

## Abstract

Weight gain in first-year university students is of particular concern in the development of lifelong overweight or obesity. Guided by social norm and social facilitation theories, the present experimental study investigated whether first-year college women's palatable food intake was adjusted to match researcher-set consumption norms while in groups of 2 or in 2 possible alone conditions (videotaped vs. not), and whether the weight status of participants affected adherence to these norms. Fifty-five women completed a survey on their interests alone, alone and videotaped, or with a partner, and were provided cookies purportedly as a snack during the survey. Normative consumption was set by a research assistant who stated how many cookies most participants ate and caloric consumption was measured. While neither norm condition nor BMI/weight status were found to be significant predictors of caloric consumption, participants who were alone but told they were being observed by a video camera decreased their consumption by about 107-116 calories compared to those participants who were alone and unobserved after controlling for hunger, sociability and dietary restraint. Paired individuals also decreased consumption but to a lesser extent than those alone but observed by video camera, by about 65 calories, indicating social evaluative threat may be a factor of importance in addition to the mere presence of others. These preliminary findings provide implications for future social eating model evaluations, particularly those comparing eating alone to eating in groups.

## Introduction

- Obesity [body mass index (BMI) > 30 kg/m<sup>2</sup>] is a significant health concern and may be particularly problematic for first-year college students due to development of life-long eating habits as freshman that may contribute to continued or developed obesity or overweight (BMI between 25-29.9 kg/m<sup>2</sup>) in later life<sup>1</sup>
- First year of college is a high risk period for weight gain, previously called "Freshman 15," but more realistically the "Freshman 5"<sup>2</sup>
- Social norms associated with "clustering" of obesity among young people, or a social contagion effect via social networks<sup>3,4,5</sup>
- Social Facilitation Theory suggests that a drive state is created by the mere presence of others, increasing the probability of a behavior<sup>6</sup> and has been applied to the enhanced consumption of food in response to its presence in the presence of others<sup>7</sup>
- Social Norms Approach suggests eating behavior can be inhibited or augmented based on norms set by others' consumption in the social group<sup>8,9</sup>
- Neither theory sufficiently explains social eating and the impact of weight status on consumption in the current literature
- Present experimental study attempted to resolve conflicting theoretical perspectives of Social Facilitation Theory and Norms Matching Approach by investigating if first-year college women's palatable food intake adjusted to match researcher-set norms when alone, alone and videotaped, or with a partner, and whether the weight status of participants affected adherence to these norms

Table 1. Descriptive statistics and zero-order correlations

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	
1. Sociability	1.11	.49													
2. Familiarity	1.2	.61	.15												
3. Hunger (likert)	2.6	1.30	-.14	-.12											
4. Dietary Restraint (TFEQ-R)	9.35	5.84	.06	.14	.18										
5. BMI	23.60	4.32	-.12	.03	-.08	.31									
6. Overweight Status	.30	.46	.05	.13	-.04	.21*	.79**								
7. Alone and Observed	.14	.35	.23*	N/A	.01	.07	.07	.02							
8. Normal-Norm Pair	.24	.43	-.14	-.23*	.06	-.16	-.31**	-.23*							
9. Overweight-Norm Pair	.31	.47	.00	-.27*	-.07	.09	.24*	.31**	-.28**	-.32**					
10. High Norm	.52	.50	-.12	.16	-.17	-.01	.03	-.01	.02	.04	-.02				
11. Medium Norm	.27	.44	-.03	-.19	.20	-.15	-.15	-.07	.03	.12	-.20	-.63**			
12. Calories	98.02	111.88	-.09	-.12	.52**	.01	.02	.02	-.20	.03	.02	-.03	.07		
13. Manipulation Check	.23	.42	.05	.19	-.19	.11	.05	.11	.07	-.16	.12	.03	-.05	-.15	

Note. \* p<.05, \*\* p<.01.

Table 2. Hierarchical linear regression coefficients for Regression A

Model	B	S.E.	β	R <sup>2</sup>	F	Model
1				.31**	7.66**	1
(Intercept)	-42.77	57.54				
Hunger (likert)	60.75**	13.12	.59			
Dietary Restraint	-2.56	2.62	-.12			
Sociability	5.73	37.26	.02			
2				.41**	6.66*	2
(Intercept)	-24.32	57.01				
Hunger (likert)	59.65**	12.44	.58			
Dietary Restraint	-.71	2.57	-.03			
Sociability	21.66	36.51	.07			
Alone x Observed	-110.62*	41.60	-.35			
Paired	-60.26	30.81	-.25			
3				.42**	4.91	3
(Intercept)	-56.97	68.23				
Hunger (likert)	63.41**	12.90	.61			
Dietary Restraint	-.70	2.59	-.03			
Sociability	17.51	36.88	.06			
Alone x Observed	-106.58*	41.98	-.34			
Paired	-64.69*	31.20	-.27			
High Norm	41.36	40.92	.17			
Medium Norm	10.41	45.24	.04			

Note. \*\* indicates significance at p<.01; \* indicates p<.05. N=55.

Table 3. Hierarchical linear regression coefficients for Regression B

Model	B	S.E.	β	R <sup>2</sup>	F	Model
1				.31**	5.68**	1
(Intercept)	-76.58	114.29				
Hunger (likert)	61.97**	13.71	.60			
Restraint	-2.93	2.86	-.14			
BMI	1.28	3.73	.04			
Sociability	9.10	38.85	.03			
2				.42**	4.83*	2
(Intercept)	-116.67	111.55				
Hunger (likert)	63.83**	13.27	.62			
Restraint	-1.63	2.76	-.08			
BMI	3.41	3.71	.12			
Sociability	32.93	38.53	.11			
Alone and Observed	-119.76**	43.16	-.38			
Normal-Norm Pair	-70.61	38.10	-.24			
Overweight-Norm Pair	-58.03	37.20	-.21			
3				.43**	3.83	3
(Intercept)	-147.24	120.22				
Hunger (likert)	66.62**	13.62	.64			
Restraint	-1.56	2.78	-.08			
BMI	3.38	3.75	.12			
Sociability	28.47	39.11	.09			
Alone and Observed	-115.96*	43.70	-.37			
Normal-Norm Pair	-70.14	38.47	-.24			
Overweight-Norm Pair	-66.11	38.27	-.24			
High Norm	41.37	41.72	.17			
Medium Norm	14.56	46.02	.05			

Note. \*\* indicates significance at p<.01; \* indicates p<.05. N=55.

## Acknowledgments

Thank you to the UNC Charlotte Department of Psychology and the UNC Charlotte Health Psychology Ph.D. Program for their financial support.

## Results

- Measured mean BMI for the sample 23.6 kg/m<sup>2</sup> (SD = 4.32)
- High norm condition negatively associated with manipulation check (r=-.25, p=.02), indicating that participants receiving high norm more likely to fail the manipulation check
- BMI positively associated with dietary restraint (r=.31, p<.01)
- Sample's measured mean (SD) of 9.35 (5.84) on restraint is high relative to prior samples<sup>11</sup>
- All regressions including those not reported, norm condition did not account for a significant proportion of variance in consumption, contrary to expectations
- One-way analysis of variance confirmed no significant effect of norm condition F(4,85) = 1.54, p = .20
- Descriptive statistics and correlations are presented in Table 1.

## Methods

### Participants

- Fifty-five, first-time college women attending a large publicly-funded institution located in the southeastern United States

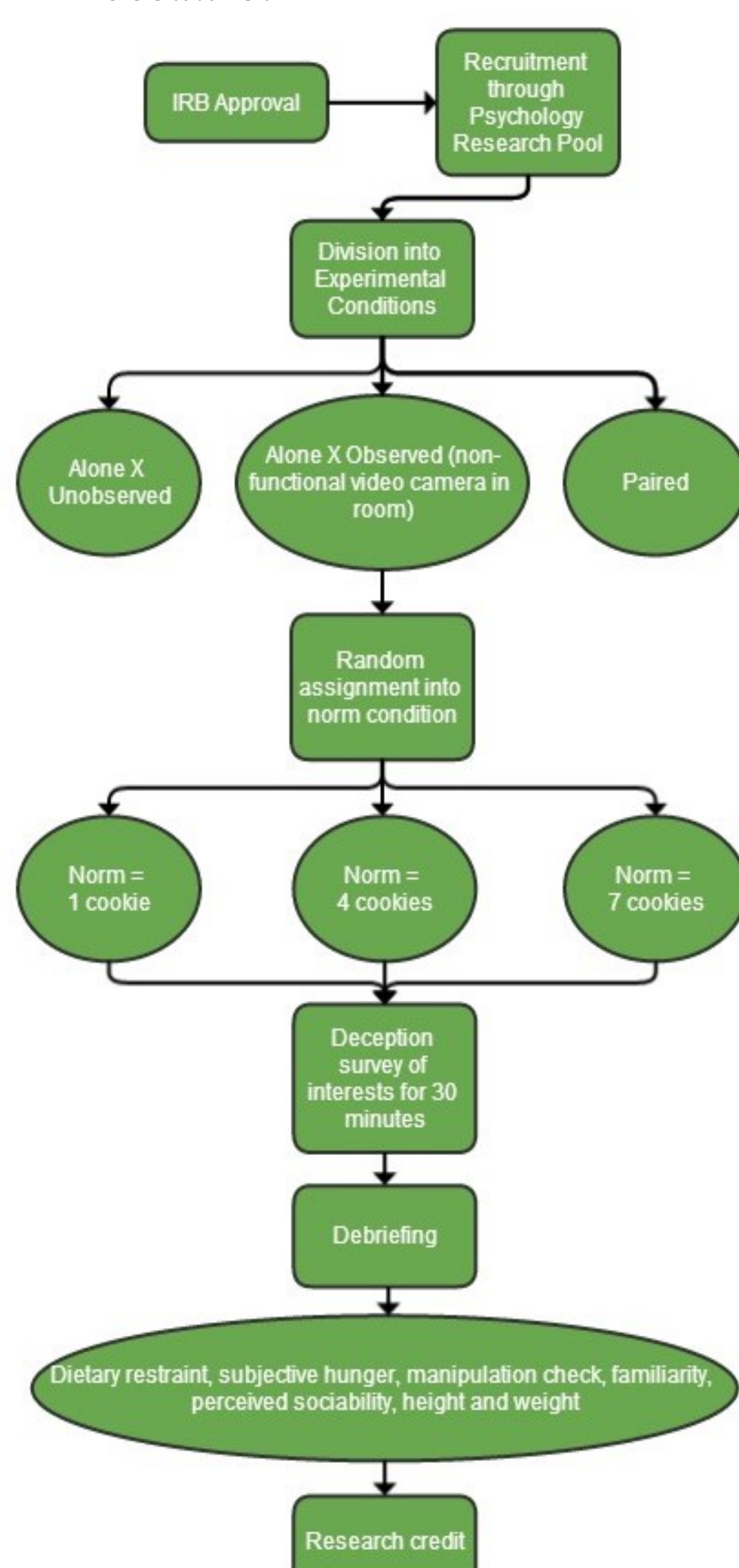
### Measures

- Body mass Index
- Caloric Consumption
- Familiarity
- Sociability
- Subjective Hunger
- Three Factor Eating Questionnaire – Restraint Subscale<sup>10</sup>

### Statistical Analyses

- Correlations were analyzed for multicollinearity among predictors
- Sociability was found to be associated with observation condition (r=.23, p=.04) and therefore was entered into the first step of the regressions.
- Regression A: subjective hunger, dietary restraint and sociability entered as step one, observation as step two and norm condition as step three with caloric consumption as the criterion variable.
- Regression B: subjective hunger, dietary restraint, and BMI entered as step one, observation condition as step two and norm condition as step three with caloric consumption as the criterion variable.

### Procedure:



## Discussion

- Alone and "observed" participants' consumption decreased ~107-116 calories vs. alone and unobserved participants after controlling for hunger, sociability and dietary restraint
- Contrary to predictions, paired individuals also decreased consumption but to a lesser extent than those alone but observed by video camera (about 65 calories).
- Consistent with expectations, consumption increased about 63-67 calories per 1-unit increase in subjective hunger.
- Model did not support hypothesis that norms set by the RAs affected consumption
- Lack of evidence for social facilitation theory may be more related to perceptions of evaluative threat depending on the source of the observation (video versus peer) than to norm adherence.
- Health promotion efforts should consider social eating augmentation and inhibition in college women.

## Future Areas of Research

- Larger sample (sufficient power) for multiple regressions
- Explore potential role of perceived weight status in future norms matching studies
- Larger samples of overweight individuals to analyze possibility of an overweight-overweight paired effect of augmented consumption, as observed prior<sup>13</sup>
- Explore impact of emotional valence of stimulus on norm matching, and if stimulus neutrality may negatively impact matching, as suggested in recent literature<sup>14</sup>
- Clarify evaluative threat role on consumption and norms matching with regard to observation by a peer vs. video taping
- New model of social eating to include group size, social evaluative processes and interactions with moderators like weight status, dietary restraint, sociability and moderators not measured here, like emotional context

## Limitations

- BMI positively associated with levels of dietary restraint, likely affecting consumption
- Those receiving the highest norm manipulation more likely to fail the manipulation check, indicating questionable efficacy of the manipulation in those cases
- Possibility that perception of permanent recording of consumption triggered decreased consumption response to the social evaluative threat<sup>12</sup>
- Study included sample of only first-year, first-time women, limiting generalizability of findings to men, older adults, women in other developmental stages, and mixed-gender groups
- Sample size likely insufficient to provide enough power to find certain results

## References

- Lloyd-Richardson, E. E., Bailey, S., Fava, J. L., & Wing, R. (2009). A prospective study of weight gain during the college freshman and sophomore years. *Preventive Medicine, 48*, 256-261.
- Levitsky, D. A., Halbauer, C. A., & Mrogljovics, G. (2004). The freshman weight gain: A model for the study of the epidemic of obesity. *International Journal of Obesity, 28*, 1435-1442.
- Leahy, T. M., Larose, J. G., Fava, J. L., Wing, R. R. (2011). Social influences are associated with BMI and weight loss intentions in young adults. *Obesity, 19*(6), 1157-1162.
- Christakis, N. A., Fowler, J. H. (2007). The spread of obesity in a large social network over 32 years. *The New England Journal of Medicine, 357*(4), 370-379.
- Hruschka, D. J., Brewis, A. A., Wutich, A., Morin, B. (2011). Shared norms and their explanation for the social clustering of obesity. *American Journal of Public Health, 101*(8), 295-300.
- Gipson, C. D., Yates, J. R., Beckmann, J. S., Marusch, J. A., Zentall, T. R., & Bardot, M. T. (2011). Social facilitation of d-amphetamine self-administration in rats. *Experiments in Clinical Psychopharmacology, 19*(6), 409-419. doi:10.1037/a0024682
- Clendenen, V. L., Herman, C. P., Polivy, J. (1994). Social facilitation of eating among friends and strangers. *Appetite, 23*(1), 1-13.
- Lally, B., Bartle, N., & Wardle, J. (2011). Social norms and diet in adolescents. *Appetite, 57*(3), 623-627. doi:10.1016/j.appet.2011.07.015
- Fitzgerald, A., Heary, C., Kelly, C., Nixon, E., & Shevlin, M. (2013). Self-efficacy for healthy eating and peer support for unhealthy eating are associated with adolescents' food intake patterns. *Appetite, 63*, 48-58.
- Stunkard, A. J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research, 29*(1), 71-83.
- Yeomans, M. R., Tovey, H. M., Tinley, E. M., & Hyman, C. J. (2004). Effects of manipulated palatability on appetite depend on restraint and disinhibition scores from the three-factor eating questionnaire. *International Journal of Obesity, 28*, 144-151.
- Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin, 130*(3), 355-391. doi:10.1037/0033-2909.130.3.355
- Salvy, S. J., Vartanian, L. R., Coelho, J. S., Jarrin, D., & Pliner, P. P. (2008). The role of familiarity on modeling of eating and food consumption in children. *Appetite, 50*(2-3), 514-518. doi:10.1016/j.appet.2007.10.009
- Bevelander, K. E., Meiselman, H. L., Anschutz, D. J., & Engels, R. (2013). Television watching and the emotional impact of social modeling of food intake among children. *Appetite, 63*(1), 70-76.