to complete a brief survey on food habits. (Two subjects were removed from the Parisian sample because more than 70%

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Table 1. Meal cessation item loadings on meal cessation factors

	Factors†	
	Internal	External
Internal cue items*		
I usually stop eating when I start feeling full.	0.779	0.136
I usually stop eating when I want to leave room for dessert.	0.745	0.092
If it doesn't taste good, I'll still eat it if I am hungry.	0.509	-0.311
External cue items*		
I usually stop eating when I've eaten what most think is normal.	-0.013	0.742
I usually stop eating when I run out of a beverage.	0.044	0.655
I usually stop eating when the TV show I'm watching is over.	0.023	0.487

* Items were measured on a 1 to 9 scale (1 = strongly disagree; 9 = strongly agree).

† Principle components analysis with oblimin rotation was used to derive the respective factors; factor correlation $r(280) = -0.041$, $p = 0.492$.

of their questionnaire was incomplete.) The Institutional Review Board approved both French and English questionnaires. Based on focus groups and on existing scales of externality (16,17), a questionnaire was developed that asked participants to rate the extent to which they agreed or disagreed (1 = strongly disagree; 9 = strongly agree) with statements regarding meal cessation. The questionnaire had been translated from English into French and then back-translated from French into English by two bilingual speakers to help ensure that both cultures were asked questions of a similar meaning. Items were kept that were successfully back-translated by both individuals.

The statements pertaining to internal cues of meal cessation included "I usually stop eating when I start feeling full;" "I usually stop eating when I want to leave room for dessert;" and "If it doesn't taste good, I'll still eat it if I am hungry." The statements pertaining to external cues of meal cessation included "I usually stop eating when I've eaten what most think is normal;" "I usually stop eating when I run out of a beverage;" and "I usually stop eating when the TV show I'm watching is over." Participants were also asked demographic questions, including height and weight.

Self-reported meal cessation behaviors were compared between those people whose BMI was $<25 \text{ kg/m}^2$ and those people whose BMI was $\geq 25 \text{ kg/m}^2$. By using the World Health Organization standards to dichotomize the BMI at 25 kg/m^2 , one-way analyses of covariance could be conducted controlling for sex, age, and years of college education. A similar analysis was conducted across meal cessation behaviors between French and Americans. All analyses were conducted using SPSS statistical software (version 13.0; SPSS, Inc., Chicago, IL). A p value of ≤ 0.05 was used as a criterion for statistical significance.

Results

To determine if the 6 meal cessation behavior measures could generally be classified as internal or external, the items were submitted to a principal components analysis with oblimin rotation. Table 1 indicates that 2 factors emerged from the rotated solution: The items, "I usually stop eating when I start feeling full," "I usually stop eating when I want to leave room for dessert," and "If it doesn't taste good, I'll still eat it if I am hungry," loaded on an internal cue factor with loadings of 0.779, 0.745, and 0.509, respectively. The items, "I usually stop eating when I've eaten what most think is normal," "I usually stop eating when I run out of a beverage," and "I usually stop eating when the TV show I'm watching is over," loaded on an external cue factor with loadings of 0.742, 0.655, and 0.487, respectively. The correlation between the two factors was -0.041 ($p = 0.492$).

Because each meal cessation item loaded on its anticipated respective factor, an "internal cue" score was calculated by adding the three internal items together and dividing this sum by 3. This process was repeated for the three external items, resulting in an "external cue" score.

It was hypothesized that individuals who were overweight would be more likely to rely on external cues of meal cessation, while those of normal weight would be more likely to rely on internal cues. Consider the average of the 3 internal cues and the average of the 3 external cues (Table 2). Compared with people who were of normal weight, overweight individuals were more likely to use external cues (5.8 vs. 5.3, $p = 0.043$) to determine when they were finished with a meal and less likely to use internal cues (3.7 vs. 4.3, $p = 0.005$). Specifically, they were more likely to rely on external cues, such as when the TV show

Table 2. Internal and external cues of meal cessation (means with standard errors in parentheses)

	BMI			Nationality		
	BMI <25 (n = 231)	BMI ≥25 (n = 45)	<i>p</i>	French (n = 131)	American (n = 145)	<i>p</i>
Internal cues (average)*	5.8 (0.10)	5.3 (0.24)	0.043	6.6 (0.12)	4.9 (0.11)	0.000
I usually stop eating when I start feeling full.	6.1 (0.16)	5.6 (0.37)	0.084	7.0 (0.19)	5.2 (0.18)	0.000
I usually stop eating when I want to leave room for dessert.	6.2 (0.15)	6.0 (0.35)	0.665	6.9 (0.18)	5.4 (0.17)	0.000
If it doesn't taste good, I'll still eat it if I am hungry.	5.1 (0.15)	4.4 (0.37)	0.060	5.8 (0.19)	4.3 (0.18)	0.000
External cues (average)*	3.7 (0.09)	4.3 (0.22)	0.005	3.2 (0.11)	4.3 (0.11)	0.000
I usually stop eating when I've eaten what most think is normal	4.5 (0.15)	5.4 (0.37)	0.010	4.0 (0.20)	5.2 (0.19)	0.000
I usually stop eating when I run out of a beverage	3.7 (0.14)	4.0 (0.33)	0.467	3.5 (0.18)	4.0 (0.17)	0.021
I usually stop eating when the TV show I'm watching is over.	2.9 (0.13)	3.6 (0.32)	0.034	2.2 (0.17)	3.7 (0.16)	0.000

Values are mean (standard error).

* Items were measured on a 1 to 9 scale (1 = strongly disagree; 9 = strongly agree).

they were watching was over (2.9 vs. 3.6, $p = 0.034$) or when others thought it was normal to stop (4.5 vs. 5.4, $p = 0.010$), and they were less likely to rely on their own hunger (5.1 vs. 4.4, $p = 0.060$) as a signal to stop.

As Table 3 indicates, the French have a lower average BMI than Americans (20.7 vs. 23.6 kg/m², $p < 0.001$). This

difference reflects national trends of BMI for the French (21.5 kg/m²) and Americans (24.8 kg/m²) for the same age group as that used in this study (12,14). As suggested by the demographically matched sample, there were no significant differences between countries for age ($P = 0.195$), college education ($p = 0.403$), or gender ($p = 0.935$).

Table 3. BMI and demographic differences between French and American samples*

	French (n = 131)	American (n = 145)	<i>p</i> *
BMI			
BMI (kg/m ²)	20.7 (2.6; 16.7 to 33.1)	23.6 (3.0; 19.7 to 36.9)	0.000
Body weight (kg)	60.2 (14.1; 44.1 to 110.5)	69.5 (10.6; 47.7 to 113.6)	0.000
Underweight (≤18.4)	15.7%	0%	0.000
Normal-weight (18.5 to 24.9)	77.6%	75.7%	0.702
Overweight (25 to 29.9)	5.2%	20.9%	0.000
Obese (≥30)	1.5%	3.4%	0.302
Age (yrs)	21.5 (2.0; 18 to 30)	21.1 (2.6; 20 to 43)	0.195
College education (yrs)	3.3 (1.1; 1 to 5)	3.2 (0.67; 2 to 6)	0.403
Gender (percent male)	27.9%	28.4%	0.935

Values are expressed as mean (range; standard deviation) unless otherwise indicated.

* Comparison between groups: χ^2 for sex and t tests for the remaining variables.

Returning to Table 2, the French were more likely to report food behaviors that suggested that they used internal cues of meal cessation rather than external cues of meal cessation (6.6 vs. 4.9, $p < 0.001$). More so than Americans, the French reported that they stopped eating when they started to feel full (7.0 vs. 5.2, $p < 0.001$), when they wanted to leave room for dessert (6.9 vs. 5.4, $p < 0.001$), and when they no longer felt hungry (5.8 vs. 4.3, $p < 0.001$). In contrast, Americans reported food behaviors that suggested that they tended to use external cues of meal cessation rather than internal cues (4.3 vs. 3.2, $p < 0.001$). More so than the French, Americans reported that they stopped eating when others thought it was normal (5.2 vs. 4.0, $p < 0.001$), when they ran out of a beverage (4.0 vs. 3.5, $p < 0.05$), and when the television show they were watching was over (3.7 vs. 2.2, $p < 0.001$).

A person's reliance on internal/external cues explained 14% of the variation between the weight of the French vs. that of Americans. Given the small size of this sample, the Sobel test for external ($p = 0.90$) and internal ($p = 0.42$) cues showed that 14% of the variation did not significantly mediate the relationship between country of origin and whether one is overweight according to standard methodologies of mediation analysis (18–20).

Discussion

In the 1960s, Schachter's externality hypothesis caught the imagination of researchers, and it stimulated a burst of research that has resulted in many of today's key behavioral theories related to food intake and regulation. This research revisits Schachter's notion and shows that one's orientation toward external vs. internal cues may have an important influence on when a person decides that he or she is finished with a meal. In this sample, those who were overweight were more likely to rely on external cues of meal cessation, whereas those who were normal-weight were more likely to rely on internal cues.

This study used a college-age sample, which is generally considered non-representative of the general population. Yet studies of portion size and eating behaviors have consistently shown that, in the context of food, such a sample is surprisingly generalizable to broader demographic groups (12). Further research should consider smoking behavior and socioeconomic differences between the French and Americans. While these variables may not account for all of the differences between the French and American waistline, they could suggest a greater proportion of explained variance in BMI than that reported here. In addition, while self-reports of BMI are known to be somewhat similarly biased in both the United States and France (21), these biases have been shown to be somewhat systematic and correlated to actual BMI. Measuring actual height and

weight would be helpful for future studies that aim to examine how the results found here remain robust or change as a function of these biases.

These preliminary findings do not preclude the use of uni-dimensional scales to measure the 2 constructs of internal cues and external cues. Future studies could be linked to using scales focused on more specifically assessing secondary dimensions related to these 2 types of cues.

There are promising opportunities for research into the ways in which relying on external cues of meal cessation in the "obesogenic environment" may influence a person to keep eating past an appropriate point (22). Relying on oneself for meal cessation, rather than on external cues, may provide one important key to energy balance (23).

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