FAMILIAL INFLUENCES ON THE USE OF CONTROLLING FEEDING
PRACTICES WITH ADOLESCENTS

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by

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Introduction

Previous research has conceptualized different types of child feeding practices, which are the methods that parents use to feed their children (Musher-Eizenman & Holub, 2007). The most studied child feeding practices are controlling feeding practices (Birch & Davison, 2001; Kremers et al., 2013; Loth, MacLehose, Fulkerson, Crow, & Neumark-Sztainer, 2013b). Controlling feeding practices include both restriction and pressure-to-eat (Loth et al., 2013b). Parental restriction of child eating includes watching to ensure that the child does not eat too many foods that are considered unhealthy and limiting the overall amount of food consumed (Birch & Davison, 2001). Parents may restrict the amount of food a child eats, such as setting a rule that the child can only eat two cookies or telling them that they cannot have another piece of pizza. In addition, parental use of pressure-to-eat includes coercing the child to eat – regardless of the child’s level of hunger (Birch & Davison, 2001). When parents use pressure they may question when their child says that they are full and tell them that they need to eat more before they can be done. Both restriction and pressure can be used within the same household. For instance, parents may use pressure during meals to get their adolescent to eat the food that has already been prepared, and then restrict their access to certain foods at other times throughout the day (Loth et al., 2013b). Unfortunately, research pertaining to the use of child feeding practices in adolescence is limited.

Adolescence is a critical period involving multiple developmental milestones and growing independence (Christie & Viner, 2005). During this time parents remain an important

influence on adolescent eating (Larson, Neumark-Sztainer, Hannan, & Story, 2007; Sato et al., 2010). Caregivers appear to allow adolescents more independence in controlling how much they eat, but continue to regulate their intake of high energy dense foods and beverages (Towner, Reiter-Purtill, Boles, & Zeller, 2015). Parents remain primarily responsible for purchasing food and cooking within the home even as responsibility for food choices transitions from caregivers to adolescents. While the feeding relationship between parents and adolescents changes during this transition, parental use of child feeding practices plays an important role.

Impact of Controlling Feeding Practices

Controlling feeding practices influence problematic eating in children and adolescents by disrupting their responsiveness to internal hunger and satiety cues (Birch & Fisher, 1998) and resulting in increased unhealthy eating-related patterns and eating psychopathology (Edmunds & Hill, 1999; Haycraft, Goodwin, & Meyer, 2014; Houldcroft, Farrow, & Haycraft, 2014; Loth, MacLehose, Fulkerson, Crow, & Neumark-Sztainer, 2014). Controlling feeding practices contribute to disrupted eating patterns and disrupted ability to recognize when children are hungry or full (Birch & Fisher, 1998). For example, increased use of restriction is cross-sectionally related to increased snack food intake when children are in an unrestricted setting (Fisher & Birch, 1999a). Additionally, higher levels of pressure have cross-sectionally been associated with increased food avoidance in 3-6 year olds (Powell, Farrow, & Meyer, 2011). When the children were pressured to eat, they tended to eat slower and avoid foods that their parents were pressuring them to eat (Powell et al., 2011). Higher parental use of pressure was also cross-sectionally associated with increased problematic eating patterns (e.g., dietary restraint, emotional eating) in a sample of children ages 7-10 years (Houldcroft et al., 2014). Dietary restraint involves cognitive restriction of food intake to control weight (Carper, Fisher, &

Birch, 2000). Someone who engages in dietary restraint is very careful about the amounts and types of foods that they eat because they are trying to control their weight. Increased maternal use of pressure-to-eat was related to increased dietary restraint in 5 year old girls (Carper et al., 2000). The 5 year-old girls exhibited increased dietary restraint which means that these children were already showing increased restriction of their own eating to control their weight (Carper et al., 2000). In a cross-sectional population based sample, parental restriction was related to use of extreme weight control behaviors in adolescent girls (Loth, MacLehose, et al., 2014). Similarly, in a cross-sectional sample of 13-15 year olds, perceived parental use of controlling feeding practices was related to increased disordered eating (Haycraft et al., 2014). If adolescents perceived that their parents were exerting more control over their eating, they reported more eating psychopathology. As such, children and adolescents exhibited more disordered eating behaviors if their parents used more controlling feeding practices.

The contribution of controlling feeding practices to the development of disordered eating in adolescents is potentially serious. The degree to which parents can influence the eating of their adolescent is changing during this period (Towner et al., 2015). However, their use of controlling feeding practices can still have a significant impact. Thus, the current study focuses on controlling feeding practices because they are commonly used among parents of adolescents (Loth, MacLehose, Fulkerson, Crow, & Neumark-Sztainer, 2013a) and may contribute to maladaptive eating patterns (Loth et al., 2013a). Little is known about what factors influence a caregiver to use controlling feeding practices (Francis, Hofer, & Birch, 2001a; Gray, Janicke, & Dumont-Driscoll, 2014). This study seeks to identify the most salient familial predictors of controlling child feeding practices in adolescents.

Birch and Davison Model

One way to understand the influences on child feeding practices is via Birch and Davison's (2001) model of multiple interactions between parent and child factors that affect child feeding practices. This model accounts for various familial influences, such as weight status and eating patterns of both the parent and child, on the use of child feeding practices in children of all ages. The Birch and Davison (2001) model elaborates on a prior model of the domain specificity of eating proposed by Costanzo and Woody (1985) and discusses the many influences of parent-child interactions in a feeding context. The model is presented in Figure 1, reprinted with permission from Birch and Davison (2001). The main influences within the model include parent weight status, parent eating (e.g., food preferences, food selection, food

Figure 1. Birch and Davison (2001) Model

Figure 1. Reprinted from *Pediatric Clinics*, Volume 48, Issue 4, Birch, L. L., & Davison, K. K., Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight, Pages 893-907, Copyright (2001), with permission from Elsevier

availability, and dieting), child weight status, and child eating (e.g., food preferences, food selection, and regulation of energy intake; Birch & Davison, 2001). Birch and Davison (2001) caution that the model only addresses influences on food intake and not energy expenditure (i.e., physical activity) and does not include all environmental influences on the development of childhood obesity. Much of the research on various sections of the model has been conducted in younger children (Johannsen, Johannsen, & Specker, 2006). Thus, more research is needed to examine the specific influences identified within the model in regards to feeding during adolescence.

Birch and Davison (2001) note a limitation of the categories they included by stating that they sought to include both behavioral and environmental factors that may lead to future research to identify which influences would be better targets for intervention. Thus, it is necessary to examine each of the proposed categories as starting points for other factors that may influence child feeding practices. For example, looking beyond parent and child influences to include the home environment may provide important context. Suggested components like food availability may lead to questions about both the availability of specific foods as well as accessibility, which may be related to income. With child feeding practices serving as a central tenant of the model (Birch & Davison, 2001), it is fitting to use this model to investigate influences at the child, parent and home level on child feeding practices.

Predictors of Controlling Child Feeding Practices

Child predictors. An important consideration for understanding parent's use of controlling feeding practices is the bi-directional nature of child-parent influences (Powell et al., 2011). Parents may adapt their use of feeding practices in response to their child's eating or weight and, in turn, the child's eating and weight may be impacted by parent's use of different

feeding practices. Consistent with the Birch and Davison (2001) model, the current study includes child factors that may influence the use of controlling feeding practices while acknowledging the bi-directional nature of the relationship.

Child weight. Restriction is most frequently and consistently associated with child weight gain and further, childhood overweight (Clark, Goyder, Bissell, Blank, & Peters, 2007; Dev et al., 2013; Faith, Scanlon, Birch, Francis, & Sherry, 2004; Klesges et al., 1983). Parents appear to use more restriction in response to their child's overweight status. Increased restriction has been cross-sectionally associated with increased overweight among an adolescent sample with a mean age of 14 (Berge, Meyer, Loth, MacLehose, & Neumark-Sztainer, 2015), and in a cross-sectional sample of children and adolescents ages 6-17 (Gray et al., 2014). Furthermore, when comparing overweight vs. non-overweight adolescents with a mean age of 14 in a cross-sectional sample, parental use of restriction was higher for overweight adolescents (Loth et al., 2013b). Similarly, female caregivers of persistently obese adolescents reported higher use of restrictive feeding practices (Towner et al., 2015). Parents may use restriction in an attempt to help their child control their weight after they are already overweight.

In contrast, other work has found differing results for the relationship between controlling feeding practices and child weight (Campbell et al., 2010; Loth, Fulkerson, & Neumark-Sztainer, 2014; Spruijt-Metz, Li, Cohen, Birch, & Goran, 2006), possibly due in part to the bi-directional nature of the relationship (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2010; Jansen et al., 2014; Powell et al., 2011). Parents may also use restriction in order to prevent their child from becoming overweight. One longitudinal study found that parental restriction at baseline was associated with lower body mass index (BMI) z-score after 3 years in children ages 5-6 at baseline (Campbell et al., 2010). The same study found no association between restriction and

child BMI z-score for older children aged 10-12 years at baseline (Campbell et al., 2010). Another longitudinal study followed children (average age 11 at baseline) for 2.7 years and found no association between child feeding practices and total fat mass (Spruijt-Metz et al., 2006). As such, parents may adapt the feeding practices they use in response to their child's weight as the child grows.

In addition, mixed results have been found for the association between use of pressure-to-eat and child weight. One cross-sectional study found that parents used more pressure with non-overweight adolescents (average age 14 years; Berge et al., 2015). Similarly, a different cross-sectional study found that maternal pressure was associated with lower child weight for children ages 2-10 years old (Kroller, Jahnke, & Warschburger, 2013). While parents appear to use more pressure with younger children who are not overweight, this may not be the case with adolescents. A cross-sectional study found no differences in the use of pressure between persistently obese and non-overweight adolescents ages 12-18 years (Towner et al., 2015). The authors conclude that parents appear to allow adolescents more control over how much they eat. Thus the use of pressure may be more sensitive to developmental considerations. Overall, the use of controlling child feeding practices appears to be related to the child's weight status. However, other potential influences such as the home environment and parent or child eating patterns have not been examined along with the child's weight, which may influence parents' use of child feeding practices.

Child eating patterns. The Birch and Davison (2001) model breaks the construct of child eating into three categories; food preferences, food selection, and regulation of energy intake. Child eating includes different eating patterns such as emotional eating, external eating, and restraint (Van Strien, Frijters, Bergers, & Defares, 1986). As previously discussed, restraint is the

cognitive restriction of food intake to control weight (Carper et al., 2000). Emotional eating is excessive eating in response to states of arousal such as anxiety and fear (Van Strien et al., 1986). For example, if a person is sad or feels subjectively stressed they might eat something they like to help themselves feel better (Carper et al., 2000). External eating is eating when in the presence of food, regardless of the person's level of hunger (Van Strien et al., 1986).

Research has shown that perceived parental pressure may lead to disturbed eating behaviors (e.g., emotional and external eating) in 7-12 year olds by disrupting their responsivity to internal hunger and satiety cues (Van Strien & Bazelier, 2007). When parents pressure their child to eat they may influence their child to eat in response to emotions they are feeling or to the presence of food. In a sample of 5-year-old girls, parental pressure-to-eat was positively associated with emotional, external and restrained eating (Carper et al., 2000). Parental use of pressure may also be related to child food refusal. Parents of young children who exhibited disruptive mealtime behavior, including refusal to eat in a laboratory observation, used more coercive feeding practices including prompts to eat (Sanders, Patel, Grice, & Sheperd, 1993). For children who refused to eat, parents used more pressure. Similarly, in 3-6 year olds, cross-sectional findings show that parental use of pressure was significantly related to child food avoidance (Powell et al., 2011). Parental use of pressure has been significantly related to eating in children.

Parental restriction has also been significantly associated with child eating patterns. In a cross-sectional sample of school age youth, parental restriction was negatively associated with external eating, or eating when in the presence of food regardless of level of hunger (Carper et al., 2000). Young children whose parents used more restriction did not eat in response to external cues to eat (e.g., the presence of food). Perceived parental restriction was not associated with

higher levels of dietary restraint in a cross-sectional study of 7-12 year olds (Van Strien & Bazelier, 2007). While some of the research has accounted for the influence of child weight, other potential influences, such as parental eating and the home environment have not been included.

Parent predictors.

Parent weight. One important parental predictor of the use of child feeding practices may be the parents own weight status (Birch & Davison, 2001). If parents are struggling with their own eating and weight issues, they may be more likely to use controlling feeding practices (Francis, Hofer, & Birch, 2001b). For example, one sample of mothers who endorsed higher dietary restraint themselves exerted more control over their 5-8 year old daughter's eating regardless of their child's weight (Tiggemann & Lowes, 2002). While these findings are with school-aged children, similar findings have been found in parents of adolescents. Results from two population-based studies found that parents of adolescents were more likely to use restriction if they were overweight, or pressure if they were underweight (Berge et al., 2015). Thus, a parent's own weight status can influence their use of controlling feeding practices. Research has yet to examine how much parent weight status influences child feeding practices in the context of other potential influences.

Parental eating patterns. The model breaks the construct of parent eating into four categories; food preferences, food selection, food availability, and dieting (Birch & Davison, 2001). Parent eating is comprised of multiple eating patterns such as, restraint, emotional eating and uncontrolled eating (Cappelleri et al., 2009). Uncontrolled eating is the tendency to eat more than usual due to loss of control over eating or eating in certain circumstances regardless of hunger (Cappelleri et al., 2009). People with this eating pattern might feel that they are unable to stop eating or feel the need to eat if someone else is eating. Thus, people eat in response to cues

that are external to themselves. These different eating patterns may have different impacts on how parents feed their children.

Parental dietary restraint, specifically, is associated with restrictive feeding practices (Fisher & Birch, 1999a; Francis et al., 2001b). Parents who limit their own intake are more likely to limit the intake of their children. In mothers of 3-5 year olds, increased maternal dietary restraint was associated with increased restriction of their child's intake (Fisher & Birch, 1999a). The children whose mothers restricted their own intake ate more palatable snack foods when they were in an unrestricted setting. Thus, the use of restrictive feeding practices in the home may lead to increases in the child eating restricted foods in other unrestricted settings. Similarly, maternal dietary restraint was significantly positively related to use of both restriction and pressure-to-eat in mothers of 5 year olds (Francis et al., 2001b). While this research provides some evidence for this relationship, the samples are limited to young children. It is unclear if this association holds with parents of adolescents.

Other eating patterns (e.g., uncontrolled eating and emotional eating) have received less attention in connection with feeding practices. In one sample of mothers of 3-6 year olds, increased uncontrolled eating was significantly associated with use of restriction (Fisher & Birch, 1999b). Mothers who had less control over their own eating used less restriction with their young children. Connections between parental emotional eating and child feeding practices have also been found. After controlling for maternal weight, mothers who scored high in emotional eating were more likely to use emotional feeding with their 4-year-old children (Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002). Mothers who used food in response to negative emotions used food to help control their child's emotions. These findings provide preliminary evidence for the relation between parental eating and child feeding practices. More research is

needed to expand our view of the potential influence of different parental eating patterns on the use of child feeding practices across ages and especially within adolescence.

Home environment predictors.

The influences within the parent and child levels are limited because they do not take into account the larger context in which these influences operate. The home environment may provide important context (Savage, Fisher, & Birch, 2007). Suggested components like food availability may lead to questions about both the availability of specific foods and also accessibility, which may be related to income. Income may influence whether parents use specific feeding practices. The Birch and Davison (2001) model includes food availability within the parent eating category, however, other home environmental factors are not included. The current study expands upon the Birch and Davison (2001) model to include home environment variables, such as income.

Availability of foods in the home. An important consideration for the use of controlling feeding practices is the context in which they occur, which may be influenced by factors such as the availability and accessibility of different foods in the home (Campbell et al., 2010; Loth, MacLehose, Larson, Berge, & Neumark-Sztainer, 2016). Adolescents have more freedom to choose what they want to eat in the home, depending on the availability of certain foods (Darling, Rehm, Coccia, & Cui, 2015; Reicks et al., 2015; Story, Neumark-Sztainer, & French, 2002). When fruits and vegetables are available in the home, mothers have been found to feed their children similar amounts of fruits and vegetables that they consume themselves (St John Alderson & Ogden, 1999). In addition, restriction and pressure-to-eat may operate differently within the home (Francis et al., 2001a). For example, restriction may be used to limit access to palatable snack foods, while pressure may be used during meal-times to promote eating healthful

foods (Francis et al., 2001a). When specifically examining the use of restriction and availability of foods in the home, restriction was positively associated with adolescent intake of both healthy and unhealthy foods, compared to adolescents in an unrestricted home environment (Loth et al., 2016). Another direct link between availability of foods in the home and use of controlling feeding practices was found such that the use of restriction was negatively related to mother's report of purchasing desired snacks (Fisher & Birch, 1999b). When mothers purchased more palatable snack foods, they used more restrictive feeding practices to reduce intake of those snack foods. This small but growing body of literature suggests that accessibility and availability of foods may impact the types of feeding practices parents use. Unfortunately, the available work in this area has not adequately studied the influence of income, in conjunction with food availability, on controlling feeding practices.

Income. Income is an important consideration due to its contribution to the family eating environment (Gable & Lutz, 2000). Parents of adolescents from low-income households have been found to commonly use both restriction and pressure-to-eat more than their higher income counterparts (Loth et al., 2013a). Within these lower income families, parents report that they have concerns that their adolescent is not eating enough food, which can then lead to pressuring them to finish all of their food at a meal (Loth et al., 2013a). Child feeding practices may be sensitive to the effects of income due to the types and quantity of food that families are able to afford. If families are worried about food going bad or wasting food, they may be more likely to use pressure. Alternatively they may use more restrictive practices when they aren't sure if they have enough food for all family members or they need their food to last for a certain amount of time.

In regards to child feeding practices and income, previous research has primarily focused on middle-income families (Francis et al., 2001a). More research is needed to explore differences in the use of different child feeding practices across diverse demographic samples (e.g., SES, race/ethnicity; Francis et al., 2001b; Loth, Fulkerson, et al., 2014; Sherry et al., 2004). Specifically, it is important to examine whether income plays a role in controlling feeding practices because previous research has examined differences among different demographic groups without consideration of other potential influences.

Currently, the literature on controlling child feeding practices is limited in scope. Much of the research focuses on younger children, and the vast majority of studies investigate only one level of influence such as, child weight or parent eating. Studies integrating multiple levels of influence on controlling feeding practices are needed to better understand both the unique contributions of each domain, as well as interactions of variables across domains. For example, when examining the contribution of parent eating on the use of child feeding practices, it is important to consider the context in which this occurs (i.e., home-level), which could affect the amounts or types of foods in the home. While more research is being done in this area with adolescents, the literature is still limited.

The Present Study

The primary aim for this study is to explore potential statistical predictors of the use of controlling child feeding practices (e.g., pressure and restriction) among parents of adolescents. Using Birch and Davison's (2001) model as a conceptual framework, the present study seeks to understand which factors are associated with parental use of controlling feeding practices (e.g., parent and child eating, parent and child weight, and the home environment). In regards to eating patterns, previous research has focused primarily on the contribution of parental dietary restraint

to the use of controlling feeding practices (Fisher & Birch, 1999a; Francis et al., 2001b), while less research has examined other parental eating. The current study seeks to expand this understanding by examining a variety of eating patterns (e.g., restraint, uncontrolled eating, and emotional eating) in both parents and adolescents. Additionally, the current study seeks to investigate the relation of the home environment to our understanding of parental use of controlling feeding practices. Preliminary evidence suggests that the environment plays a role during adolescence due to increased autonomy in eating during this developmental period (Towner et al., 2015). More research is needed to investigate controlling feeding practices in socioeconomically diverse communities. This study seeks to expand the understanding of parental use of controlling feeding practices by examining multiple potential factors within an age-group that has not received much attention: adolescents. With an improved understanding of which influences are the most important, future efforts can be made to address them.

Method

Participants

Participants took part in a larger study examining physiological stress reactivity and stress induced eating in adolescents. Parents ($N=54$, M parent age =43.63 years, $SD=6.42$; 94.4% female) of adolescents ages 12-17 ($N=54$, M age =13.94 years, $SD=1.75$; 43.6% female) completed measures assessing their child feeding practices, eating patterns and the home environment. Adolescents completed measures of their eating patterns. Inclusion/exclusion criteria were chosen to limit factors known to affect stress reactivity, which was a focus of the larger study but not the current study. Inclusion criteria comprised: 1) adolescent between the ages of 12 and 17, 2) both parent and child speak English as their primary language, and 3) adolescent BMI at or above the 15th percentile for age and gender or higher. This lower limit on adolescent BMI percentile was chosen to reduce a bias towards sampling youth with eating disorder tendencies. Exclusion criteria comprised: 1) no adolescent medication use that affects cortisol reactivity (e.g., steroids, oral contraceptives, etc.), 2) no adolescent major medical illnesses, 3) no current adolescent participation in a weight loss program or 5 pound weight loss in the previous month, 4) no parent or adolescent report of emotional or behavioral problems, learning disorder, eating disorder, major psychiatric disorder, or severe cognitive deficits, 5) no adolescent nicotine, alcohol or illicit drug use, and 6) disliking snacks used throughout the larger study procedures.

Procedure

Participants were recruited for the study through flyers in the community (e.g., food banks) and letters sent to schools and community centers. All potential parent participants completed an initial eligibility phone screen. A summary of screening, participation, and retention across all study visits can be found in Figure 2. All measures used in the present study were collected during study visits 1 and 2. Once deemed initially eligible after the phone screen, adolescents and their parents were scheduled for the first study visit. At the first study visit (day 1), consent and assent were obtained from the parent and adolescent respectively and further eligibility was determined

(i.e., depressive symptoms, eating disorder behavior, liking snacks). Adolescent report of depressive symptoms and eating disordered behavior were assessed following consent using the Reynolds Adolescent Depression Scale (Reynolds & Mazza, 1998) and the Youth Eating Disorders Examination Questionnaire (Fairburn & Bèglin, 1994), respectively. If

Figure 2. Study Participant Flow

Figure 2. Study participant flow of screening, participation, and retention.

adolescents reported elevated depressive symptoms or eating disordered behavior they were given referrals to local providers.

Parent and adolescent height and weight were measured at the beginning of study day 1. If families were deemed ineligible at this point they were compensated \$15 for their time and their participation ended. If families still met eligibility criteria, they continued with study procedures for day 1. Because the larger study examined physiological stress reactivity and objective eating in response to stress, adolescents participated in a habituation period to the laboratory setting on day 1 before completing a stress-induction protocol on day 2. All measures used in this study were collected during in-person study visits 1 and 2 and completed via paper and pencil. The demographics questionnaire and the Home Environment Survey (Gattshall, Shoup, Marshall, Crane, & Estabrooks, 2008) were given on day 1 to the parent and all other measures were given on day 2. Measures related to eating behavior were completed after all snack presentations were completed for the adolescent on day 2. This was done to reduce the potential influence of the eating behavior measures on their eating throughout the larger study. Parents and adolescents completed measures in separate rooms. Families were compensated up to \$150 for their participation in the 3 in-person study visits and one at-home data collection. All procedures were approved by the Kent State Institutional Review Board.

Measures

Demographics. Parents completed a 50-item measure of basic demographic information for themselves and their adolescent (e.g., age, gender, education, income).

Ratio of income-to-needs. Parents reported their total household income before taxes per year and were instructed to include income from all sources including child support, unemployment compensation, etc. Parents also reported the number of people living in their

household. The ratio of income-to-needs was calculated by dividing the total family income by the poverty threshold for the same family size (United States Bureau of the Census, 2014).

Participants were defined as low-income if their total household income fell below 200% according to the 2014 National Federal Poverty Guidelines for the number of people per household (United States Bureau of the Census, 2014). According to the guidelines, a family of four would fall below the 200% poverty threshold if their annual household income was under \$47,700 (United States Bureau of the Census, 2014).

Parent and adolescent weight status. Parent and adolescent height (stadiometer) and weight (digital scale) were measured objectively in triplicate and the average was used to calculate BMI for parents (kg/m^2) and BMI percentile based on age-and-gender for adolescents (Centers for Disease Control and Prevention, 2000). BMI percentile is used to better account for changes in growth for children during development. Participants wore light clothing and no shoes for each measurement.

Controlling Child Feeding Questionnaire. Parents completed the Child Feeding Questionnaire (CFQ; Birch et al., 2001). The CFQ has been validated for use with parents of adolescents (Kaur et al., 2006), and within other parent populations (Camcı, Bas, & Buyukkaragoz, 2014; Corsini, Danthiir, Kettler, & Wilson, 2008; Nowicka, Sorjonen, Pietrobelli, Flodmark, & Faith, 2014). The CFQ has met criteria for construct validity (Geng et al., 2009; Kaur et al., 2006). Additionally good internal consistency reliability (Camcı et al., 2014; Corsini et al., 2008; Nowicka et al., 2014), and good test-retest reliability have been found within the CFQ (Camcı et al., 2014; Nowicka et al., 2014). The CFQ is a 37-item measure of child feeding practices rated on a 5-point Likert scale with items ranging from 1 (*disagree*) to 5 (*agree*). Higher scores indicate higher levels of use of the feeding practices. Two scales from the CFQ

were included in the present analysis, representing the controlling feeding practices of interest: Restriction (8 items; e.g., “I intentionally keep some foods out of the house so my teen won’t eat them”), and Pressure-to-Eat (4 items; e.g., “If my teen says ‘I’m not hungry,’ I try to get her/him to eat anyway”). The scale has been validated for parents of adolescents and was found to have similar psychometric properties in this sample (Kaur et al., 2006). The internal consistency reliability for this measure was good to acceptable for each subscale in the current sample: Restriction $\alpha=.89$, and Pressure to Eat $\alpha=.78$.

Three Factor Eating Questionnaire. Parents completed the Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985). The TFEQ has been validated for use with many adult populations (Anglé et al., 2009; de Lauzon et al., 2004; Karlsson, Persson, & Sjöström, 2000). The TFEQ has met criteria for convergent (de Lauzon et al., 2004), discriminant (de Lauzon et al., 2004; Karlsson et al., 2000) and construct validity (Anglé et al., 2009). Additionally good internal-consistency reliability has been found within the TFEQ (Anglé et al., 2009; Karlsson et al., 2000). The TFEQ is an 18-item measure of eating patterns rated on a Likert scale with most items ranging from 1 (*definitely true*) to 4 (*definitely false*). Higher scores indicate higher disturbed eating patterns. The TFEQ includes subscales measuring Cognitive Restraint (3 items; “I deliberately take small helpings to control my weight”), Uncontrolled Eating (9 items; “Sometimes when I start eating, I just can’t seem to stop”), and Emotional Eating (6 items; “When I feel lonely, I console myself by eating”). The internal consistency reliability for this measure in the current sample for each subscale was acceptable to excellent: Cognitive Restraint $\alpha=.69$, Uncontrolled Eating $\alpha=.81$, and Emotional Eating $\alpha=.94$.

Dutch Eating Behavior Questionnaire. Adolescents completed the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien et al., 1986). The DEBQ has been validated for use

with children and adolescents (Baños et al., 2011; Halvarsson & Sjöden, 1998; Van Strien & Oosterveld, 2008). The TFEQ has met criteria for convergent, discriminant, and construct validity (Halvarsson & Sjöden, 1998). Additionally good internal-consistency reliability has been found within the DEBQ (Baños et al., 2011; Halvarsson & Sjöden, 1998; Van Strien & Oosterveld, 2008). The DEBQ is a 33-item measure of eating patterns rated on a Likert scale with items ranging from 1 (*never*) to 5 (*very often*). Higher scores indicate increased problematic eating patterns. Subscales from the DEBQ for the present study include Emotional Eating (13 items; “Do you have a desire to eat when you have nothing to do?” and “Do you have a desire to eat when you are disappointed?”), External Eating (10 items; “If you see others eating, do you also have the desire to eat?”), and Restrained Eating (10 items; “Do you try to eat less at mealtimes than you would like to eat?”). The internal consistency reliability for this measure in the current sample was good to excellent: Emotional Eating $\alpha=.94$, External Eating $\alpha=.84$, and Restrained Eating $\alpha=.93$.

Home Environment Survey. Parents completed the Home Environment Survey (HES; Gattshall et al., 2008). The HES has met criteria for construct validity and had good test-retest and inter-rater reliability (Gattshall et al., 2008). The HES is a 91-item measure of the availability of foods and physical activity equipment in the home. The HES includes subscales such as, Fruit/Vegetable Availability (27 items), Availability of Fat/Sweets (14 items), and Accessibility of Fat/Sweets (4 items). The availability of food items is rated on a scale from 0 (*never*) to 4 (*always*) with sample food items including: oranges, popcorn, and apple juice. Higher scores indicate higher presence of foods within the category. An example of an accessibility item includes, “In our home, we store high-calorie snack foods in a place where they could be seen and easily reached (includes foods like chips, crackers, nuts, cookies, ice

cream, cake, candy etc.”). The internal consistency reliability for this measure in the current sample was good to acceptable for each subscale: Fruit/Vegetable Availability $\alpha=.69$, Availability of Fat/Sweets $\alpha=.80$, and Accessibility of Fat/Sweets $\alpha=.65$.

Analytic Plan

The current study utilized a data analytic procedure by Flessner et al. (2011) and Stewart et al. (2008) to determine the most salient predictors of controlling feeding practices. This analytic plan was chosen in order to examine which influences are the most important to consider for the use of controlling feeding practices with parents of adolescents. Based on the model of child feeding practices developed by Birch and Davison (2001), and previous literature, 12 variables across 3 domains (i.e., child, parent, and home environment) were included in preliminary testing. Within each domain, 4 variables were included. Specifically, in the child domain, child BMI percentile, and 3 eating patterns (i.e., emotional eating, external eating, and restraint) were included. Similarly, within the parent domain, BMI and 3 eating patterns (i.e., emotional eating, uncontrolled eating, and restraint) were included. Home environment variables included income-to-needs ratio and 3 food availability/accessibility items (i.e., Fat/Sugar Availability, Fat/Sugar Accessibility, and Fruit and Vegetable Availability). Variables within each domain were selected based on previous literature suggesting them to be important in the context of child feeding practices. The procedure was conducted twice: once for Restriction and once for Pressure-to-eat. Scale scores were calculated using the average of the items for each scale. Candidate variables were assessed for normality and subsequently did not require transformation. First, all variables were examined for association with the outcome (i.e., Restriction and Pressure). Any variables with an α of 0.1 or less based on two-tailed Pearson Correlations were included in the next step of the analysis. Second, potentially redundant

variables were removed if they had intercorrelations higher than 0.7. Third, candidate variables were then placed into a hierarchical linear regression in the second step after controlling for adolescent age in the first step. After an initial hierarchical linear regression was conducted, all variables with significance .05 or greater were removed and the regression was re-run. Finally, this procedure was repeated such that a final regression model was reached in which all predictors remained significant.

Results

Findings

The final sample was comprised of 54 parent-adolescent dyads. Table 1 presents demographic characteristics for the sample. Parents were primarily female (94.4%), Caucasian (87.0%), and overweight/obese (64.8%). Adolescents included slightly more males than females, (43.6% female) with a mean age of 13.94 ($SD=1.75$). They were primarily Caucasian (83.3%) and not overweight/obese (61.1%). Approximately 28.3% of the sample fell below the 200% poverty threshold according to parent report of annual household income ($M=85,729$, $SD=50,638$) and number of people living in the home ($M=4.4$, $SD=1.1$).

Table 1

Demographic Characteristics (N = 54)

Characteristic	N (or Mean)	% (or SD)
<i>Child Characteristics</i>		
Biological sex		
Female	25	43.6
Age	$M = 13.94$	$SD = 1.75$
Ethnicity		
White	45	83.3
Black or African American	5	9.3
Asian or Pacific Islander	1	1.9
American Indian or Eskimo	0	0
Other	3	5.6
BMI percentile for age-and-gender	$M = 64.20$	$SD = 29.91$
Healthy weight ($\leq 85^{\text{th}}$ ile)	33	61.1
Overweight (85 th ile to 95 th ile)	14	25.9
Obese ($>95^{\text{th}}$ ile)	7	13.0
<i>Parental Characteristics</i>		
Biological sex		
Female	51	94.4
Age	$M = 43.63$	$SD = 6.42$
Ethnicity		
White	47	87.0
Black or African American	5	9.3
Asian or Pacific Islander	2	3.7
American Indian or Eskimo	0	0
Other	0	0
BMI	$M = 29.42$	$SD = 7.78$
Healthy weight (below 24.9)	19	35.2
Overweight (25.0 to 29.9)	15	27.8
Obese (30 or higher)	20	37.0
<i>Home Environment Characteristics</i>		
Income-to-needs Ratio	$M = 3.42$	$SD = 2.16$
Below 200% poverty threshold	15	28.3
Above 200% poverty threshold	38	71.7

Note.

All percentages may not equate to 100 due to rounding.

SD = standard deviation; M = sample mean

A complete list of specific controlling feeding practices endorsed by parents can be found in Table 2. Endorsement for specific feeding practices was defined as parents selecting slightly

agree or agree for an item (Loth et al., 2013a). The specific restrictive feeding practices endorsed by the largest percentage of parents

were watching to make sure that their

adolescent does not eat too many

sweets (50%) or high fat foods (50%).

A large portion of parents endorsed

needing to watch to make sure their

child doesn't eat too many of their

favorite foods (43%). Within

pressure, the specific feeding practice

endorsed by the largest percentage of

parents was trying to get their

adolescent to eat even when they say

they are not hungry (19%). Similar amounts of parents endorsed that their child should eat all the

food on their plate (17%) and endorsed needing to make sure that their adolescent eats enough

(15%).

Table 2

Parent Endorsement of Specific Controlling Feeding Practices (N = 54)

	% of Parents Who Agree
<i>Restriction</i>	
I have to watch out that my teen does not eat too many sweets like candy, ice cream, cake, or pastries.	50.0
I have to watch out that my teen does not eat too many high fat foods.	50.0
I have to watch out that my teen does not eat too much of his/her favorite foods.	42.6
I intentionally keep some foods out of the house so my teen won't eat them.	38.9
I offer sweets such as candy, ice cream, cake, and pastries to my teen as a reward for good behavior.	13.0
I offer my teen his/her favorite food in exchange for good behavior.	11.1
If I did not guide or regulate my teen's eating, he/she would eat too many junk foods.	38.9
If I did not guide or regulate my teen's eating, he/she would eat too many of his/her favorite foods.	40.7
<i>Pressure</i>	
My teen should always eat all of the food on his/her plate.	16.7
I have to be especially careful to make sure my teen eats enough.	14.8
If my teen says "I'm not hungry," I try to get her/him to eat anyway.	18.5
If I did not guide or regulate my teen's eating, she/he would eat much less than she/he should.	11.1

Note. Endorsement for specific feeding practices was defined as parents selecting slightly agree or agree.

Predictive Models of Controlling Feeding Practice

Restriction. Preliminary correlation analysis revealed 4 of 12 possible predictors of parental use of restriction (see Table 3). These four variables (Child BMI percentile, TFEQ Restraint, DEBQ Emotional Eating, and DEBQ External Eating) were examined for intercorrelations >0.7 (see Data Analytic Plan). The DEBQ Emotional Eating subscale was removed as a possible predictor as a result of the intercorrelation with the DEBQ External Eating score. The DEBQ External Eating score was retained due to having a stronger association with

Table 3

Correlations examining associations among Controlling Feeding Practices, and Candidate Predictor Variables (N=54)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Restriction	--													
2. Pressure	.24	--												
3. Child Age	-.33*	-.17	--											
4. Child BMI Percentile	.34*	.13	-.14	--										
5. Child Emotional Eating	-.25	-.32*	.26	-.08	--									
6. Child External Eating	-.37**	-.12	.28*	-.06	.75**	--								
7. Child Restrained Eating	-.15	.02	.33*	.03	.22	.15	--							
8. Parent BMI	.22	.42**	-.18	.21	-.05	-.04	-.10	--						
9. Parent Emotional Eating	.12	-.03	-.07	-.12	-.05	-.08	-.12	.27*	--					
10. Parent Uncontrolled Eating	.18	.02	-.13	-.01	-.02	-.05	-.17	.18	.64**	--				
11. Parent Restraint	.32*	-.14	.20	.18	-.07	-.09	.12	-.10	.22	.22	--			
12. Income-to-needs ratio	-.02	-.45**	.01	-.17	-.05	-.04	-.07	-.40**	-.18	-.08	.14	--		
13. Fat/Sugar Availability	.15	.27	-.02	-.05	-.18	-.08	.06	.25	.23	.10	.07	-.07	--	
14. Fat/Sugar Accessibility	.02	.06	.06	.08	.27	.19	.11	.25	.07	-.08	.03	-.16	.35**	--
15. Fruit and Vegetable Availability	-.05	.06	.12	-.02	-.08	-.05	-.14	-.09	-.20	-.15	.10	.10	-.34*	.07

Note: *** $p < .001$; ** $p < .01$; * $p < .05$. Boldface items indicate that the variable was included in initial regression analysis. Child eating variables were measured using the Dutch Eating Behavior Questionnaire. Parent eating variables were measured using the Three Factor Eating Questionnaire. Home environment variables were measured using the Home Environment Survey.

the outcome (i.e., Restriction). The remaining 3 variables were entered into a standard regression analysis to determine significance (Child BMI percentile, $p = .08$; TFEQ Restraint, $p = .01$; and DEBQ External Eating, $p = .05$; see Table 4). TFEQ Restraint was re-entered into a subsequent regression model and remained a significant predictor (see Table 5). TFEQ Restraint accounted for 15.2% of the variance in use of restriction, $F(1, 51) = 10.4$, $p < .01$. The R-square for the full model was .26.

Pressure. Preliminary correlation analysis revealed 4 of 12 possible predictors of parental use of pressure (see Table 3). These four variables (DEBQ Emotional Eating, Parent BMI, HES Fat/Sugar Availability, and Income-to-needs ratio) were examined for intercorrelations >0.7 (see Data Analytic Plan). Subsequently all variables were retained due to intercorrelations <0.7 . The remaining 4 variables were entered into a standard regression analysis to determine significance (Parent BMI, $p = .14$; DEBQ Emotional Eating, $p = .02$; Availability of

Fat/Sweets, $p = .26$; and Income-to-needs ratio, $p = .006$; see Table 4). DEBQ Emotional Eating and income-to-needs ratio were re-entered into a subsequent regression model and remained significant predictors (see Table 5). DEBQ Emotional Eating and income-to-needs ratio accounted for 29.1% of the variance in use of pressure, $F(2, 48) = 10.2$, $p < .001$). The R-square for the full model was .31.

Table 4

Preliminary Standard Regressions Examining Predictors of Restriction and Pressure (N = 54)

	B	S.E.	Beta (β)	R^2	ΔR^2
Restriction					
Step 1:				.10	.10*
Child Age	-.18	.08	-.31*		
Step 2:				.31	.21**
Child BMI Percentile	.01	.00	.21		
Child External Eating	-.36	.18	-.25		
Parent Restraint	.15	.06	.31*		
Pressure					
Step 1:				.02	.02
Child Age	-.08	.07	-.15		
Step 2:				.38	.36***
Parent BMI	.02	.02	.20		
Child Emotional Eating	-.17	.07	-.29*		
Fat/Sugar Availability	.21	.18	.14		
Income-to-needs Ratio	-.16	.05	-.37**		

Note: *** $p < .001$; ** $p < .01$; * $p < .05$. Child eating variables were measured using the Dutch Eating Behavior Questionnaire. Parent eating variables were measured using the Three Factor Eating Questionnaire. Home environment variables were measured using the Home Environment Survey.

Table 5

Final Standard Regressions Examining Predictors of Restriction and Pressure (N = 54)

	B	S.E.	Beta (β)	R^2	ΔR^2
Restriction					
Step 1:				.11	.11*
Child Age	-.19	.08	-.33*		
Step 2:				.26	.15**
Parent Restraint	.20	.06	.40*		
Pressure					
Step 1:				.02	.02
Child Age	-.08	.07	-.15		
Step 2:				.31	.29***
Child Emotional Eating	-.19	.07	-.33*		
Income-to-needs Ratio	-.19	.05	-.46***		

Note: *** $p < .001$; ** $p < .01$; * $p < .05$. Child eating variables were measured using the Dutch Eating Behavior Questionnaire. Parent eating variables were measured using the Three Factor Eating Questionnaire. Home environment variables were measured using the Home Environment Survey.

Discussion

To the author's knowledge, this is the first study to investigate (a) the association between multiple domains salient to child development (i.e., child, parent, and home) and the use of controlling child feeding practices and (b) which potential factors are the most important with adolescents. Child feeding practices serve as a central tenant of Birch and Davidson's (2001) model, which provides a fitting guide for examining potential child, parent, and home level variables in relation to the use of controlling feeding practices. Support for the inclusion of different levels of potential influence when examining the use of child feeding practices was found such that across both restriction and pressure significant associations were found within more than one domain. Additionally, restriction and pressure differ in that the most salient predictors had little overlap across the two, pointing to the need to avoid collapsing findings across these distinct controlling feeding practices. Thus, the present study provides important information about the associations with restriction and pressure across multiple domains and points in the direction of the most salient factors as starting points for future intervention.

Previous research has been narrower in scope and has tended to focus on only one or two areas (e.g., associations between child weight and feeding practices, or parent eating and feeding practices; Faith, Berkowitz, et al., 2004; Haycraft et al., 2014; Johannsen et al., 2006; Spruijt-Metz et al., 2006; Towner et al., 2015). By investigating associations between a range of child, parent, and home level variables, the present study provides a broader view of the relation of those levels and the use of controlling feeding practices. The current study extends the literature by exploring these associations with parents of adolescents, while previous research has

primarily focused on younger children and has been limited in adolescent samples (Johannsen et al., 2006).

The associations presented in the Birch and Davidson (2001) model of multiple interactions between parent and child factors that affect child feeding practices were supported by the present study. Across both controlling feeding practices significant associations were found between parent and child eating and weight variables. Support was also found for expanding the model to include environmental variables such as availability of foods and income-to-needs, specifically for pressure. This recommendation is consistent with previous cross-sectional research with restriction and food availability (Loth et al., 2016), but is novel in the context of pressure. Based on the current results, environmental variables are salient for the use of pressure, but not for restriction. More research is needed to elaborate on findings within the home environment and resolve the discrepant findings between this and previous research. Expanding the model to include environmental variables provides important context in which parents use child feeding practices and should be included in future research (Loth et al., 2016).

Restriction

Preliminary correlation analyses supported aspects of the Birch and Davidson (2001) model in that restriction was significantly correlated with child BMI percentile, child eating patterns (i.e., DEBQ - External Eating), and parent eating patterns (i.e., TFEQ - Dietary Restraint). Specifically, increased restriction was correlated with higher parental dietary restraint, higher BMI percentile and lower adolescent external eating. Previous research with these variables has also found significant associations with the use of restriction for both increased child BMI percentile (Dev et al., 2013; Klesges et al., 1983) and decreased external eating (Carper et al., 2000).

After completing regression analyses controlling for age, BMI percentile and external eating were not retained. However, these variables remain important for consideration in future research due to the significant associations they have with restriction. They inform the larger picture of what factors are related to the use of restriction. One possible reason for why these two child level variables were not retained is increased autonomy given to adolescents. This is consistent with previous research which suggests that caregivers appear to allow adolescents more independence in controlling how much they eat (Towner et al., 2015). Thus, future research should investigate the trajectory of use of restriction throughout childhood and adolescence.

Importantly, the positive correlation between restriction and external eating has implications for the understanding of associations between these variables. Restriction is largely considered to be negative, however, the present study provides support for re-examining these associations to determine directionality and possible consideration of restriction as possibly have positive associations. Restriction did not have significant correlations with variables at the home-environment level. Although two previous studies found a significant association between food availability and restriction (Fisher & Birch, 1999b; Loth et al., 2016), there is an overall lack of research into these possible associations. More research is needed to determine whether these variables are related to the use of restriction.

After entering the variables into a regression to determine which variables were the most salient, only parental dietary restraint remained significant, such that higher levels of Parental dietary restraint (TFEQ – Restraint) were associated with increased use of restriction. These results are consistent with previous research with early school-age youth (Fisher & Birch, 1999a; Francis et al., 2001b). The use of restriction has been conceptualized as the result of a parent's own struggles with their eating and weight (Francis et al., 2001a). If parents struggle to control

their own eating, they may believe that their child will struggle and they try to exert more control via restriction. By replicating these findings with adolescents, the current study expands knowledge of which variables are the most salient for parental use of restriction in this age range. Although their children are growing up, a parent's own dietary restraint continues to contribute to their increased use of restriction in this adolescent sample. It appears that this association may be less sensitive to developmental considerations as support has been found across a wide age range. This understanding can inform efforts to reduce use of restriction. When targeting reductions in the use of restriction, parental dietary restraint appears to be the most important place to start intervention efforts.

Pressure

Preliminary correlational analyses supported aspects of the Birch and Davidson (2001) model. Specifically, pressure-to-eat was significantly correlated with child eating patterns (i.e., emotional eating) and parent BMI. Additional factors not included in the original Birch and Davidson (2001) model were also significantly correlated with parental use of pressure, including income-to-needs ratio and availability of foods high in fat and sugar (HES FAT/Sugar Availability).

Following regression analysis parental BMI and availability of foods high in fat and sugar were not retained. These variables remain important for understanding the complete picture of what variables are related to the use of pressure. One possible reason why they were not retained is the higher prevalence of obesity in low-income populations (Strauss & Knight, 1999). Income-to-needs, rather than parent BMI appears to be a stronger predictor of pressure than parent BMI due to the relation between those variables. Regarding high fat and sugar availability, this is the first study to investigate associations between availability and the use of pressure. In low-income neighborhoods, there is frequently a lack of access to healthy foods contributing to increased

consumption of foods high in fat and sugar (Block, Scribner, & DeSalvo, 2004). Income-to-needs might also be a better predictor for the use of pressure due to the relation between income and access to healthy foods.

Findings from regression analyses suggested that adolescent emotional eating (DEBQ – Emotional Eating) and income-to-needs ratio were the most salient predictors of the use of pressure. Interestingly, the strongest predictor of pressure was income-to-needs ratio. Specifically, increased pressure was associated with lower income-to-needs ratio. This finding is notable within the context of the current study given that income-to-needs ratio fell within a domain (home environment) that was not originally included in the Birch and Davidson's (2001) model. This study therefore extends the literature by building upon the Birch and Davidson (2001) model and including a variable (income-to-needs) that has not been used in relation to child feeding practices.

Income contributes to the family eating environment such that low-income families might not be able to financially afford healthy foods (Gable & Lutz, 2000), but income has been largely neglected in the literature. Parents who have fewer resources available to them appear to use more pressure-to-eat tactics, which is consistent with one previous study which found that low-income parents use more pressure compared to higher income parents (Loth et al., 2013a). This is important considering that there is a higher prevalence of obesity within low-income populations even after controlling for other demographic factors (Strauss & Knight, 1999). If families use their limited financial resources to purchase food, they may not want to see that food go to waste and may therefore pressure their children to eat what has been prepared. It is possible that children from low-income households may then be particularly susceptible to having disrupted internal hunger and satiety cues due to this increased pressure, which may contribute to

disparities in childhood obesity. Data from the current study is not adequate to address this potential relation, so future research is needed to investigate this potential contributor to income disparities in childhood obesity.

While income has been used previously in conjunction with child feeding practices, a strength of the current study is the use of income-to-needs as the indication of socioeconomic diversity. Previous research with income findings related to child feeding practices included option categories that spanned \$15,000 and did not consider household size (Loth et al., 2013a). Income-to-needs is a more precise measurement of economic well-being because it is sensitive to the economic needs of a family (McLoyd, 1998). When using a strict household income limit, families with 3 members and families with 6 members could be contained within the same category, without considering the economic needs of the family to support either 3 or 6 members. Previous research has use samples composed of primarily middle-income families (Francis et al., 2001a), and there has been a call for more research with diverse samples (Francis et al., 2001b; Loth, Fulkerson, et al., 2014; Sherry et al., 2004). This study provides support for considering environmental factors, especially income-to-needs ratio in examining relationships with controlling child feeding practices.

Within influences currently included in the Birch and Davidson (2001) model, adolescent emotional eating was negatively associated with parental use of pressure. This finding was unexpected and is in contrast with previous cross-sectional research with adolescents which found a positive association between controlling feeding practices and increased pre-adolescent and adolescent disordered eating (Edmunds & Hill, 1999; Haycraft et al., 2014; Houldcroft et al., 2014; Loth, MacLehose, et al., 2014). Three of the studies finding this association used adolescent report of feeding practices, which measures their perception of controlling feeding

practices (Edmunds & Hill, 1999; Haycraft et al., 2014; Houldcroft et al., 2014). It is possible that an adolescent's perception of parental control may contribute more to maladaptive eating, than parental report of control. Thus, an adolescent's perceptions of controlling feeding practices are more likely to be a risk factor for adolescent maladaptive eating patterns. In the current sample, it is possible that adolescents are exercising autonomy and not responding to the pressure exerted by their parents (Carper et al., 2000). For adolescents, increased control over how much they are eating (Towner et al., 2015) may result in an expression of autonomy through decreased maladaptive eating in response to emotions.

Findings from the present study are in contrast with previous literature which found that increased use of pressure was positively associated with both emotional and external eating (Carper et al., 2000; Van Strien & Bazelier, 2007). One possible explanation for this discrepancy is the age range studied with previous research including younger samples (Carper et al., 2000; Van Strien & Bazelier, 2007). The current study extends the literature by examining the association in adolescents. Discrepant findings provide further evidence for the potential bi-directional nature of child level variables on the use of child feeding practices. Child level variables both influence and are influenced by parental use of controlling feeding practices (Clark et al., 2007; Powell et al., 2011; Ventura & Birch, 2008). Cross-sectional data only provide a snapshot and do not give an indication of directionality. In this case conflicting results are quite plausible because each study provides one view of a specific sample.

Clinical Implications

In order for effective interventions to be developed, researchers must first better understand predictors of child feeding practices (Berge et al., 2015). For example, based on the results from the current study it would be important to take into account a parent's own eating

when targeting restrictive feeding practices. Parents may struggle to separate the restraint that they exert on themselves from how much they should restrict their child's eating. Interventions could focus on helping the parent separate the two or work to reduce both the parent's own dietary restraint and use of restriction with their child.

With interventions to reduce a parent's use of pressure, it would be vital to include discussion about their financial needs. Because parents who are low income appear to use more pressure-to-eat tactics, this may be a result of concern about wasting food. Specific strategies may be helpful for these families, such as helping parents determine portion sizes which may limit the amount of food waste and potentially reduce use of pressure.

Importantly, in the current study increased use of restriction and pressure were negatively associated with external and emotional eating respectively. While the finding for restriction is consistent with some previous research (Carper et al., 2000), this aspect of controlling feeding practices appears to be inconsistent with the prevailing notion that controlling feeding practices have a primarily negative impact on child eating and weight. Recent research has questioned whether there are optimal levels of controlling feeding practices (Jansen et al., 2014). It is possible that there is an ideal level of controlling feeding practices, which is needed in order to positively influence children's weight management and reduce negative impacts of controlling feeding practices. This would reconcile the use of controlling feeding practices and recommendations within family behavioral treatments (FBT) for weight loss. In FBT parents are the agent of change and are responsible for facilitating changes to promote healthy eating and subsequent weight loss for their child (Wilfley, Stein, Saelens, & et al., 2007). Within these treatment programs parents are directed to engage in restrictive feeding practices such as limiting the number of high energy dense foods that their child consumes and engage in some use of

pressure to encourage intake of fruits and vegetables. Currently the inherent conflicts between the child feeding literature and the behavioral weight loss literature have not been reconciled. If, as the present study suggests, controlling feeding practices are not entirely negative, weight loss programs such as FBT could be great platforms for further investigating which aspects of restriction or pressure may result in negative outcomes. By manipulating the amount of restriction or pressure parents engage in during FBT, more information can be obtained as to how these feeding practices impact child eating and weight.

Limitations and Future Directions

The results of this study should be considered in light of several limitations. Findings are tentative given the small sample size, cross-sectional design, and need for more stringent methodological parameters to test the model. Although, this study was embedded in Birch and Davidson's (2001) conceptual framework and extended the framework by including environmental level variables, there was not a large enough sample size to allow for structural equation modeling. Additionally, with a small sample size, the present study has a reduced chance of detecting a true effect if an effect exists. The small sample size undermines the reliability of the results and may not reflect true findings (Field, 2013). Thus, the present study may be limited in statistical power to detect an effect, given that larger samples are better approximations of the general population (Field, 2013). Future research with larger samples is needed to test the model.

The current study was limited to self-report data from both the parents and adolescents. Including multiple informants for each construct may help understanding of unexpected findings. For example, the current study is limited to adolescent self-report of their eating. Additionally, utilizing observations of meal-time behaviors would give a more objective view of feeding

practices that parents are using rather than relying on self-report. The current sample was primarily composed of mothers. While mothers have been found to be primarily responsible for feeding (Blissett, Meyer, & Haycraft, 2006), as social norms change, fathers may play more of a role. Finally, the current study was cross-sectional limiting ability to interpret causal directions in the associations found. Longitudinal research is needed to investigate directional associations (Loth, Fulkerson, et al., 2014; Ventura & Birch, 2008).

Future longitudinal research is needed to investigate differences in the use of child feeding practices throughout child and adolescent development. Due to the bi-directional nature of child influences on the use of controlling feeding practices (Clark et al., 2007; Powell et al., 2011), parents may adapt their use of feeding practices over time. Child feeding practices have been found to be stable from age 5 to 7 years (Faith, Berkowitz, et al., 2004); however, it is not known how child feeding practices change during adolescence. Some researchers have theorized that adolescents may influence their caregivers feeding practices more than younger children (Hennessy et al., 2010). This study suggests that future research should include aspects from different levels of influence, such as child, parent and home environment. Future research should incorporate multiple levels of influence on the use of child feeding practices. As understanding of these influences grows, efforts can be made to address potential adverse outcomes associated with controlling feeding practices.

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