Adult weight management patients' perceptions of family dynamics and weight status

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Summary
Our overall objective was to describe the parent-child, romantic, and family dynamics of adult weight management program (WMP) patients, and associations with children's and partners' weight status. First, we determined if family functioning mediated the effect between parent-child feeding practices and perceived child weight status, and romantic relationship anxiety and avoidance and perceived partner weight status. Second, we assessed if perceived child and partner weight status moderated the associations between family functioning and parent-child feeding practices and romantic relationship anxiety and avoidance, respectively. Patients (N=203) who resided with a child and partner from two WMPs completed assessments of parent-child feeding practices (Child Feeding Questionnaire), romantic relationship anxiety and avoidance (Relationship Structures Questionnaire), family functioning (Family Assessment Device General Functioning Scale), and perceived child and partner weight status. Bivariate analyses determined differences in weight status and relationship dynamics and family functioning, and mediation and moderation analyses were conducted to answer the two research questions. Family functioning was not a mediator between romantic relationship dynamics and partner weight status or parent-child dynamics and child weight status. Lower family functioning was associated with higher parent-child restrictive feeding practices, only among children with overweight/obesity. Similarly, lower family functioning was associated with higher anxiety and avoidance in romantic relationships, only for partners with overweight/obesity. Patients with children and/or partners with overweight/obesity reported more impaired family dynamics and functioning, compared to patients with children and/or partners with a healthy weight status.

KEYWORDS
family, feeding practices, obesity, overweight, parent-child, romantic relationship, weight management

1 | INTRODUCTION

Currently, two out of three US adults are overweight/obese,1 and approximately half of all adults are pursuing weight loss.2 Parental obesity is one of the strongest risk factors for the development of obesity in children, and obesity rates between children and parents are highly correlated.4 Obesity rates between romantic partners/spouses (referred to as partners herein) are also highly correlated; where the longer partners stay together, the more congruent their weight statuses become. Given that the majority of US children...
and adults are currently living with a parent or partner, respectively, who have overweight/obesity and are pursing some type of weight loss, it is important to understand associations between parent-child, couple, and family dynamics and family members’ weight status to determine which family dynamics should be potentially targeted in future family-based weight management prevention and intervention.

The majority of weight management interventions that have included family members’ participation are in paediatric weight management programmes (WMPs), and often include one participating parent. Overall, these interventions have shown positive changes in youth dietary and physical activity behaviours and weight loss. In adult WMPs and bariatric surgery, intervention and treatment are primarily isolated to patients’ behaviours, and when involving an additional family member (typically spouses), the studies report mixed results. Focusing purely on patients’ behaviours and even the inclusion of one family member is likely narrow-sighted, as patients often reside with and are influenced by multiple family members and dynamics that can either encourage or discourage the adoption of new health behaviours and ultimately weight loss.

Family Systems Theory describes families as bidirectional systems where multiple reciprocal interactions occur simultaneously between parents and children, partners/spouses, and among the entire family. For example, when a mother participating in a WMP changes her behaviours, those changes may affect her child’s or partner’s health behaviours as well; the child’s or partner’s reactions to behavioural changes may encourage or discourage further health behaviour changes that she attempts. A patients’ existing family dynamics when they begin WMPs also likely determines how easily changes are made in the family and household, and supported by other family members. Further, how the patient, partner and child adapt to these health behaviour changes could inherently change the parent-child and romantic dynamics and how the overall family functions. Given the complexity of families and behaviour change and weight loss, obtaining single assessments of one type of family relationship (eg, parent-child or romantic) does not provide a comprehensive assessment of the multiple existing dynamics in families, and does not represent the overall family environment.

Parent-child dynamics have been assessed by prior researchers through parenting styles, and specific parent-child feeding practices. Overall, authoritative parenting and less restrictive parental feeding practices are associated with children’s healthy food intake and healthy weight status. Romantic relationship dynamics have been assessed through avoidance and anxiety within the couples’ relationship and romantic relationship quality, where higher avoidance and anxiety and lower relationship quality have been observed among adults in WMPs and in bariatric surgery. Family functioning is a commonly used assessment of the broader family environment, where impaired family functioning is associated with higher rates of overweight/obesity in both youth and adults. What has not yet been explored, in the context of weight management, are the associations between restrictive parent-child feeding practices and greater pressure to eat with impaired family functioning, and anxiety and avoidance in romantic relationships with impaired family functioning, and further that these associations may be more pronounced based on children’s and partners’ overweight/obesity status. We can find no study to date that comprehensively explores how parent-child and romantic relationship dynamics associate with the overall family environment in relation to family members’ weight status.

In order to develop family-based programming to both treat adult obesity and potentially prevent and/or treat obesity among children and romantic partners of patients in WMPs, we need to better understand the dynamics between parents and children and romantic partners, the broader family environment, and their association with family members’ weight status. Thus, the purpose of this study is to describe the dynamics between adult WMP patients and their children (parent-child feeding practices) and partners (romantic relationship anxiety and avoidance), the broader family environment (family

WHAT IS ALREADY KNOWN ABOUT THIS SUBJECT

- Obesity status is highly correlated among family members (parent-child dyads, romantic partners).
- Impaired family functioning is more prevalent among families with obesity.
- Restrictive feeding practices are more commonly practiced by parents of children with overweight/obesity.

WHAT THIS STUDY ADDS

- This study extends previous research by examining two distinct family dynamics, parent-child and partner, and their association with overall family functioning, and evaluates whether associations between parent-child and romantic relationship dynamics and family functioning are moderated by child and partner weight status.
- There were significant associations between greater parent-child restrictive feeding practices and impaired family functioning, and higher avoidance and anxiety in romantic relationships and impaired family functioning, although these effects were only observed among children and partners who were perceived to have an overweight/obese weight status.
- This indicates that among families where multiple members have overweight/obesity, impairments in parent-child and romantic partner dynamics may affect the entire families’ functioning. This is important to consider among patients in WMPs, as behaviour change is necessary for weight loss, and patients who report more family support often have better long-term behaviour change and weight loss.
functioning) and patients’ perceptions of both children’s and partners’ weight status. Specifically, we determined if family functioning mediated the effect between parent-child feeding practices (restrictive feeding, pressure to eat) and perceived child weight status, and romantic relationship anxiety and avoidance and perceived partner weight status. Second, we assessed if perceived child weight status moderated the association between parent-child feeding practices and family functioning, and if partner weight status moderated the association between romantic relationship anxiety and avoidance and family functioning. This study extends previous research by examining two distinct family dynamics, parent-child and partner, and their association with overall family functioning, and evaluates whether associations between parent-child and romantic relationship dynamics and family functioning are moderated by child and partner weight status.

2 METHODS

2.1 Participants

Patients attending an adult WMP at The Ohio State University and Wake Forest Baptist Medical Center were screened for participation. To be eligible, patients needed to be ≥18 years, read and speak English, live in the home the majority of the week (≥4 days) with their child ages 2-18 and a romantic partner (≥18 years), and have no known medical conditions or terminal illnesses that would prevent them from participation in their WMP. Patients were excluded if they were under age 18, did not live with a romantic partner (≥18 years) and child (ages 2-18) at least 4 days per week, and had a known medical condition or terminal illness (ie, cancer) that prevented them from participation in the WMP. If patients had more than one child living in the home with them that met our inclusion criteria, they were instructed to select their youngest child within the age range when completing the survey. We purposely included patients participating in diverse outpatient weight management options at both sites including combinations of educational/behavioural WMPs, bariatric surgery and weight-loss medication management to provide a broad assessment of organized weight management approaches and reflect the diversity of programmes available.

The targeted sample size was 300 (150 patients from each of the two sites). Based on a power analysis using G*Power 35,29 a sample of 92 was sufficient to conduct regression models with five predictors with a beta of .80.

2.2 Protocol

Following Smart IRB approval from both academic/medical institutions (Smart IRB #2017B0210), patient recruitment took place from May to November 2017 at the outpatient weight management clinics at both institutions. Members of the research team recruited patients in the waiting rooms at these sites, where they read a recruitment script, and if they agreed, provided verbal consent. Following consent, patients were handed a one-time survey packet on a clipboard to complete prior to exiting the clinic. The majority were completed prior to their appointment in the waiting room. A member of the research team was available at all times to answer questions. Every consecutive patient meeting our inclusion criteria was invited to participate. Overall, less than 20 patients across both sites (~6%) declined the opportunity to participate, namely due to time limitations. Participants received a $10 retail gift card for their time and participation in the study. The surveys were de-identified and entered into a database prior to analysis.

2.3 Measures

Patients were asked to self-report their age, sex (male, female), height (feet, inches), weight (lbs), perceived weight status (underweight, normal/healthy weight, overweight, obese), ethnicity, race, relationship status (married, cohabitating) and length (months/years), highest level of education completed, income level, food security,30,31 and number of children living in the household. Patients were also asked to report their youngest child’s age, sex, height, weight, perceived weight status, ethnicity, race, and their partners’ age, sex, height, weight, perceived weight status, ethnicity and race. For the purpose of our analysis, we used patients’ reports of their child’s and partners’ weight status as a dichotomous variable by collapsing underweight and healthy weight (healthy weight) and overweight and obese (overweight/obese). Due to the underestimation of height and weight used to calculate weight status among patients with obesity,32-34 and that overall perception of weight status likely has greater influence on behaviour change and outcomes, we used perception of overweight/obesity rather than rely on accurate patient-reported partner and child height and weight.34

The Child Feeding Questionnaire (CFQ) was used to assess the patient’s assessment of feeding practices that they engage in with their child. The CFQ is reliable (α = .60-.8814) and valid for use with parents of children at least 2 years old, and had been validated with ethnically diverse and community samples.14,35 We used two subscales of the CFQ, restrictive feeding (eight items) and pressure to eat (four items), which are both scored on a 5-point Likert scale (1 = disagree, 2 = slightly disagree, 3 = neutral, 4 = slightly agree, 5 = agree). Cronbach’s alpha was .87 and .68 for restrictive feeding and pressure to eat, respectively.

The Relationship Structures Questionnaire-30 (ECR-RS) was used to assess patients’ relationship with their romantic partner. The ECR-RS provides both anxiety (three items) and avoidance (six items) in romantic relationships.18 The ECR-RS is both reliable (α = .93-.9536) and valid with diverse patients, including those with obesity.20,21,37 Cronbach’s alpha in our sample was .87 and .89, for the anxiety and avoidance scales, respectively.

The Family Assessment Device-General Functioning Scale (FAD GF) was used to measure the current level of family functioning, or the overall family emotional environment.38 The FAD GF is reliable (α = .72-.9222-24,27) and has significant construct and criterion validity in both clinical and non-clinical samples, including patients with obesity and in weight management.25,28,40 The FAD GF has a clinical cut-off score which notes clinically impaired (≥2.0) or healthy family...
functioning (<2.024). The FAD GF was used both as a continuous variable and as a dichotomous variable in our analyses. Cronbach’s alpha in our sample was .94.

2.4 | Analysis

To be included in the analysis, completed data for perceived partner and child weight status and for all the aforementioned measures were required. Data cleaning, univariate (descriptive and chi-square statistics) and bivariate analyses (correlations and paired t tests) were conducted using SPSS version 25 (SPSS Inc., Chicago).\(^{41}\) Mediation and moderation analyses were conducted using MPLUS version 6.1.\(^{42}\) A mediation analysis was conducted to assess if family functioning mediated the effect of romantic relationship dynamics (relationship anxiety and avoidance) on perceived partner weight status (healthy weight, overweight/obese), and mediated the effect of parent-child dynamics (restrictive feeding, pressure to eat) on perceived child weight status (healthy weight, overweight/obese). The mediation model was fully saturated, and all the variables included in the analysis were observed.

A moderation analysis was conducted to determine (a) if partner weight status (healthy weight, overweight/obese) moderated the association between romantic relationship (relationship anxiety and avoidance) dynamics and family functioning, and (2) if child perceived weight status (healthy weight, overweight/obese) moderated the association between parent-child dynamics (restrictive feeding, pressure to eat) and family functioning. To test for group differences, each pathway was constrained and a Chi difference was conducted to determine if the constraints reduce the fit of the model. Both baseline moderation models were fully saturated due to the observation nature of the variables. The romantic partner moderation model is displayed in the top of Figure 1, and the parent-child moderation model is displayed in the bottom of Figure 1.

3 | RESULTS

There were 203 participants who provided completed child and partner data for the variables of interests, the majority of missing data were for perceived child or partner weight status. On average patients identified as female (85.7%), 41 years, White (76.9%), and were married (83.7%). Patients’ partners on average were male (83.7%), 42 years, White (71.4%), and had 1 to 2 children (85.4%). On average patients reported that they had 1 to 2 children ≤18 years living at home; children were male (52.2%), 10 years, and White (68.3%). The majority of patients reported that their partners had an overweight or obese weight status (58.4%), and their child had a healthy weight status (77.4%). There were 111 (55.5%) bariatric surgery patients (pre-surgery, n = 64; post-surgery, n = 43; not specific pre- or post-surgery, n = 4), 72 (36.2%) patients were participating in an outpatient educational/behavioural WMP, and 21 (10.6%) patients were doing individuals plans or medication only. There were five patients who were doing a combination of one of the WMPs and were either pre- or post-surgery. There were no significant differences for the variables of interest based on programme participation type or location. Additional demographics and scale descriptives are reported in Table 1.

3.1 | Family functioning

Correlations between family functioning, restrictive feeding, pressure to eat, and anxious and avoidant relationships are displayed in Table 2. Family functioning was strongly correlated will all variables except the parent-child pressure to eat scale. Based on the FAD GF clinical cut-off score, close to 20% of patients (n = 43, 21.2%) reported clinically impaired family functioning.

Patients who reported impaired family functioning based on the clinical cut-off (n = 43) reported significantly higher anxiety (2.72 ± 1.68) in their romantic relationship (t(51.45) = -4.49, P < .001) compared to patients who reported healthy family functioning (n = 160; 1.51 ± 1.07). Similarly, patients with impaired family functioning also reported higher avoidance (3.12 ± 1.66; t(50.76) = -5.09, P < .001) in their romantic relationships compared to patients with healthy family functioning (1.75 ± 1.02). However, patients who reported impaired family functioning (3.37 ± 1.09) reported significantly less child restrictive feeding (t(201) = -2.41, P = .017) compared to patients who reported healthy family functioning (2.94 ± 1.02). There was not a significant difference between patients who reported impaired and healthy family functioning for pressure to eat.

![FIGURE 1 Perceived partner weight status as a moderator of romantic (ECR-RS) and family (FAD) dynamics (top model), and perceived child weight status as a moderator of parent-child (CFQ) and family (FAD) dynamics (bottom model)](image-url)
3.1.1 Family functioning as a mediator

One significant pathway in the mediation model was between restrictive feeding and significant other weight status ($B = 0.29$, $SE = 0.09$, $P = .002$), where higher parent-child restrictive feeding practices were observed among partners who were perceived to be overweight/obese. Other significant pathways were between avoidance ($B = 0.15$, $SE = 0.03$, $P < .001$) and anxiety ($B = 0.07$, $SE = 0.02$, $P = .002$) and family functioning, where higher avoidance and anxiety were associated with more impaired family functioning. The results of the model do not support family functioning as a mediator between parent-child dynamics (restrictive feeding, pressure to eat) and perceived child weight status, or between romantic relationship dynamics (anxious and avoidant) and perceived partner weight status. The rest of the non-significant pathways are reported in Table 3.

3.2 Partner and child weight status

There was a significant relationship between patients’ perception of their child’s and partners’ weight status, $X^2 (2, N = 201) = 18.76$, $P < .001$; patients who perceived their child to have a healthy weight status were more likely to perceive their partner to have a healthy weight status. Differences based on patients’ perceptions of their partners’ and child’s weight status for parent-child dynamics (restrictive feeding, pressure to eat), romantic relationship dynamics (anxious and avoidant relationship) and family functioning are displayed in Table 4. Patients who reported that their child had an overweight/obese weight status ($n = 46; 3.52 \pm 0.85$) reported more child restrictive feeding practices ($t(90.05) = -4.23, P < .001$) compared to those who perceived their children to have a healthy weight status ($n = 157; 2.88 \pm 1.06$). Patients with children with an overweight/obese weight status ($1.67 \pm 0.87$) reported less pressure to eat.
although this result did not reach full statistical significance. Patients who perceived their partners to have an overweight/obese weight status more frequently reported impaired family functioning, with the model explaining 4% of the variance in family functioning. If patients perceived romantic partners to have a healthy weight status, there were no significant associations between romantic relationship dynamics (avoidance and anxiety) and family functioning. In the model (see Figure 1) that examined perceived child weight status as a moderator, the pathway from restrictive feeding to family functioning was constrained to test for equivalence between groups. The model experienced a significant loss of fit ($\Delta \chi^2$ (df) = 0.70(1), $P = .40$). Thus, the constraint was removed and the pathway from pressure to eat to family functioning was constrained to be equal across groups. There was significant loss of fit when this pathway was constrained ($\Delta \chi^2$ (df) = 1.47(1), $P = .23$). The constraint was removed, and the final model was the fully saturated baseline model. The loss of fit from both the constraints indicates significant differences based on perceived child weight status. Specifically, if patients perceived children to have a healthy weight status, there were no significant associations between parent-child dynamics (restrictive feeding practices and pressure to eat) and family functioning, with the model explaining 9% of the variance in family functioning. If patients perceived children to have an overweight/obese weight status, both higher avoidance ($B = 0.21, SE = 0.08, P = .01$) was associated with more impaired family functioning, with the model explaining 4% of the variance in family functioning.

In the model that examined perceived partner weight status as a moderator (see Table 5), the pathway from avoidance to family functioning was constrained to test for equivalence between groups. The constraint produced a significant loss of fit for the model ($\Delta \chi^2$ (df) = 3.15(1), $P = .08$). Thus, the constraint was removed and the pathway from anxiety to family functioning was constrained across both groups. Again, there was a significant loss of fit ($\Delta \chi^2$ (df) = 0.71 (1), $P = .40$). The constraint was removed, and the final model was the fully saturated baseline model. The loss of fit from both the constraints indicates significant differences in the associations between romantic relationship dynamics and family functioning based on perceived partner weight status. Specifically, if patients perceived romantic partners to have a healthy weight status, there were no significant associations between romantic relationship dynamics (avoidance and anxiety) and family functioning, with the model explaining 7% of the variance in family functioning. If patients perceived romantic partners to have an overweight/obese weight status, both higher avoidance ($B = 0.17, SE = 0.04, P < .001$) and anxiety ($B = 0.10, SE = 0.04, P < .01$) were associated with more impaired family functioning, with the model explaining 41% of the variance in family functioning.

### TABLE 2
Correlations between parent-child (CFQ), romantic relationship (ECR-RS) and family (FAD) dynamics

<table>
<thead>
<tr>
<th>Pathway</th>
<th>B</th>
<th>SE</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAD: Family functioning</td>
<td>0.11</td>
<td>0.22</td>
<td>.613</td>
</tr>
<tr>
<td>CFQ: Restrictive feeding</td>
<td>0.29</td>
<td>0.09</td>
<td>.002</td>
</tr>
<tr>
<td>CFQ: Pressure to eat</td>
<td>-0.17</td>
<td>0.10</td>
<td>.089</td>
</tr>
<tr>
<td>ECR-RS: Avoidance</td>
<td>0.19</td>
<td>0.10</td>
<td>.064</td>
</tr>
<tr>
<td>ECR-RS: Anxiety</td>
<td>-0.06</td>
<td>0.09</td>
<td>.513</td>
</tr>
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### TABLE 3
Mediation pathways

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<th>Pathway</th>
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<th>SE</th>
<th>P-value</th>
</tr>
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<td>Partner weight status</td>
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<td></td>
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<tr>
<td>FAD: Family functioning</td>
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<td>0.26</td>
<td>.493</td>
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<tr>
<td>CFQ: Restrictive feeding</td>
<td>-0.07</td>
<td>0.11</td>
<td>.510</td>
</tr>
<tr>
<td>CFQ: Pressure to eat</td>
<td>-0.06</td>
<td>0.13</td>
<td>.647</td>
</tr>
<tr>
<td>ECR-RS: Avoidance</td>
<td>0.01</td>
<td>0.12</td>
<td>.940</td>
</tr>
<tr>
<td>ECR-RS: Anxiety</td>
<td>0.05</td>
<td>0.11</td>
<td>.668</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Pathway</th>
<th>B</th>
<th>SE</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child weight status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAD: Family functioning</td>
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<td>0.03</td>
<td>.276</td>
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<tr>
<td>CFQ: Pressure to eat</td>
<td>0.03</td>
<td>0.04</td>
<td>.425</td>
</tr>
<tr>
<td>ECR-RS: Avoidance</td>
<td>0.15</td>
<td>0.03</td>
<td>.000</td>
</tr>
<tr>
<td>ECR-RS: Anxiety</td>
<td>0.07</td>
<td>0.02</td>
<td>.002</td>
</tr>
</tbody>
</table>

Note: Significant results are bolded.
DISCUSSION

The purpose of this study was to describe the dynamics between WMP patients and their children (restrictive feeding, pressure to eat) and romantic partners (romantic relationship anxiety, avoidance), the broader family environment (family functioning), and perceptions of both their children’s and partners’ weight status. There were significant associations between greater parent-child restrictive feeding practices and impaired family functioning, and higher avoidance and anxiety in romantic relationships and impaired family functioning, although these effects were only observed among children and partners who were perceived to have an overweight/obese weight status. This indicates that among families where multiple members have overweight/obesity (eg, the patient and child or the patient and partner), impairments in parent-child and romantic partner dynamics may affect the entire families’ functioning. Although these effects were only observed among children and partners who were perceived to have an overweight/obese weight status. This indicates that among families where multiple members have overweight/obesity (eg, the patient and child or the patient and partner), impairments in parent-child and romantic partner dynamics may affect the entire families’ functioning. This is important to consider among patients in WMPs, as behaviour change is necessary for weight loss, and patients who report more family support often have better long-term behaviour change and weight loss. It may be that for families where multiple members have overweight/obesity, individual patient behaviour change will not be effective. Instead, WMPs may need to offer interventions to bolster parent-child dynamics, romantic partner dynamics, and overall family functioning to ensure the overall family is ready to make changes in the household, and to monitor how making behavioural changes may affect both parent-child and romantic relationships and the overall family.

Approximately, 20% of patients in our sample reported clinically impaired functioning, which is higher than prior reports of impaired family functioning in paediatric weight management, but lower than reports of adolescents in weight management and adolescents and parents undergoing bariatric surgery. In our sample, impaired family functioning was more pronounced among patients who perceived their partners to have an overweight/obese weight status, rather than patients who perceived their children to have an overweight/obese weight status. This is novel information, given there is no prior work comparing family functioning based on both partner and child weight status among WMP patients, and could have implications for both individual and family-based weight management.

With respect to children, patients with impaired family functioning reported less restrictive feeding, meaning there may have been fewer rules and overall structure around eating and feeding. However, patients who perceived their child to have an overweight/obese weight status showed more restrictive feeding and pressure to eat, indicating parents alter their feeding practices based on children’s weight status. This is novel information, given there is no prior work comparing family functioning based on both partner and child weight status among WMP patients, and could have implications for both individual and family-based weight management.

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With respect to children, patients with impaired family functioning reported less restrictive feeding, meaning there may have been fewer rules and overall structure around eating and feeding. However, patients who perceived their child to have an overweight/obese weight status showed more restrictive feeding and pressure to eat, indicating parents alter their feeding practices based on children’s weight status. Prior researchers have also noted parents of children with overweight and obesity become more restrictive in feeding; with their children’s weight subsequently worsening. Despite prior work showing impaired family functioning among the children of adult bariatric surgery patients who were perceived to be overweight/obese, family functioning was not associated with perceived child weight status in this study. Family functioning was also not a mediator between restrictive feeding practices and pressure to eat and perceived child

| TABLE 4 | Differences in perceived partner and child weight status based on parent-child (CFQ) and family (FAD) dynamics and romantic (ECR-RS) dynamics |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| M (SD)                          | M (SD)                          | t (df)                          | P-value                         | M (SD)                          | M (SD)                          | t (df)                          | P-value                         |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Partner weight status           |                                 |                                 |                                 | Child weight status             |                                 |                                 |                                 |
|                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |
| FAD: Family functioning         | 1.59 (0.41)                     | 1.72 (0.56)                     | 1.89 (198,82)                   | .060                            | 1.65 (0.47)                     | 1.72 (0.61)                     | .089 (201)                     | .374                            |
| CFQ: Restrictive feeding        | 2.76 (1.12)                     | 3.22 (0.96)                     | 3.03 (160,99)                   | .003                            | 2.88 (1.06)                     | 3.52 (0.85)                     | .423 (90,05)                   | .000                            |
| CFQ: Pressure to eat            | 2.16 (0.95)                     | 2.07 (0.96)                     | 0.69 (199)                      | .485                            | 2.23 (0.93)                     | 1.67 (0.87)                     | .365 (201)                     | .000                            |
| ECR-RS: Anxious                 | 1.63 (1.21)                     | 1.86 (1.39)                     | 1.21 (199)                      | .227                            | 1.83 (1.38)                     | 1.56 (1.04)                     | 1.37 (94,90)                   | .174                            |
| ECR-RS: Avoidant                | 1.75 (0.98)                     | 2.24 (1.47)                     | 2.84 (197,81)                   | .005                            | 2.02 (1.29)                     | 2.13 (1.35)                     | .53 (201)                      | .598                            |

Note: Significant results are bolded.

Abbreviations: HW, healthy weight; Obese, overweight/obese.

| TABLE 5 | Perceived partner and child weight status moderation pathways between parent-child (CFQ) and family (FAD) dynamics and romantic (ECR-RS) dynamics |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Pathway to FAD: Family functioning | Healthy weight | Overweight/obese |
| B | SE | P-value | B | SE | P-value |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Parent-child dynamics            |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |
| CFQ: Restrictive feeding         | 0.03                            | 0.07                            | .64                            | 0.21                            | 0.08                            | .01                            |
| CFQ: Pressure to eat             | 0.12                            | 0.08                            | .15                            | 0.004                           | 0.05                            | .929                           |
| Romantic relationship dynamics   |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |                                 |
| ECR-RS: Avoidance                | 0.06                            | 0.05                            | .243                           | 0.17                            | 0.04                            | .001                           |
| ECR-RS: Anxiety                  | 0.06                            | 0.04                            | .18                            | 0.10                            | 0.04                            | .007                           |

Note: Significant results are bolded.
weight status. However, there was a significant association between increased restrictive feeding practices and more impaired family functioning, but only for children who were perceived to have an overweight/obese weight status. This again indicates that parents change how they feed their children based on their perception of their weight status. However, we cannot determine if parental restrictive feeding increased following parental participation in WMPs, or if restrictive feeding practices are a by-product of impaired family functioning. However, it appears that for parents enrolled in WMPs with children who are overweight/obese, methods addressing child feeding practices and overall family functioning are needed both to aid adults with behaviour change and weight loss and to prevent increased weight gain among children already placed at a higher risk of developing obesity as adults.

With respect to romantic partners, patients with impaired family functioning reported more anxiety and avoidance in their romantic relationships, and patients who perceived their partners to have an overweight/obese had slightly higher rates of impaired family functioning. Despite the strong associations between family functioning and romantic anxiety and avoidance, and a weaker association between perceived partner weight status, family functioning was not a mediator between romantic anxiety and avoidance and partner weight status. Romantic partner relationship dynamics had a stronger association with partner weight status, than family functioning did with partner weight status. However, when partners were perceived to be overweight/obese, family functioning had a clearer role. In the moderation analysis, higher avoidance and anxiety were significantly associated with more impaired family functioning, but only among partners who were perceived to be overweight/obese. This may mean that in relationships where both the patient and their partner are overweight/obese, the patient is actively seeking weight management intervention, that impairments are present in both romantic relationship factors and overall family functioning. However, given the cross-sectional nature of this study, we cannot determine whether impairments in relationship factors led to impairments in family functioning, or the reciprocal. It is also unclear if these dynamics may have changed when the patient sought out weight management intervention, or if these impairments were present before seeking intervention.

4.1 Limitations

This study has several important limitations to consider in the interpretation of its findings. First, this was a cross-sectional study, preventing any causal inferences. Second, WMP patients self-reported on all measures included in the study, including perceived child and partner weight status. Third, this was a convenience sample, limiting generalizability to patients in other WMPs. Finally, the study would be enhanced through the use of dyadic or triadic perspectives of relationship dynamics and family functioning.

5 CONCLUSION

The results presented herein are the first step in determining which parent-child, romantic relationship and family variables to target in family-based interventions to prevent obesity in a group of children and adults who are at higher risk of future weight gain and comorbidity. Future family-based programming designed with these relationships in mind may: (a) aid in weight loss or appropriate healthy growth among parents, romantic partners and children; (b) set the family and household up for success with making long-term healthy behaviour changes and (c) enhance the parent-child, partner/spouse and overall family relationships. Longitudinal, prospective and dyadic and/or triadic research is needed to determine how WMPs and weight loss affect the growth and health behaviours of children and partners, and the influence that relationship factors have on these trajectories.

CONFLICT OF INTEREST

No conflict of interest was declared.

AUTHOR CONTRIBUTIONS

K.J.P., C.A.B. and J.A.S. conceptualized the study and oversaw the completion of data collection. K.J.P. and M.F. drafted the manuscript in full and ran all analyses. All authors contributed to and reviewed the manuscript prior to submission.

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