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The Effect of a Target Bite Count and Plate Size on Food Intake

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Introduction

One factor behind the increasing rates of obesity is plate size¹. Research has shown that eating from a larger plate leads to greater consumption by affording a larger portion². This tendency may be the result of completion compulsion³ coupled with people's poor ability to monitor their own intake.

Bite count has been shown to be an accurate measure of intake. The Bite Counter objectively monitors ingestive behavior by providing real time bite count³ (Fig. 1).

The purpose of the current study was to determine if an instruction on the number of bites to take and providing bite count feedback could overcome the effect of plate size.



Figure 1. Wrist-roll measured by the Bite Counter.

Methods

Participants ate a meal of macaroni and cheese with up to 3 others in a laboratory setting.

Design	Small plate	Large plate
Instruction given: "Take 12 bites"	n=32	n=28
Instruction not given	n=28	n=27

Table 1. Experimental design and sample size by condition.

Participants	Female	Male
Same size	67	48
Age	18.58 ± 1.01	18.97 ± 1.49
BMI	22.17 ± 2.76	24.04 ± 3.80
Ethnicity	58 Caucasian, 9 others	42 Caucasian, 6 others

Table 2. Participant demographics.

Methods (cont'd)

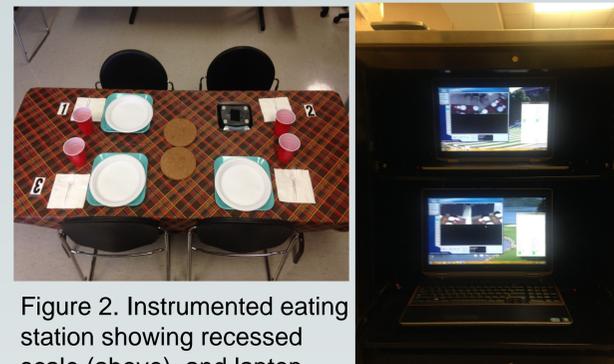


Figure 2. Instrumented eating station showing recessed scale (above), and laptop monitoring station (right).

Prior to eating participants completed a hunger scale. They were allowed to serve themselves from one large container in the middle of the table (Fig. 2). After obtaining a stable food weight from recessed scales in the eating station the experimenter instructed participants to turn on their Bite Counters and begin eating. As the participants ate, the experimenter monitored the session via two laptops that were connected to four video cameras in the ceiling, one recording each participant (Fig. 2).

As participants finished their course they either indicated that they were finished eating at which time they were instructed to turn off their Bite Counters and wait for others to finish, or they requested an additional course of macaroni and cheese which was served by a research assistant. If additional courses were served a stable food weight was obtained and the participants were allowed to continue eating.

The dependent variables were: *grams consumed*, *bites taken*, *bite size*, and *hunger change*.

Results

ANOVAs were used to analyze the dependent variables. Analysis of *grams consumed* revealed a main effect of plate size ($p < .001$) (Fig. 3).

Analysis of *bites taken* revealed a main effect of plate size ($p < .001$), a main effect of instruction ($p < .001$), and an interaction ($p < .001$) (Fig. 4).

Analysis of *bite size* revealed a main effect of instruction ($p < .001$) (Fig. 5).

Analysis of *hunger change* revealed a main effect of *plate size* ($p < .05$) and a marginal interaction ($p = .06$).

Results (cont'd)

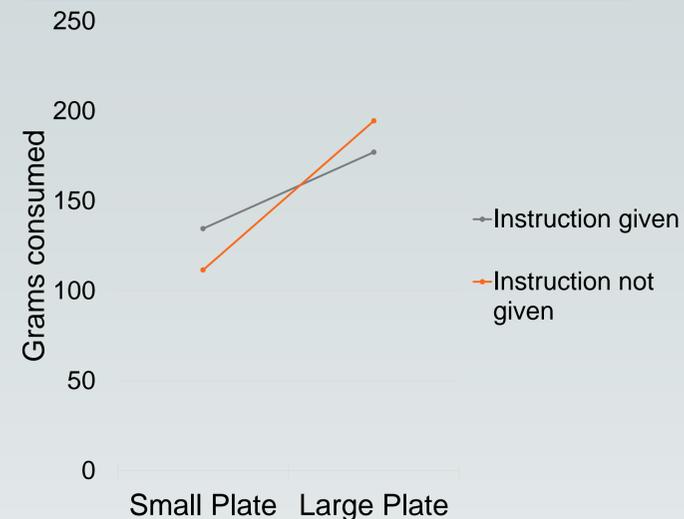


Figure 3. Means for *grams consumed* by condition.

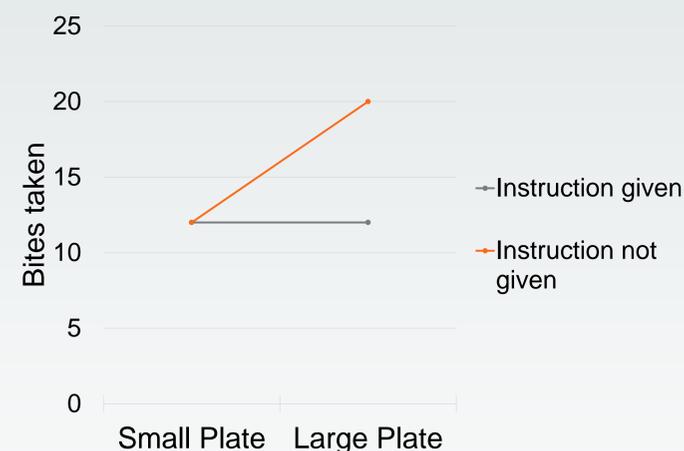


Figure 4. Means for *bites taken* by condition.

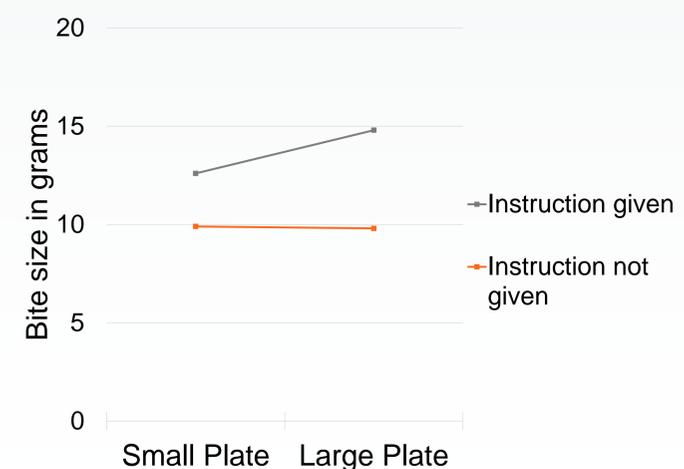


Figure 5. Means for *bite size* by condition.

Conclusion

The purpose of this study was to determine if an instruction to take fewer bites than normally taken, would reduce intake and overcome the environmental cue of plate size, where eating from a larger plate causes individuals to eat more^{5,6}. Research has shown that such environmental cues may contribute to the increasing rates of overweight and obesity⁷.

This study replicated the effect of plate size on consumption while demonstrating the ability of a wearable intake monitor such as the Bite Counter, along with an instruction, to overcome that effect.

Individuals who were given the instruction to take only 12 bites compensated for the lack of control over their own environment by taking significantly larger bites⁸. This is consistent with research that has demonstrated an effect of plate size and portion size on bite size when participants are aware of the manipulations^{9,10}.

In conclusion, the results suggest that the use of a wearable intake monitor along with an instruction on the number of bites to take can overcome the effect of plate size on the number of bites people take. Future research should examine ways to mitigate the effect of instruction on bite size to prevent compensation by taking larger bites.

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