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The Kids-Palatable Eating Motives Scale: Relation to BMI and binge eating traits

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Abstract

Introduction—Despite high rates of obesity in adolescents, little is known about their individual motives for eating caloric foods for reasons unrelated to hunger. The goal of this study was to provide a preliminary validation of the "Kids Palatable Eating Motives Scale" (K-PEMS), a self-report survey designed to identify individual motives for eating tasty foods in adolescents. The study also sought to determine if any specific motive(s) can account for variance in BMI and binge-eating disorder (BED) traits which can exacerbate obesity.

Methods—BMIz and responses to the K-PEMS and the Children's Binge Eating Disorder Scale (C-BEDS) were obtained from inner-city low-income African American adolescents. Linear and logistic regressions were used to identify K-PEMS motives that were associated with greater BMIz and binge-eating traits.

Results—The K-PEMS identified eating tasty foods for Social, Conformity, Reward Enhancement, and Coping motives. Higher frequency of eating tasty foods for Social and Conformity motives and lower frequency of eating these foods for Reward Enhancement accounted for 39% of the variance in BMIz among the overweight and obese adolescents. In contrast, eating for Coping motives was related to a 3-fold increase in the amended provisional criteria for BED in children which occurred in 7% of this young minority sample.

Discussion—The K-PEMS can be used to identify adolescents' primary motives for eating tasty foods. These motives may provide early identification of obesity and binge-eating risk but more importantly, can be tailor-targeted to affect specific behavioral and/or cognitive changes to prevent these conditions in adulthood.

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Contributors

Mary Boggiano co-developed the K-PEMS, conceived the study, and co-ran analyses. Lowell Wenger wrote the initial draft and co-ran analyses. Sylvie Mrug oversaw inclusion of the K-PEMS into a larger battery of questionnaires. Emilee Burgess co-developed the K-PEMS and provided draft feedback. Phillip Morgan wrote a smaller sample paper that helped guide this study. All approved the final manuscript.

Conflict of interest

The authors declare no conflict of interest.

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Keywords

Adolescent obesity; Motivation; Emotions; Non-metabolic; Binge-eating

1. Introduction

In the United States, 35% of the 12–19 year old adolescents have BMIs at the 85th percentile or higher (Ogden, Carroll, Kit, & Flegal, 2014). These percentages are even higher for African American adolescents, particularly from low income families living in southern states (CDC, 2012). A contributor to obesity among adults is binge-eating (Yanovski, 2003) which is characterized by consumption of an unusually large amount of food at one sitting with a sense of loss of control over the eating (APA, 2013). While low-income African American adolescents have been studied for negative health and developmental outcomes, such as violence, substance abuse, and school drop-out (Voisin, Neilands, & Hunnicutt, 2011), little is known about their risk of binge-eating (Cassidy et al., 2012). Given the high burden of obesity on African Americans and the link between binge-eating and obesity, it is imperative to investigate risk factors in minority adolescents if we are to attenuate the high rates of obesity in this group.

Towards this goal, the “Kids Palatable Eating Motives Scale” or K-PEMS was adapted from our adult version, the Palatable Eating Motives Scale (PEMS; Burgess, Turan, Lokken, Morse, & Boggiano, 2014). The K-PEMS identifies individual motivations for eating tasty foods and drinks for reasons other than to meet energy needs. These foods tend to contribute to overweight by being calorie-dense and highly palatable and are also known to trigger binge-eating (Astrup & Brand-Miller, 2012; Blundell & Finlayson, 2004; Witt & Lowe, 2014). The K-PEMS differs from other adolescent measures of eating behavior such as the Yale Food Addiction Scale for Children which identifies addictive-like eating of tasty foods (Gearhardt, Roberto, Seamans, Corbin, & Brownell, 2013) but not the motives behind eating these foods. It differs from the children’s versions of the Eating in the Absence of Hunger Questionnaire and Emotional Eating Scale because these measure emotional and external factors of eating beyond satiety and when not hungry, and the urge to eat in response to specific emotions (Tanofsky-Kraff et al., 2007, 2008). Furthermore, they are not specific to highly palatable foods and measure antecedents to eat vs. motives for eating in order to bring about a specific outcome, i.e., “I keep eating because I am feeling sad” vs. “I eat these tasty foods to forget things that I am worrying about.” The K-PEMS also assesses reasons other than emotions for eating palatable foods.

In this study we hypothesized that the K-PEMS would factor into the same motives for eating tasty foods as does the PEMS and that one or more of the K-PEMS motives would independently contribute to variance in BMIz and binge-eating traits in a young minority group at high-risk for obesity.

2. Materials and methods

2.1. Participants

N = 73 African American adolescents between 12 and 17 years of age (M = 14.7, SD = 0.9) from schools in Birmingham, Alabama participated as part of the "Coping with Violence Study" designed to understand the effects of violence exposure on the health of adolescents from lower-income families. The UAB Institutional Review Board for Human Use approved the study.

2.2. Measures

2.2.1. The Kids-Palatable Eating Motives Scale (K-PEMS)—The K-PEMS is comprised of 19 items that probe various motives for "eating tasty food and drinks". See Appendix A. The instructions include examples of tasty foods and drinks which were adopted from the Yale Food Addiction Scale (Gearhardt, Corbin, & Brownell, 2009). Motive scores for the K-PEMS were obtained by deriving the mean of the response scores across the motive's items using a 1–5 point scale.

2.2.2. The Children's Binge Eating Disorder Scale (C-BEDS)—The C-BEDS is a 7-item interviewer-administered survey intended to screen children under the age of 13 for binge-eating disorder (BED; Shapiro et al., 2007). It was used here as a self-report questionnaire so that it could be easily interpreted and because of its brevity given that it was part of a lengthy battery of questionnaires. The C-BEDS yields a "provisional criteria for BED" (Marcus & Kalarchian, 2003) and an "amended provisional criteria for BED" depending on the items endorsed (Shapiro et al., 2007). In order to obtain a continuous variable for regression analysis on the K-PEMS motives, a "Risky Eating" variable was created from the sum of "yes" responses to the dichotomized C-BEDS items (see Table 2 footnote).

2.2.3. Body mass index (BMI)—BMI was calculated with the formula: kg/m^2 from body weight and height obtained in the laboratory by trained researcher assistants. BMI percentiles and BMIz values were also obtained (CDC, 2000). BMIz was used as a continuous variable for all statistical analyses except where BMI percentiles were categorized for descriptive purposes as underweight, healthy weight, overweight, and obese (Barlow & Committee, 2007).

2.3. Procedures

The adolescents completed the K-PEMS and C-BEDS via an audio-computer-assisted self-interviewing program which allowed each adolescent the opportunity to answer questions privately. BMI was obtained at the end of the interview.

2.4. Statistical analyses

Factor analysis of the K-PEMS used Principal Components Analysis with Varimax Kaiser Normalization rotation and eigenvalues >1. Cronbach's alpha assessed internal reliability of each factor (or motive). ANOVA assessed effects of sex on motive scores. Linear regressions assessed independent associations between the K-PEMS motives and BMIz and Risky

Eating. Due to the overall low number of participants, Risky Eating was regressed on each K-PEMS motive in separate regressions. Binary logistic regressions tested associations between each of the K-PEMS motives and the C-BEDS amended provisional criteria for BED. All regressions controlled for age, sex, and BMIz. Alpha was set at 0.05 for significance.

3. Results

3.1. Factor structure and inter-item reliability of the K-PEMS motives

PCA yielded the same four factors as the adult PEMS version: Social, Coping, Reward Enhancement, and Conformity motives. Each motive had acceptable internal reliability (Cronbach's $\alpha = 0.90$ to 0.64). The items comprising each factor were also the same as the PEMS and are noted in Appendix A.

3.2. Demographics, BMI, and K-PEMS motive scores

Females comprised 52% and males 48% of the sample. Their mean BMIz was 0.84, SD = 1.1 and mean BMI percentile was 71.4, SD = 27.1. Mean BMIz and BMI percentiles did not differ between females and males. Mean scores on the K-PEMS motives ranged from "Never/Almost never" to "Some of the time". Mean motive scores were 2.06, SD = 0.30 for Social; 1.43, SD = 0.7 for Coping; 1.90, SD = 1.0 for Reward Enhancement; and 1.20, SD = 0.3 for Conformity. Sex differences were observed only for Coping as females ate tasty foods more frequently than males: M = 1.67, SD = 0.9 vs. M = 1.19, SD = 0.3; $p < 0.01$, respectively.

3.3. Associations between K-PEMS motives and BMIz

As shown in Table 1, greater frequency of eating tasty foods for Social motives was associated with higher BMIz independent of the other K-PEMS motives, age, sex, and Risky Eating. When only the overweight/obese participants were analyzed, greater frequency of eating tasty foods for Conformity and a lower frequency of eating tasty foods for Reward Enhancement were independently associated with higher BMIz scores.

3.4. Associations between K-PEMS motives and Risky Eating and the C-BEDS amended provisional criteria for BED

As shown in Table 2, Social, Coping, and Reward Enhancement scores were significantly associated with the C-BEDS derived continuous Risky Eating variable independent of age, sex, and BMIz when all participants were included. When divided by sex as also shown in Table 2, the association between Coping scores and Risky Eating was significant only for females while the association between Social scores and Risky Eating was significant only for males. The association between Reward Enhancement scores and Risky Eating was significant for both sexes. Only 5 participants (7% of the sample) met the amended provisional criteria for BED. With all participants included in the logistic regression, only Coping was associated with this criteria for BED ($OR = 3.14$; $p < 0.05$).

4. Discussion

The goal of this study was to conduct a preliminary evaluation of the K-PEMS, a measure designed to identify motivations for eating tasty foods in inner-city African American adolescents and to determine if some of the motives could account for unique variability in BMIz and binge-eating traits. As predicted, factor analysis identified the same motives as for the adult PEMS version. Despite the modest sample size, the K-PEMS yielded several important results.

Foremost, 39% of the variance in the BMIz of adolescents classified as overweight/obese could be accounted for by more frequent eating of palatable foods for Social and Conformity motives and by a decreased frequency of eating these foods for Reward Enhancement motives. In comparison, eating tasty foods for Coping motives did not contribute to variance in BMIz. This was in contrast to the association between Coping and BMI found in college students and weight-loss seeking participants (Boggiano et al., 2014). It may be that adolescents do not recognize that they are eating these foods to deal with negative moods or situations, or that the tendency to eat as a means of coping does not occur until later in development, when adolescents become less dependent on parental support. Moreover, it is both interesting and disturbing that the young females in our sample already had significantly higher Coping scores than the males because African American women have much higher obesity rates than African American men and Whites (Ogden et al., 2014). Hence, if eating to Cope is sustained from this early age, it might contribute to obesity later in life.

Secondly, the finding that the other K-PEMS motives (Social, Conformity, and Reward Enhancement) were associated with BMIz in the overweight adolescents but not in their healthy weight peers suggests that overweight adolescents are eating palatable foods more frequently for reasons other than hunger as shown by others that have measured “eating in the absence of hunger” (Tanofsky-Kraff et al., 2008). However, the K-PEMS reveals more specific information. For example, the association between BMIz and Social and Conformity scores suggests that eating in the absence of hunger results from external pressures such as from family and friends to eat the foods in order to be more social or to fit in. Likewise, the negative association between BMIz and Reward Enhancement scores suggests that overweight adolescents are less likely to eat the foods for their hedonic properties. One possibility is that they know that the tasty foods are contributing to their overweight and correspondingly create negative feelings which may override any pleasure normally derived from these foods.

Concerning binge-eating risk, Coping scores were associated with the amended provisional C-BEDS criteria for BED, despite the limited number of adolescents meeting the criteria. This finding is consistent with a previous finding using the PEMS where only Coping was associated with binge-eating severity in a weight-loss seeking population (Boggiano et al., 2014). On the other hand, Coping along with Reward Enhancement and Social motives were associated with the continuous Risky Eating variable in this study. This parallels a finding in a racially-diverse group of college students where these motives were associated with binge-eating severity (Boggiano et al., 2014). However, in both the college and the present

adolescent sample, Coping was the strongest correlate of binge-eating. Lastly, 7% percent of this adolescent sample met the C-BEDS amended provisional BED criteria, a number higher than the estimated 1–2% of any diagnosable binge-eating for this age group (Hudson, Hiripi, Pope, & Kessler, 2007). Together, these findings suggest that African American youth may be more at risk for eating disorders than we think, particularly for BED.

5. Conclusion

This study provided optimistic findings for the K-PEMS' utility as a tool to predict early risk of obesity and/or BED, and more importantly, to identify individual motives for eating tasty but obesogenic and generally unhealthy foods. This is knowledge that parents and clinicians can use to implement tailored strategies to steer adolescents towards more adaptive habits with food.

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Appendix A. Kids-Palatable Eating Motives Scale (K-PEMS)

Instructions: Below is a list of reasons that kids sometimes eat tasty foods and drinks such as:

- Sweets like ice cream, chocolate, doughnuts, cookies, cake, candy, and other desserts
- Salty snacks like chips, pretzels, and crackers
- Fast foods like hamburgers, cheeseburgers, pizza, fried chicken, and French fries
- Sugary drinks like soda, sweet tea, and milkshakes

Thinking of all the times you ate these kinds of foods or drinks, how often did you eat or drink them for the following reasons? Please circle the answer that best describes you.*

1. I eat these foods to forget things that I am worrying about[a]

Never/Almost never *Some of the time* *Half of the time* *Most of the time* *Almost always/Always*

2. I eat these foods because my friends want me to eat/drink them[d]

Never/Almost never *Some of the time* *Half of the time* *Most of the time* *Almost always/Always*

3. I eat these foods because it helps me enjoy myself when I'm at a party[c]

Never/Almost never *Some of the time* *Half of the time* *Most of the time* *Almost always/Always*

4. I eat these foods because it helps me when I feel down or nervous[a]

Never/Almost never *Some of the time* *Half of the time* *Most of the time* *Almost always/Always*

5. I eat these foods to enjoy time with friends[c]

Never/Almost never *Some of the time* *Half of the time* *Most of the time* *Almost always/Always*

6. I eat these foods to cheer up when I am in a bad mood[a]

Never/Almost never *Some of the time* *Half of the time* *Most of the time* *Almost always/Always*

7. I eat these foods because I like the feeling I get when I eat them[b]

Never/Almost never *Some of the time* *Half of the time* *Most of the time* *Almost always/Always*

8. I eat these foods to so that others won't joke about me not eating or drinking these foods[d]

Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
9. I eat these foods because it's exciting[b]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
10. I eat these foods to get a super good feeling inside[b]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
11. I eat these foods because it makes social gatherings more fun[c]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
12. I eat these foods to fit in with a group I like[d]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
13. I eat these foods because it gives me a pleasant feeling[b]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
14. I eat these foods because it improves parties and celebrations[c]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
16. I eat these foods to celebrate a special occasion with friends[c]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
17. I eat these foods to forget about my problems[a]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
18. I eat these foods because it's fun[b]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
19. I eat these foods to be liked[d**]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*
20. I eat these foods so I won't feel left out[d]				
Never/Almost never	*Some of the time*	*Half of the time*	*Most of the time*	*Almost always/Always*

[*] The responses are coded 1 through 5, respectively. Note: There is no item #15 as analysis of a similar item in the adult PEMS was also omitted due to poor factor loading (Burgess et al., 2014).

[**] This item (#19) loaded poorly on the Conformity motive so was excluded from analysis in this study. Future use of the K-PEMS should change the item to read: "I eat these foods so that others will like me".

[a,b,c,d] Denote items comprising the 4 motives: a = coping; b = reward enhancement; c = social; d = conformity.

Table 1

Regression models of the Kids-Palatable Eating Motives Scale (K-PEMS) motives with BMIz as the dependent variable using all participants (*N* = 73) and participants divided by BMI percentile category.

Dependent variable	**BMIz**			
	β	**t**	**p**	**R^2**
All participants (N = 73)				
Independent variables				
Social motive	0.29	2.06	0.04*	
Coping motive	0.02	0.13	0.90	
Reward Enhancement motive	−0.27	−1.71	0.09	
Conformity motive	−0.19	−1.32	0.19	0.13
Underweight & healthy (N = 44)				
Independent variables				
Social motive	0.25	1.38	0.18	
Coping motive	−0.16	−0.68	0.50	
Reward Enhancement motive	−0.18	−0.92	0.36	
Conformity motive	−0.13	−0.62	0.54	0.1
Overweight & obese (N = 29)				
Independent variables				
Social motive	0.53	2.00	0.06	
Coping motive	0.17	0.60	0.55	
Reward Enhancement motive	−0.88	−2.70	0.01*	
Conformity motive	0.53	2.50	0.02*	0.39

The models controlled for age, sex, and Risky Eating as independent variables; they were not significant.

*Significant independent variables, $p < 0.05$.

Table 2

Separate linear regression models with C-BEDS-based "Risky Eating" as the dependent variable regressed on each K-PEMS motive.[a]

Dependent variable	Risky Eating[b]		
	β	t	p
Independent variable:			
K-PEMS Motive:			
Social			
All participants[c]	0.25	2.23	0.03*
Female	0.12	0.78	0.44
Male	0.40	2.40	0.02*
Coping[d]			
All participants	0.33	2.72	0.008**
Female	0.32	2.18	0.04*
Male	0.34	1.95	0.06
Reward Enhancement			
All participants	0.36	3.20	0.002**
Female	0.33	2.29	0.03*
Male	0.38	2.13	0.04*
Conformity			
All participants	0.18	1.56	0.12

* $p < 0.05$;

** $p < 0.01$ denote significant independent association with Risky Eating.

[a] Each line represents a separate linear regression model with the K-PEMS motive noted, age, sex, and BMIz as independent variables. Regressions per sex category were conducted when the motive was significant with all participants included.

[b] The Risky Eating variable was created from the sum of "yes" responses to C-BEDS items 1, 2, 3, 4, 5, and 7 (these pertained to eating when not hungry, loss of control when eating, eating because of negative feelings, eating as a reward, sneaking or hiding food, and getting rid of the food, respectively).

[c] All participants $N = 73$; female $N = 38$; male $N = 35$.

[d] C-BEDS item #3 was omitted from the "Risky Eating" dependent variable due to a high correlation between this item and the Coping motive ($r = 0.44$, $p < 0.01$).