

What Factors Influence Uptake into Family-Based Obesity Treatment after Weight Screening?

Rachael W. Taylor, PhD¹, Sheila M. Williams, DSc², Anna M. Dawson, MA³, Barry J. Taylor, FRACP³,
Kim Meredith-Jones, PhD¹, and Deirdre Brown, PhD⁴

Objectives To determine what factors drive participation in a family-based weight management program for 4- to 8-year-old children following screening for overweight or obesity.

Study design Children (n = 1093) attended a comprehensive screening appointment where parents completed questionnaires on demographics, motivation for healthy lifestyles, feeding practices, and beliefs about child size, prior to feedback about the child's weight. Parents of overweight or obese children (body mass index \geq 85th percentile) attended a follow-up interview to assess reactions to feedback and willingness to participate in a 2-year intervention.

Results A total of 271 (24.8%) children were overweight or obese with 197 (72.7%) agreeing to the intervention. Socioeconomic status differed in intervention participants (n = 197) compared with non-participants (n = 74), whereas no differences were observed in parental feeding practices, ineffective parenting practices, or self-determined forms of motivation. However, fewer non-participating parents believed their child to be overweight (23% vs 49%, $P < .001$) or were concerned about it (16% vs 43%, $P < .001$), despite children having an average body mass index approximating the 95th percentile. Non-participating parents did not expect their child to be overweight ($P = .002$) and rated receiving this information as less useful ($P = .008$) than participating parents.

Conclusion Preconceptions about child weight and reactions to feedback determined intervention uptake more than parenting or motivation for health. Many parents agreed to participate in the intervention despite not viewing their child as overweight. (*J Pediatr* 2013;163:1657-62).

In New Zealand, almost 1 in 3 young children aged 2-4 years are overweight or obese.¹ This appears to conflict with widespread poor parental recognition of overweight in young children. The majority of parents simply do not see their child as being overweight, even when clinical measurements show that this is indeed the case.^{2,3} Such poor recognition must reduce the likelihood of appropriate behavior change that could influence weight.³ These parents are not likely to seek treatment for overweight or obesity or enroll in intervention opportunities should they arise.

The advent of weight screening initiatives in several countries^{4,5} means that parents will learn about the weight status of their child, which will be unexpected news for many.³ Although it is clear that discussing weight status is a sensitive issue for both parents and health professionals,⁶ studies show that parents do want to know this information, as long as it is given in a non-judgmental manner.^{7,8} Because ethical considerations dictate that participants must be informed of screening results and that effective treatment pathways are available,⁹ it is crucial to determine how best to conduct the feedback process. We undertook a weight screening initiative in 4- to 8-year-old children to determine whether motivational interviewing for feedback was an appropriate way to inform parents that their young child was overweight, in comparison with usual care.¹⁰ Prior to feedback of weight status, we collected extensive measures of parental motivation for healthy lifestyles in their child, parenting practices (ineffective parenting and feeding practices), and beliefs about child weight. We determined which demographic, lifestyle, and parenting factors assessed before knowledge of weight status (for many) might predict uptake into an intervention following a weight-screening initiative.

Methods

The Motivational Interviewing and Treatment study is a two-stage randomized controlled trial involving feedback of weight status after screening followed by a 2-year behavioral intervention. Ethical approval was obtained from the Lower South Regional Ethics Committee (LRS/09/09/039) and all parents gave informed consent.

The study has previously been described in detail.¹⁰ In brief, all families with children aged 4-8.99 years enrolled at 9 participating primary care practices or attending secondary care clinics across 2 time periods (March 2009-March 2010 and January 2011-May 2011) were sent a personalized letter inviting

From the Departments of ¹Medicine, ²Preventive and Social Medicine, and ³Women's and Children's Health, University of Otago, Dunedin, New Zealand; and ⁴School of Psychology, Victoria University of Wellington, Wellington, New Zealand

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BMI Body mass index
HCCQ Health Care Climate Questionnaire

them to participate. Exclusion criteria included cystic fibrosis, severe childhood arthritis, severe asthma, inflammatory bowel disease, congenital or chromosomal abnormalities, severe developmental delay, medication that may influence body composition, or not planning to remain in the region for the ensuing 2 years. Potential participants were able to leave a phone message saying they did not want to participate; no further contact was undertaken with this group. All remaining families were contacted by phone 1 week later to assess interest and eligibility. Once verbal consent was obtained, participants were randomized to feedback condition, motivational interviewing for feedback, or usual care, stratified by general practice.

After written informed consent was obtained, duplicate measures of the child's height (Leicester Height Measure [Invicta Plastics Ltd, Oadby, Leicester, United Kingdom]), weight (Tanita BC-418), and waist circumference (level of the umbilicus) were obtained with the children wearing light clothing and no shoes. Body mass index (BMI) was derived and z-scores calculated.¹¹ Body composition was assessed in all participants using bioelectrical impedance (Tanita BC-418) and in a random subsample (n = 268) by dual-energy X-ray absorptiometry. Parents completed an online questionnaire within the clinic appointment (100% completion rate), which included the following: (1) demographics (household structure, ethnicity of child, parental heights and weights), including information on the socioeconomic status of their place of residence using the New Zealand Index of Deprivation (ranges from 1 - least deprived to 10 - most deprived)¹²; (2) parental feeding practices were assessed using the Comprehensive Feeding Practices Questionnaire¹³ and ineffective parenting practices using the Parenting Scale¹⁴; (3) parental motivation for healthy lifestyles in their children was measured using modified versions of the Treatment Self-Regulation Questionnaire (a 15-item questionnaire yielding several factors that indicate more [autonomous] and less [introjected] self-determined forms of motivation by asking parents to rate the extent to which these items play a role in making lifestyle changes for their family [7-point Likert scale is used, 1 = 'not at all true,' 7 = 'very true']¹⁵ and the Motivational Screening Measure (assesses parental intent to increase physical activity, improve the diet, and change the weight of the child through 3 questions: 'I am trying to...', 'I could...' and 'It is important for me to...' on a scale from 0 to 10)¹⁶; and (4) parental concern about their child's weight was based on a 5-point Likert scale (1 = not at all concerned, 5 = very concerned), and parents were also asked to rate their child's current weight status using a 5-point scale (a little underweight, underweight, normal weight, a little overweight, overweight).

Parents of normal weight children (BMI <85th percentile) received feedback and had no further involvement in the study. Parents of overweight (BMI 85th to <95th percentile)¹¹ or obese children (BMI ≥95th percentile)¹¹ received feedback according to their randomized feedback condition, after all questionnaires and measures had been completed. For both situations, weight status was discussed in a neutral

manner using a traffic light approach, which avoided the use of the terms overweight/obese.¹⁷ Thus, the BMI chart for age and sex presented normal weight (BMI < 85th) as green, overweight (BMI 85th to <95th) as orange, and obese (BMI ≥95th) as red. In the motivational interviewing condition, interviewers used an Elicit-Provide-Elicit approach,¹⁸ which allowed interviewers to explore parents' expectations and prior knowledge about their child's weight before providing the BMI results. It also allowed parents to discuss their reaction to the feedback and emphasized parents' autonomy and expertise with reference to their child and their family's lifestyle. Interviewers in this condition refrained from giving unsolicited advice to parents. Feedback sessions in both conditions were videotaped and transcribed in 270 participants; 1 participant did not consent to this.¹⁷

All parents of overweight or obese children were invited to complete an in-person follow-up interview approximately 1-2 weeks after the health check. Parents completed a shortened version of the online health check questionnaire and answered 10 questions, which assessed their response to feedback. Interview questions are shown in **Table I** (available at www.jpeds.com) and included 4 questions regarding their understanding of the BMI information and how useful they felt it was (Q1-4), 4 questions that asked about the way in which the information was delivered (Q5-8), and 2 questions that assessed whether they felt judged or blamed for their child's weight (Q9-10). All 10 questions were rated on a 7-point Likert scale and these data were analyzed quantitatively. Parents also completed the Health Care Climate Questionnaire (HCCQ), which assessed their perception of the degree to which their interviewer was

Table II. Multivariate regression predicting intervention uptake

	OR (95% CI)	P
Ethnicity		
Maori*	0.80 (0.31, 2.03)	.633
Pacific*	0.16 (0.06, 0.46)	.001
Maternal education		
Completed secondary school or some tertiary education (not university) [†]	1.44 (0.57, 3.62)	.442
University degree [†]	2.88 (1.12, 7.39)	.028
Other [†]	1.16 (0.25, 5.37)	.852
Parental rating of child's weight status before feedback	3.36 (1.49, 7.58)	.003
Parental concern about child's weight status before feedback	2.64 (0.74, 9.43)	.135
Self-determination theory ¹⁵		
Autonomous motivation	1.09 (0.69, 1.73)	.699
Introjected motivation	0.93 (0.75, 1.14)	.473
Motivational screening measure ¹⁶		
Trying to change child's weight	1.01 (0.82, 1.23)	.472
Parental feeling of being judged by the advisor	0.70 (0.56, 0.88)	.003
Parental agreement that it was useful to be given the information	1.40 (1.09, 1.80)	.009
Information about the child's weight was unexpected	1.02 (0.87, 1.21)	.767

*Reference group is New Zealand European and others.

†Reference group is some secondary school.

autonomy supportive (following self-determination theory principles).¹⁹ The HCCQ targets parental response to the interviewer rather than to the information presented. At the end of the interview, all parents were invited to participate in a 2-year family-based lifestyle intervention.

Statistical Analyses

All analyses were undertaken using Stata Release 12 (Stata-Corp LP, College Station, Texas). Differences between participants and non-participants are presented as mean (SD) for simplicity, but were analyzed using logistic regression. Given that the sample was drawn from 9 participating general practices and the secondary care population, the *P* values for the differences between participants and non-participants were adjusted using the sandwich estimator for possible correlations among the samples. As little was known about the predictors of participation in an intervention study, separate bootstrap procedures were used to select the most consistent predictors from the demographic, life-style, and parental variables for the multivariate analysis. Each bootstrap procedure selected 500 samples with replacement and fitted a stepwise regression model to each. Variables included in more than one-half the models for each set of variables were considered for the final model. A further bootstrap procedure²⁰ was used to select the variables for the final model shown in **Table II**.

Results

From the original 3704 invitations sent, 1317 families agreed to be involved in the study. The remaining 2387 families were

excluded (*n* = 198), declined (*n* = 1166), or were rated as non-contactable after 5 attempts (*n* = 1023). A total of 1093 families actually attended the health check. Child participants (*n* = 1093) and non-participants (*n* = 2611) were similar in terms of age (*P* = .877) and ethnicity (*P* = .124); however, more non-participating children were male (*P* = .006) and came from homes in more deprived areas (*P* < .001).

Of these 1093 children, 271 were overweight or obese (24.8%) and were included in the analyses; 197 parents agreed to participate in the 2-year intervention (72.7% uptake). Few differences in demographic variables were observed between intervention participants and non-participants with age, sex, ethnicity, maternal BMI, or household structure differing little by intervention uptake (**Table III**). However, non-participants were more likely to be from homes in more deprived areas (*P* = .039) and participant mothers also tended to be more highly educated (*P* = .051, **Table III**). No difference in uptake was observed according to feedback condition (*P* = .221).

Marked differences in the perception of child weight before feedback of weight results were apparent between families choosing to be involved in the intervention (**Table III**). Only 23% of non-participants believed their child to be overweight, compared with 49% of participating parents prior to feedback of weight results (*P* = .002). Large differences were also observed in the proportion of parents who, prior to weight feedback, were concerned about their child's weight (16% compared with 43% in non-participants and participants, respectively, *P* < .001). This lack of awareness or concern in non-participating parents

Table III. Differences in demographic factors and body size between those who participated in the intervention and those who did not

	Participants, 197	Non-participants, 74	<i>P</i>
Age (y)	6.4 (1.5)	6.4 (1.4)	.925
Sex (male)	86 (44%)	35 (47%)	.715
Ethnicity* n (%)			
New Zealand European and others	148 (76%)	52 (70%)	.090
Maori	37 (19%)	13 (18%)	
Pacific Island	11 (6%)	9 (12%)	
New Zealand Deprivation Index†	4.9 (2.8)	5.4 (2.9)	.039
Household structure			
Single parent	36 (18%)	9 (12%)	.390
Two-parent or other	161 (82%)	65 (88%)	
Maternal education‡			
Some secondary school	60 (31%)	26 (35%)	.051
Completed secondary school or some tertiary education (not university)	50 (26%)	25 (34%)	
University degree	73 (38%)	18 (24%)	
Other	11 (6%)	5 (8%)	
Maternal BMI (kg/m ²)§	29.1 (6.2)	28.7 (6.7)	.453
Child BMI z-score	1.63 (0.47)	1.56 (0.41)	.092
Child % body fat¶	26.3 (4.9)	25.7 (4.7)	.291
Child % body fat¶	25.5 (8.6)	25.4 (7.7)	.932
Parental rating of child's weight status before feedback**	3.6 (0.7)	3.2 (0.5)	.002
Parental concern about child's weight status before feedback††	2.3 (1.1)	1.9 (0.7)	<.001

Data are presented as mean (SD) or n (%) as indicated but analyzed using logistic regression adjusted for clustering by primary care practice/secondary care (*n* = 11).

**n* = 270.

†*n* = 262.

‡*n* = 268.

§*n* = 258.

||*n* = 268 with bioelectrical impedance analysis measures.

¶*n* = 135 with dual-energy X-ray absorptiometry measurements.

Higher scores indicate **higher rating of overweight, ††increased concern regarding weight.

about their child's weight occurred despite children having an average BMI z-score of 1.61 (around the 95th percentile), and there being no differences in actual BMI or percentage body fat between the 2 groups (Table III).

Some differences were observed in terms of motivation for healthy lifestyles among parents. Participating parents scored more highly for introjected motivation (eg, because I would feel bad about myself if my child did not have a healthy lifestyle). However, no differences were observed in autonomous motivation (eg, because I personally believe that it is the best thing for my child's health).¹⁵ Differences were also observed in active attempts by parents to achieve a healthier lifestyle for their children. Parents who decided to participate were more likely to report already trying to improve their child's diet or increase their activity (Table IV). Although participating parents were more likely to be those already trying to change the child's weight than non-participants ($P = .002$), the numbers were relatively small in both groups, ($n = 57$ (29%) participants and $n = 9$ (12%) non-participants), compared with the number trying to influence diet ($n = 198$ in total sample [73%]) or activity ($n = 170$, 63%). Interestingly, these attempts to change dietary intake did not appear to occur via differences in parental feeding strategies or ineffective parenting practices, which were not related to intervention uptake (Table IV).

For the total sample, feedback was well received as indicated by high scores on the HCCQ (average of 5.8 from possible maximum of 7.0). However, it is apparent that some parents did not react well to feedback, and these reactions did differ between the 2 groups for some measures (Table V). HCCQ scores tended to be lower in non-participants than participants ($P = .068$), which reflects

parents' perception of the degree to which their interviewer was autonomy supportive. When asked, non-participating parents did feel they were being judged more by the interviewer and blamed for their child's weight (36% of non-participants compared with 10%-11% of participating parents, $P < .001$). General understanding and rating of the BMI information appeared similar between groups but parents who declined to enroll in the intervention were less likely to rate receiving information about their child's weight as useful ($P = .008$) and tended to be more upset about the way the information was given ($P = .071$), which is consistent with their feelings of blame. These parents were also more likely to rate the information about their child's weight as unexpected compared with parents in the intervention ($P = .002$, Table V).

Variables significant in univariate analyses were selected for the multivariate model using the bootstrap procedure described earlier (Table II). This demonstrated that university-educated mothers were almost 3 times as likely as mothers with no formal tertiary education to enroll in the intervention, with Pacific families being significantly less likely than New Zealand Europeans and others to participate (OR 0.16, $P = .001$). Even though motivation measured by any variable was no longer significant, parental feelings of being judged or not viewing the BMI information as useful remained significant predictors of intervention uptake.

All parents who declined to participate were asked to provide reason(s) why they did so and 8 chose not to answer this question. The main reason given for not participating was being too busy, with many (18.3%) simply not interested. Several cited other family or health issues as taking precedence (eg, behavioral issues in study child, medical issues in sibling, difficulties with estranged co-parent). Only 4 of these 66 parents commented that they believed there was no need to change the child's weight—one of these children was barely overweight (just on the 85th percentile) but all of the 3 other children had BMI values greater than the 90th percentile. A few parents ($n = 5$) commented that they did not like the focus on child weight, with another 5 commenting that they were already making changes and thus did not require assistance (Table VI; available at www.jpeds.com).

Table IV. Parenting and motivation for healthy lifestyles in their children according to intervention uptake

	Participants	Non-participants	P
Self-determination theory ¹⁵ *			
Autonomous motivation	5.8 (1.1)	6.0 (0.8)	.130
Introjected motivation	5.2 (1.6)	5.0 (1.7)	.044
External motivation	2.1 (1.3)	2.0 (1.0)	.373
Amotivation	2.1 (0.9)	1.8 (0.9)	.105
Motivational screening measure ¹⁶ †			
Trying to improve child's diet	7.1 (2.6)	6.2 (2.9)	.006
Trying to increase child's exercise	6.4 (2.4)	5.8 (2.6)	.001
Trying to change child's weight	3.5 (3.4)	2.3 (2.8)	<.001
Parental feeding practices ¹³ ‡			
Healthy eating guidance	4.3 (0.6)	4.2 (0.6)	.742
Restriction	2.2 (0.7)	2.2 (0.8)	.986
Monitoring	4.2 (0.7)	4.1 (0.8)	.560
Parent pressure	2.5 (0.8)	2.6 (0.8)	.123
Child control	2.3 (0.6)	2.3 (0.5)	.545
Ineffective parenting practices ¹⁴ §	2.8 (0.6)	2.8 (0.7)	.742

Data are presented as mean (SD) but analyzed using logistic regression adjusted for clustering by primary care practice/secondary care ($n = 11$).

*7-Point scale anchored by 1 = not at all true and 7 = very true.

†11-Point scale anchored by 0 = definitely not and 10 = definitely.

‡5-Point scale.

§7-Point scale.

Discussion

Few comparable studies exist that have examined recruitment into weight management programs for young children, and none appear to have occurred following weight screening. This is an important difference as childhood obesity interventions typically involve treatment-seeking parents or recruit via referral from health agencies where it might be expected that parents are more motivated. By contrast, we specifically sampled a wide cross-section of the population to ensure inclusion of parents who were unlikely to be aware that their child was actually overweight. Taveras

Table V. Parental views of the feedback process according to intervention uptake

	Participants, 192	Non-participants, 54*	P
HCCQ score [†]	5.9 (1.0)	5.5 (1.3)	.068
Parental feeling of being judged by the advisor [†]	1.7 (1.3)	2.5 (1.8)	.011
Parental feeling of being blamed for the child's weight [†]	1.7 (1.4)	2.5 (1.8)	.001
Information provided about child's weight			
How easy was it to follow and use the information presented? [‡]	1.7 (0.9)	1.8 (1.0)	.525
How useful did you find the information presented? [§]	2.3 (1.4)	2.7 (1.5)	.074
How easy was it to understand and follow the explanations of terms?	6.0 (1.4)	5.6 (1.6)	.136
How useful did you find the traffic light system to explain weight?	1.9 (1.4)	2.2 (1.3)	.232
Feedback about child's weight			
I felt upset by the information given. [†]	3.5 (2.1)	3.6 (2.1)	.718
I felt upset by the way the information was given. [†]	1.5 (1.2)	2.0 (1.7)	.071
I felt it was useful to be given the information. [†]	6.1 (1.3)	5.5 (1.7)	.008
The information about my child's weight was unexpected. [†]	4.1 (2.4)	4.8 (2.3)	.002

Data are presented as mean (SD) but analyzed using logistic regression adjusted for clustering by primary care practice/secondary care (n = 11).

*Missing data in 5 participants and 20 non-participants who refused to attend follow-up interviews.

Questions anchored by † 1 = not at all true and 7 = very true, ‡ 1 = very easy and 7 = very difficult, § 1 = very useful and 7 = not at all useful, || 1 = very difficult and 7 = very easy.

et al²¹ recruited a large sample of 2- to 6-year-old overweight children through primary care rolls and had access to basic information from 329 parents who did not want to participate but were happy to indicate why that was so. As in our study, no differences in age or sex of children were observed between parents who agreed or otherwise to participate; however, unlike our study, overweight children were less likely than obese children to be involved. The increased participation rate of our overweight children may have arisen because of the differing nature of feedback in these 2 studies, or perhaps because of cultural differences between study populations. The parents in the study by Taveras et al²¹ were invited to participate following a brief letter of invitation, whereas the parents in our study received face-to-face feedback about the weight status of their child. This gave the parents the opportunity to discuss these findings in considerable detail, regardless of which feedback group they were assigned to, which presumably encouraged parents of overweight (but not yet obese) children to participate. Other studies have investigated recruitment strategies in weight management clinics²² or obesity prevention initiatives,²³ or factors related to attrition, once involved in interventions, and so are not relevant.

Motivation has been shown to be an important determinant of uptake²⁴ in behavioral interventions in older children and adolescents. Focus groups in parents of younger children describe efforts to change food intake that are largely determined by practical and health considerations rather than any concern about weight.²⁵ Similar findings were obtained in this overweight sample with many more parents trying to change dietary or activity behaviors in their children than weight itself. Self-determination theory posits that motivation is more likely to result in behavioral change when it is influenced by internal cues (autonomous motivation, eg, the desire to be healthy) rather than external cues (controlling motivation, eg, because my doctor thinks I should).²⁶ Thus, it was intriguing to see that indicators of autonomous and controlling motivation differed little between participating and non-participating parents. The examination of these constructs has received consider-

able attention lately, particularly with respect to motivation for exercise in adolescent populations,²⁷ but does not appear to have been examined at younger ages. Our questionnaire assessed parental motivation for healthy diets and physical activity in their children. Assessment in adults has demonstrated that the Treatment Self-Regulation Questionnaire provides a valid indicator of motivation across these 2 health behaviors.¹⁵ Although autonomous motivation was uniformly high in our sample, normative data do not exist to determine whether this was a highly motivated population. This is unlikely, given that our sample population, although not a truly representative sample, did broadly reflect that of the local population, with few differences between those recruited to the initial study and those not participating.¹⁷ Furthermore, only scant information was provided about the purpose of the study at recruitment and the widespread lack of awareness regarding child body size was clearly apparent with the majority of parents reporting this information to be unexpected. Although participating parents were more likely to be those already trying to change the child's weight than non-participants, the numbers were relatively small in both groups, further supporting the view that few parents considered their child's weight to be an issue.

A major strength of our study includes the assessment of motivation, parenting, and other factors of interest in a large sample of participants prior to feedback of weight status in parents who were predominantly unaware of the weight status of their young child. However, the major drivers of participation in treatment were a greater awareness of their child's excess weight and general acceptance of the message when delivered. So, for health professionals there are encouraging signs that the majority of parents with young children will engage in obesity-treatment services if they are available. However, it is also important to determine the most effective ways of engaging the more intransigent group, who do not perceive that there is a problem. How best to support this group to be aware and motivated without inadvertently leading them to feel judged and blamed remains to be determined. Such work will contribute to much needed guidance for

screening initiatives about how best to inform parents of young children that their child is overweight.²⁸ ■

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Reprint requests: Rachael W. Taylor, PhD, Department of Medicine, University of Otago, PO Box 56, Dunedin 9054, New Zealand. E-mail: rachael.taylor@otago.ac.nz

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Table I. Questions from the follow-up interview

	Scale 1-7 anchored by
1. How easy was it to follow and use the information presented in the health check booklet?	1 = very easy, 7 = very difficult
2. How useful did you find the information presented in the health check booklet?	1 = very useful, 7 = not at all useful
3. How easy was it to understand and follow the explanations of terms (such as BMI, Blood Pressure, and Waist to Height ratio)?	1 = very difficult, 7 = very easy
4. How useful did you find the traffic light system (green, orange, and red zones) to explain your child's weight status?	1 = very useful, 7 = not at all useful
5. I felt upset by the information given in the health check.	1 = not at all true, 7 = very true
6. I felt upset by the way the information was given in the health check.	1 = not at all true, 7 = very true
7. I felt it was useful to be given this information.	1 = not at all true, 7 = very true
8. The information about my child's weight was unexpected.	1 = not at all true, 7 = very true
9. I felt judged by my advisor.	1 = not at all true, 7 = very true
10. I felt blamed for my child's weight.	1 = not at all true, 7 = very true

Table VI. Parental reasons for not participating

	<i>n</i> *	%
Too busy	28	34.1
Not interested	15	18.3
Other family or health issues	10	12.2
Missed multiple appointments	7	8.5
Don't like focus on child's weight	5	6.1
Not necessary to be involved	5	6.1
No need to change child's weight	4	4.9
Moving away from area	4	4.9
Annoyed with study	2	2.4
Other	2	2.4
TOTAL	82	100

*Parents could provide more than 1 reason; 66 of 74 parents gave 82 reasons in total.