



The effects of happiness and sadness on Children's snack consumption[☆]

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ABSTRACT

Children appear to engage in emotional eating (i.e., eating in response to negative and positive emotions), but existing research has predominantly relied on parent-report and child-report, which may not necessarily reflect children's actual emotional eating behaviors. This study examined the effects of happiness and sadness on children's observed snack consumption and examined whether child characteristics (i.e., weight, gender, and age) interact with mood to predict snack consumption. To elicit mood, children ($N = 91$; $M_{ages} = 6.8$ years; 48 boys) were randomly assigned to one of the three mood induction conditions (happy, sad, or neutral); children's snack consumption was observed and measured after mood induction. Findings showed that children in the sad condition consumed more energy from chocolate, followed by children in the happy condition, and then the neutral condition. However, the reverse pattern was observed for goldfish crackers: children in the neutral condition consumed more energy from this savory snack than children in the happy condition, followed by children in sad condition. Child weight status and gender did not interact with mood to predict snack consumption. Child age did interact with mood: older children consumed more chocolates in the sad condition compared to younger children. Child age was not related to snack consumption in the happy and neutral conditions. This study suggests that emotional eating in response to positive and negative emotions is evident during early childhood, but that this is behavior is developing during this period.

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1. Introduction

Overeating, especially in response to negative emotional arousal, such as sadness, anger, frustration, or boredom (i.e., negative emotional eating), has been extensively examined during adulthood (Geliebter & Aversa, 2003; van Strien, Frijters, Bergers, & Defares, 1986; Van Strien et al., 2013). Adults who engage in negative emotional eating tend to have more negative physical (e.g., overweight, binge eating (Geliebter & Aversa, 2003); and psychological outcomes (e.g., depression; (Ouwens, van Strien, & van Leeuwe, 2009). Adolescents and children also eat in response to emotional arousal as reported by parents (van Strien et al., 1986; Tan & Holub, 2015; Topham et al., 2011; van Strien & Oosterveld,

2008) and self-report (Braet & Van Strien, 1997; Nguyen-Rodriguez, Chou, Unger, & Spruijt-Metz, 2008; Tanofsky-Kraff et al., 2007). However, although negative emotional eating appears to be present during childhood, existing work has predominantly relied on parent-report and child-report, which may not necessarily reflect children's actual, observed emotional eating.

To our knowledge, only one study has observed emotional eating during early childhood (Blissett, Haycraft, & Farrow, 2010), but this study exclusively focused on emotional eating in response to negative emotions (in this case, children's emotional eating was examined in response to frustration). Their findings suggested that 3- to 5- year olds consumed more of one type of food (breadsticks) in the sad condition compared to preschoolers in the neutral condition (Blissett et al., 2010). Nonetheless, because this study had a small sample size (12 preschoolers in the mood-inducing condition, 13 in the control group), more research is needed (Blissett et al., 2010). In addition, observational research conducted examining emotional eating in older children and adolescents is also limited, but highlights the nuances seen in this research. In all the studies

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we reviewed, the effect of food consumption in response to mood appears to vary depending on individual child or family factors. Specifically, it was found that individual or family factors, such as gender, dietary restraint, tendency to binge eat, or parental rejection, moderated the relationship between the mood induction condition and eating behaviors (Goldschmidt, Tanofsky-Kraff, & Wilfley, 2011; Hilbert, Tuschen-Caffier, & Czaja, 2010; Kelly et al., 2015; Vandewalle, Moens, Bosmans, & Braet, 2017). Since little is known about the effect of mood induction on eating behaviors in young children, the current study examined whether mood induction was related to food consumption in young children, while also considering whether the child characteristics of weight status, gender, and age would moderate this relationship.

1.1. Child characteristics and emotional eating

Little is known about how individual differences in children, such as weight, gender, and age, relate to children's emotional eating. Findings with adults show a positive association between weight status and negative emotional eating (Geliebter & Aversa, 2003; Koenders & van Strien, 2011; Nolan, Halperin, & Geliebter, 2010; van Strien et al., 1986). Some studies have found that children who are overweight engage in more emotional eating than children who are average weight (Braet & Van Strien, 1997; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2008); however, other studies have failed to demonstrate the relationship between weight status and emotional eating in children (Blissett et al., 2010; Nguyen-Rodriguez et al., 2008; Tanofsky-Kraff et al., 2007; van Strien & Bazelier, 2007).

The role of child gender on emotional eating is also unclear. Some studies suggest that adolescent girls report more emotional eating than adolescent boys (Tanofsky-Kraff et al., 2007; Wardle et al., 1992), but some studies fail to replicate these findings among adolescents and children (Blissett et al., 2010; Braet & Van Strien, 1997; Nguyen-Rodriguez, Unger, & Spruijt-Metz, 2009; Tan & Holub, 2015; van Strien & Bazelier, 2007; van Strien & Oosterveld, 2008).

The developmental course of emotional eating behavior is unknown, as well. Some longitudinal and cross-sectional studies suggest that emotional eating increases with age for children and adolescents (Ashcroft, Semmler, Carnell, Van Jaarsveld, & Wardle, 2008; Wardle et al., 1992), yet other studies find that younger children (7- to 9-years old) reported more emotional eating than older children (10- to 12-years old (Wardle et al., 1992; van Strien & Bazelier, 2007). In addition, other studies find no age-related differences in emotional eating (Tan & Holub, 2015). Taken together, the associations between child characteristics (i.e., weight, gender, and age) and emotional eating are unclear. However, these child characteristics are potential moderators of the relationship between mood induction and emotional eating.

1.2. Positive emotional eating

Recent work with adults highlight the importance of considering that individuals also eat in response to positive emotions, such as happiness and excitement (Evers, Adriaanse, de Ridder, & de Witt Huberts, 2013; Geliebter & Aversa, 2003; Nolan et al., 2010). Yet, findings with adults are mixed. One experimental study found that caloric intake did not differ when participants were induced with positive, negative, or neutral moods (Bongers, Jansen, Havermans, Roefs, & Nederkoorn, 2013). Although mean differences were not found across consumption conditions, self-reported emotional eating scores were related to greater caloric intake in the positive condition. In another experimental study, both positive emotions and negative emotions induced the same

amount of calorie consumption compared to control conditions (Evers et al., 2013). This suggests that positive emotions, not just negative emotions, evoke food consumption. Nonetheless, research has yet to examine through observation children's tendency to eat in response to positive emotions. It is highly plausible that children eat when they are happy given the way children are socialized with food. For example, children are conditioned to associate positive events and moods with eating at birthday parties, at holiday gatherings, and at school functions where a reward for a job well done is a treat. However, less is known about whether positively or negatively valenced emotions differentially predict children's eating. It is possible that children are more responsive to negative emotional arousal given that prior work suggests that children eat more in response to sadness, especially when they have been socialized to use foods to cope with emotional arousal (Blissett et al., 2010; Tan & Holub, 2015; Topham et al., 2011), but additional research is needed.

In addition, little is known about whether child characteristics (i.e., weight, gender, and age) are related to positive emotional eating. To our knowledge, only a handful of studies have examined individual differences in positive emotional eating among adults. These suggest that men reported engaging in positive emotional eating more than women and that lower weight status (body mass index) is related to higher positive emotional eating scores (Geliebter & Aversa, 2003; Nolan et al., 2010). However, it is unknown whether these findings will generalize to children.

1.3. The current study

The current study experimentally induced negative (sadness), positive (happiness), and neutral moods in children to examine their eating behavior in response to induced mood. The goals of this study were: 1) to observe children's snack consumption across these three conditions and 2) to examine whether the effect of emotional arousal on children's snack consumption differed by child characteristics (i.e., age, gender, and weight status). We hypothesized that children would consume more snacks in response to negative affect than positive affect. Given the mixed findings regarding child characteristics and negative emotional eating, and that there is little research on positive emotional eating during childhood, we did not have specific hypotheses related to whether child characteristics would moderate children's eating in response to negative and positive emotions.

2. Method

2.1. Participants

Ninety-five children were recruited through multiple methods, including flyers to elementary schools, child care centers, pre-schools, and extracurricular activity centers (e.g., dancing, martial arts), as well as the university online recruitment system to participate in a study about children's eating behaviors. Four children were excluded due to refusal to participate in the experimental manipulation ($n = 2$) and dietary restrictions ($n = 2$). The mean age of the remaining children (48 boys, 43 girls) who participated was 6.8 years ($SD = 1.2$; Range: 4.5 to 9.0). Most children were Caucasian (40.7%) followed by Hispanic (18.7%), Biracial (18.7%), Asian (14.3%), African American (6.6%) and Middle Eastern (1.0%). Children's height and weight were measured and converted into age and gender specific body mass index z-score (BMIz) based on standardized growth charts from the Centers for Disease Control and Prevention (NutStat Program; Dean et al., 2007). The mean child BMIz was 0.38 ($SD = 1.0$). The study protocol was reviewed and approved by the University [blinded] Institutional Review

Board. Most parents who participated (81%) received a \$10 store gift card, but a small number of parents (19%) received course credit for their participation.

2.2. Procedure

To ensure that children were not hungry when participating, parents and their children were scheduled to come into the laboratory within 30 min after they had eaten lunch ($n = 41$) or dinner ($n = 51$). Parents signed a consent form and children provided verbal assent prior to participating.

While parents were completing a survey, children's moods were being elicited in another room. Prior to mood induction, children were asked about their current mood using a face array ranging from very sad, sad, neutral, happy, to very happy (Blissett et al., 2010). Children were randomly assigned to one of three mood conditions (happy, sad, or neutral) and watched one of three 3-min video clips to elicit emotions while the researcher left the room. When the clip ended, the researcher entered the room and reassessed children's mood. Children were then provided with four snacks (goldfish crackers, frosted animal cookies, chocolates teddy graham crackers, and chocolates) and were told that it was playtime and they could play with the toys (puzzles, etch a sketch, magna-doodle, books) or eat whatever they wanted while waiting for the researcher to come back. Children were left alone in the room for 5 min. After that, the researcher entered the room and reassessed children's mood. Before children left the laboratory, all children watched a happy clip from the *Lion King* where Timon and Pumba sing the song "Hakuna Matata" to Simba. Children's mood was reassessed to ensure positive feelings after participation. Children were then reunited with their parents. The duration for this entire protocol was less than 20 min. All children received a certificate and prize for their participation.

3. Materials and measures

3.1. Video clips

To elicit happiness, sadness, and neutral emotions, three 3-min clips were selected. All clips were selected from the Disney's *Lion King*. The happy clip was a scene where Simba is singing "I can't wait to be a king" with Nala, the neutral clip was a scene where all animals are heading to witness the arrival of a newborn cub, Simba, and the sad clip is a scene where Simba mourns his father's death (von Leupoldt et al., 2007).¹

3.2. Observed emotional eating

To measure snack consumption in response to emotional arousal, the weight of chocolates, teddy grahams, animal crackers, and goldfish crackers was recorded before and after the task. Children were provided with 12 pieces of chocolates, 36 pieces of chocolate teddy graham crackers, 12 pieces of frosted animal crackers, and 82 pieces of goldfish crackers. Each snack food had approximately 200 calories. To calculate amount of energy consumed, we subtracted the weight of snack foods remaining from the weight that was provided before the experiment. Children's caloric consumption of each food was then calculated using information found on the package of each snack food.

3.3. Planned analyses

First, we examined whether children consumed the highest amount of food in the sad condition, followed by happy condition, and then neutral condition using planned contrast analyses (1, 0, -1). Although we did not have apriori hypothesis with regard to food type, we decided to explore the effect of conditions on each snack food independently as children might respond differently with sweet versus savory foods. Prior work examining adults' emotional eating has focused almost exclusively on consumption of sweet foods (chocolates; (Macht & Dettmer, 2006; Macht & Mueller, 2007; Turner, Luszczynska, Warner, & Schwarzer, 2010). Research with children has included a wider variety of foods, but found higher consumption of savory foods (breadsticks) in response to mood induction (Blissett et al., 2010). Thus, we examined the consumption of four foods separately.

Second, we examined whether condition (happy, sad, or neutral mood induction) and child characteristics (weight, gender, and age) interacted to predict amount of food consumed using multiple regression analyses. Two dummy variables were created to represent the three conditions in the study (Cohen et al., 2003). We used the happy condition as the reference group. As a result, the sad condition was represented by Dummy 1 = 1 and Dummy 2 = 0; the neutral condition was represented by Dummy 1 = 0 and Dummy 2 = 1; and the happy condition (the reference group) represented by zeros on both dummy variables. For testing the moderation hypotheses, the child characteristic variables and the dummy variables for conditions were entered in the first step (base model), and the product terms of the two dummy variables of conditions multiplied by child characteristics (i.e., weight, gender, and age) were entered in the second step (Cohen et al., 2003). Following the recommendations of Cohen et al. (2003), child age and weight were centered before the interaction terms were computed. All p 's > 0.05 were considered statistically nonsignificant findings.

4. Results

4.1. Preliminary analyses

To ensure that the manipulation worked to induce mood, a one-way ANOVA was conducted and found that compared to baseline, children's mood significantly differed across conditions, $F(2,88) = 8.6, p < .001$. Specifically, children in the happy condition became happier ($M = 0.27, SD = 1.1$), children in the sad condition became sadder ($M = -0.90, SD = 1.2$), and children in the neutral condition remained neutral ($M = -0.18, SD = 0.93$). Given that mood induction was successful, a one-way ANOVA was conducted to ensure that all children left the lab feeling positive after watching the happy clip at the end of the session. Findings showed that children's mood in the happy ($M = 4.7, SD = 0.61$), neutral ($M = 4.5, SD = 0.69$), and sad conditions ($M = 4.5, SD = 0.74$) did not differ significantly after watching this final clip, $F(2, 83) = 0.60, p = .55$.

To ensure that the child characteristics of age and weight status (BMIz) did not differ across the three conditions (happy, sad, and neutral), two one-way ANOVAs were conducted. Child age and child BMIz did not differ across conditions, $F(2,88) = 1.4, p = .25$ and $F(2, 88) = 0.39, p = .68$, respectively. A 3 (condition) X 2 (gender) chi-square test for independence was conducted and findings showed that gender did not differ across conditions, $\chi^2(2, N = 91) = 1.87, p = .39$. In addition, a series of 2 (lunch, dinner) X 3 (condition) ANOVAs was conducted to see whether the timing of the session interacted with the condition to predict children's snack consumption. There were no significant interactions between timing and condition on chocolates ($F(2, 91) = 1.73, p = .18$), teddy graham ($F(2, 91) = 1.06, p = .35$), animal crackers ($F(2, 91) = 1.48,$

¹ A pilot study was conducted to examine the effectiveness of mood induction. Participants reported feeling happier when they watched the positive clip than when they watched the neutral clip, $t(15) = -0.46, p < .001$. They reported feeling sadder during the negative than the neutral clip, $t(15) = -16.54, p < .001$.

Table 1
Means (SD) of amount of energy consumed (kilocalories) of Each snack across conditions.

	Condition		
	Neutral	Happy	Sad
Chocolates	27.31(30.15)	44.67(50.63)	55.96(66.87)
Teddy Graham Crackers	4.26(6.46)	3.12(4.94)	3.62(5.24)
Frosted Animal Crackers	21.67 (30.02)	26.59 (32.57)	22.69 (33.84)
Goldfish Crackers	11.63(14.3)	7.84(13.28)	5.24(8.70)

$p = .23$), and goldfish crackers ($F(2, 91) = 1.62, p = .20$). Furthermore, primary analyses were conducted controlling for timing of the session and no differences were found, so these are presented below without this covariate.

4.2. Primary analyses

Table 1 presents the means and standard deviations of amount of energy consumed for each snack across conditions. To examine whether children consumed the most foods in the sad condition, followed by happy condition, and then neutral condition, planned contrast analyses were conducted for chocolates, teddy graham crackers, frosted animal crackers, and goldfish crackers. A significant linear trend, $F(1, 88) = 4.82, p = .03$, was found indicating that chocolate consumption increased across conditions (i.e., from neutral to happy to sad; Fig. 1, top panel). Specifically, planned contrasts revealed that children in the sad condition consumed more chocolates than children in the happy condition ($d = 0.19$), and that children in the happy condition consumed more

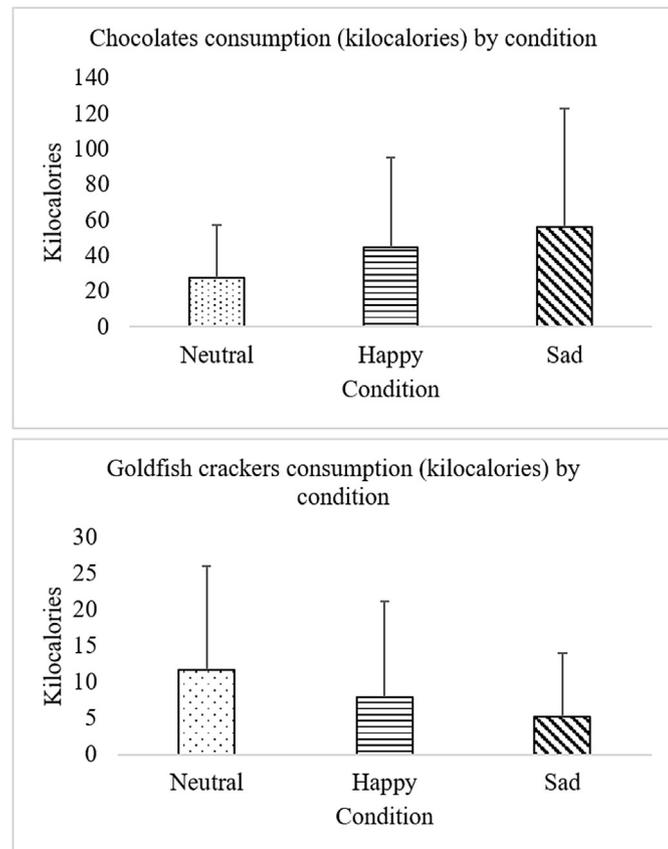


Fig. 1. The effect of mood on consumption of chocolates and goldfish crackers.

Table 2
Hierarchical regression of the interaction effect of condition and child age on chocolates consumption.

Variables	B	SE
DV: Amount of Energy Consumed		
Step 1: Predictors		
$F(3,87) = 2.42, p = .07, R^2 = .08$		
Intercept	43.49	9.26*
Dummy 1 (sad)	11.57	13.16
Dummy 2 (control)	-14.25	13.00
Child Age	8.11	5.41
Step 2: Interactions		
$\Delta F(2,85) = 3.31, p = .04, \Delta R^2 = .06$		
Dummy 1 X Child Age	31.60*	12.47
Dummy 2 X Child Age	18.46	13.03

Note. This model used a dummy-coding scheme with happy condition as the reference group. Child age was a continuous score.
* $p < .05$.

chocolates than those in the neutral condition ($d = 0.42$), $t(38.1) = 2.12, p = .041$ (Fig. 1, top panel).

A statistically significant result was also found for consumption of goldfish crackers, $F(1,88) = 4.026, p = .048$, yet the pattern was contrary to our expectations. Goldfish crackers consumption was highest in the neutral condition, followed by the happy condition, and then the sad condition. Specifically, children in the neutral condition consumed more goldfish crackers than children in the happy condition ($d = 0.27$), and children in the in happy condition consumed more goldfish crackers than those in the sad condition ($d = 0.23$), $t(88) = -2.06, p = .048$ (Fig. 1, bottom panel). The effect of mood on consumption of teddy graham crackers and frosted animal crackers were statistically nonsignificant.

To examine whether child characteristics (i.e., weight, gender, and age) would moderate the effect of mood on snack consumption, we conducted a series of multiple regression analyses using the amount of energy consumed for each food as the dependent variable. Child weight status (BMIz) and gender did not moderate the effect of mood on snack consumption. Child age significantly moderated the effect of mood on consumption of chocolates (Table 2; $F(5,86) = 2.85, p = .02; R^2 = 0.14, \text{cohen } f^2 = 0.16$), but not teddy graham crackers, frosted animal crackers, and goldfish crackers. Specifically, in the sad condition, child age was positively related to chocolate consumption, suggesting that older children consumed more chocolates compared to younger children (Fig. 2). Children's chocolate consumption in the positive and neutral conditions were not related to child age.

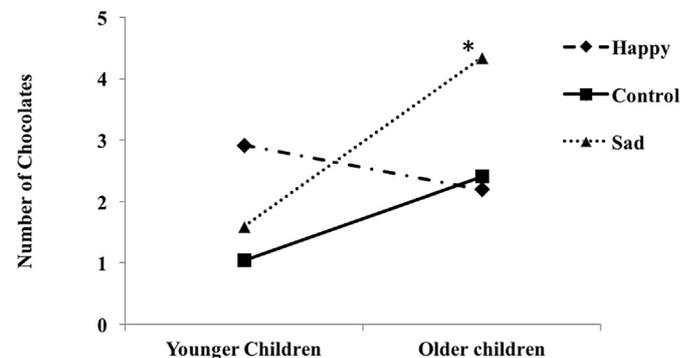


Fig. 2. The Effect of Mood on Chocolates Consumption by Child Age.
* $p < .05$.

Note: Child age was a continuous score.

5. Discussion

This study is the first to observe children's positive and negative emotional eating, as well as to examine the associations between child characteristics and emotional eating. Children's snack food consumption varied across emotional valence, revealing how happiness and sadness can shape children's eating patterns. Specifically, children in both the positive and negative conditions chose chocolates instead of other foods (i.e., teddy grahams, animal crackers, and goldfish crackers), suggesting that children prefer chocolates in response to both positive and negative emotions, which may be the sweetest or most palatable among offered snacks. Indeed, research with adults has shown that chocolates were frequently craved and consumed in response to negative emotions (Hill & Heaton-Brown, 1994; Macdiarmid & Hetherington, 1995), and that chocolate can elevate mood (Macht & Dettmer, 2006), especially when they are palatable (good tasting, (Macht & Mueller, 2007)). Less is known about eating chocolates in response to positive moods. One study with adults showed that emotional eaters consumed more kilocalories in response to positive mood than non-emotional eaters, but negative mood has no effect on food consumption between emotional and non-emotional eaters (Bongers et al., 2013). Yet, total kilocalories consumed was comprised of three foods (i.e., salty crisps, ketchup crisps, and chocolates), thus the effect of positive mood on chocolate consumption is unknown. It is also likely that children are conditioned to associate positive events and moods with eating chocolates at birthday parties and at holiday gatherings and events (e.g., Halloween). Last but not least, greater preference for chocolates in response to negative and positive emotions among children might also have occurred because of parental modeling; parents might be more likely to eat chocolate than these other foods, which are typically marketed at children, when parents themselves are emotionally aroused.

Contrary to our expectations, children consumed more goldfish crackers in the neutral condition than other conditions. It is unknown why children in the neutral condition consumed more goldfish crackers than children in the happy and sad condition. One possible reason is that goldfish crackers were the only savory snack provided, while the rest of the snack foods were sweet. An experimental study examining the effect of television advertisements showed that children ate more low-fat savory foods after viewing the non-food ads than the food-ads (Halford, Gillespie, Brown, Pontin, & Dovey, 2004). It is possible that consumption patterns observed in the neutral condition reflect "baseline" eating behavior, as some studies suggest that emotional eaters prefer sweet high-fat foods (Konttinen, Männistö, Sarlio-Lähteenkorva, Silventoinen, & Haukkala, 2010). That said, more research needs to be done to replicate this finding. Another speculation is that the neutral condition may actually be inducing boredom, and that boredom is associated with greater food consumption (Abramson & Stinson, 1977; Tanofsky-Kraff et al., 2008). Yet, it is unclear why children would choose savory foods, rather than sweet foods, in response to boredom. The literature on adults' food choice in response to boredom is mixed and full of methodological inconsistencies, with some studies suggesting consumption of savory foods, other sweet foods (Abramson & Stinson, 1977; Moynihan et al., 2015) in response to boredom. Future research should examine whether the neutral clip used in the current study induces boredom and if this finding is replicated conduct research to better understand why children would choose savory foods when bored.

Although prior work on children's eating has examined food enjoyment (Wardle, Guthrie, Sanderson, & Rapoport, 2001), this is the first study that observed how positive mood influences children's food consumption. Specifically, this study revealed that

children are also responsive to positive emotional arousal by consuming more chocolates than in the neutral condition. Given that research on positive emotional eating is relatively scant, less is known about the mechanisms that explain why children eat in response to positive emotional arousal. One possible explanation is that children have been conditioned to eat in response to positive events. In a study with adults, it was found that individuals with an uncontrolled eating style are more likely to consume foods in response to positive emotions compared to individuals with controlled eating style (Turner et al., 2010). Nonetheless, more work is needed to better understand the underlying reasons why children engage in positive emotional eating. Research exploring developmental changes in eating in response to positive emotions might also be informative. Overall, this study highlights that positive emotional arousal, not just negative emotional arousal, may shape children's long-term eating patterns and obesity risk, but more research is needed.

Older children ate more chocolates after being exposed to negative emotional content, but not positive emotional content, suggesting that negative emotional eating of chocolates may be acquired through socialization processes. Our findings also support prior research that indicated negative emotional eating becomes more common in older children (Ashcroft, Semmler, Carnell, Van Jaarsveld, & Wardle, 2007). There could be a few reasons to explain why older children are more likely to engage in emotional eating. First, children may be modeling their parents' eating; prior research has found a positive association between mothers' emotional eating and children's emotional eating (Tan & Holub, 2015). Second, children may be socialized to use foods to soothe emotional arousal such that children of parents who use emotion regulation feeding (i.e., teaching children to use foods to soothe emotional arousal) have higher negative emotional arousal and consumption (Blissett et al., 2010; Tan & Holub, 2015; Topham et al., 2011). Last, but not least, the learning process of negative reinforcement may occur such that children learn that eating can reduce the experience of negative emotions. In other words, the developmental course of negative emotional eating may be attributed to the processes of modeling, socialization, and learning. These findings may have implications on developing interventions trying to reduce children's negative emotional eating. Interventions might target teaching skills to parents on how manage their own emotional eating, as well as providing parents with different techniques for handling children's negative emotionality.

We did not find any associations between snack consumption and child weight in the current study. This might be because of the relatively small number of calories consumed during this 5-min period (children in the sad condition consumed, on average, 56 kcal of chocolates). It is likely that the impact of negative emotional eating on child weight may take years to develop. Indeed, in a longitudinal study with adults, emotional eating predicted increased weight status (Koenders & van Strien, 2011). No gender differences were found in children's negative emotional eating, although women tend to engage in negative emotional eating more than men (Nolan et al., 2010). Future research, therefore, should observe emotional eating across development to examine weight and gender differences in this construct.

Child characteristics did not interact to predict positive emotional eating. Although it is reasonable to hypothesize that children who overeat in response to positive mood may be at risk for being overweight, the existing evidence from a small number of studies with adults suggests otherwise—positive emotional eating has been associated with lower weight status (Geliebter & Aversa, 2003; Nolan et al., 2010). It is unknown why positive emotional eating is associated with lower weight status for adults. One possible reason could be that individuals select different foods to consume in

response to positive versus negative emotions. Indeed, the current study found that children in the positive condition selected more goldfish crackers (low calorie food) than children in negative condition. Thus, more research is needed on positive emotional eating among children, as well as future work may consider examining the mechanisms (e.g., child factor, food type) that explain the link between positive emotional eating and lower weight status.

Although the stimuli were successful in inducing mood, it is important to note the effect sizes for the current study's findings ranged from small to medium. Due to the ethical acceptability of inducing negative mood in children, we cannot ascertain if a stronger mood manipulation would have demonstrated a stronger effect on children's food consumption. Less is also known about the intra-individual differences in children's emotional eating from the current between-subjects experimental design. From this data, we cannot ascertain whether children who eat in response to positive affect will also eat in response to negative affect. Hence, future research may consider utilizing mixed-methods (e.g., child-report, within-group designs) to better understand intra-individual differences in both positive and negative emotional eating.

In conclusion, the current study provides a starting point for future research examining emotional eating in young children. These stimuli appear to be appropriately emotionally arousing and might be used in future research. Strengths of this study include observations with a large number of children between 5 and 8 years old. However, this study is limited by issues revolving around whether these findings generalize to real world behavior. In addition, developmental work is needed to understand developmental processes underlying emotional eating in young children. Last, but not least, research with young children should consider family socialization factors, in addition to other child characteristics (i.e., temperament) which might be related to children's negative and positive emotional eating.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.appet.2017.12.021>.

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