Child and Adolescent Obesity: Assessment, Management and Treatment by Practitioners in the Waikato Region

Joanna M. McClintock,
Waikato Regional Diabetes Service, Health Waikato, Hamilton, New Zealand

Barbara Hedge,
Dept of Clinical Psychology, Torbay Hospital, Torquay, Devon, United Kingdom

The prevalence of childhood obesity is rapidly increasing in New Zealand. Children who are obese are more likely to be obese into adolescence and adulthood, and develop corresponding physical and psychological health problems. While prevention projects may slow the increasing rate of childhood obesity, this approach does not help those children who are already obese. Health practitioners have a vital role in assisting this group of children, however little is known about how practitioners go about this in day to day practice. The purpose of this study was to identify current assessment, management, and treatment strategies for childhood obesity used by primary care health professionals in the Waikato region. Based on research conducted in the United States, 250 questionnaires were sent out to general practitioners and child health specialists. Fifty-six participants returned fully completed questionnaires. Although the results indicate that child health practitioners were particularly concerned with childhood obesity, very few of the practitioners followed published guidelines for the medical, laboratory, and psychological evaluations of obesity. Psychological and social factors were the most endorsed barriers to practitioners implementing intervention at a primary care level. These findings suggest the need for increased application of appropriate tools to assess childhood obesity and initiate intervention. In particular, the psychological models of health behaviour change could be utilised to support current intervention strategies.

Child and adolescent obesity is an increasingly prevalent health disorder and is of particular concern because children who are obese are more likely to continue to be obese through adolescence and into adulthood (Freedman, Khan Kettel, Serdula, Dietz, Srinvasan, & Berenson, 2005; Goran, 2001). With close to one-third (29%) of New Zealand children aged between 2 and 14 years identified to be overweight or obese (Ministry of Health, 2008) it is important that steps are made to address this issue, especially because research involving obese children has indicated that interventions when implemented during childhood have long-term outcomes that are superior to interventions implemented in adulthood (Jonides, Buschbacher, & Barlow, 2002).

The rapidly rising prevalence of obesity among children is of concern because it will be associated with a corresponding increase in obesity related disorders for health service practitioners to contend with in the future (Barlow, Dietz, Klish, & Trowbridge, 2002). This highlights the importance of health service practitioners being able to identify those with obesity related problems and provide optimum services. It is also important that these issues are addressed at the first point of health contact, which in the New Zealand context is typically the primary care clinician.

Alongside the medical and laboratory aspects of childhood obesity, it is also essential to determine the implementation of psychological approaches in the primary care setting given that behaviour change principles underlie any treatment of obesity (e.g., taking medication, increasing exercise, reducing kilojoule intake). Assessing practitioners' knowledge about obesity and their assessment, management, and treatment strategies for childhood and adolescent obesity will assist in the future development of primary care clinicians and teams who manage childhood obesity.

Such a needs assessment was undertaken in the United States by a working group of the Maternal and Child Health Bureau, National Centre for Education in Maternal and Child Health, and Harris Interactive Inc., who explored specialist practitioner's management of childhood obesity (Trowbridge, Sofka, Holt, & Barlow, 2002). The majority of specialists were concerned about childhood obesity, recognised that it had medical and functional impacts, and that treatment was necessary (Barlow & Dietz, 2002). However, most did not initiate treatment in children who had no medical associated condition; nor did they initiate treatment when the child or adolescent did not want to control their weight (Barlow et al., 2002). The majority of respondents carried out appropriate behavioural, psychological, and familial evaluations. However, many did not conduct a complete screening to exclude possible

complications associated with obesity (Barlow et al., 2002; Jonides et al., 2002). Motivation, time, self-efficacy, and access to services were found to be the most significant barriers to treatment of childhood obesity (Story et al., 2002). Barlow and Dietz made a number of recommendations including that health practitioners be educated on the risk of different obesity-related conditions and the best screening techniques to use, that best practice checklists be developed, that motivational techniques be used, that the reduction of sedentary behaviour be promoted, and that media promotion of healthy eating and healthy exercise be increased.

Evaluation of Child and Adolescent Obesity

In order for a child who is obese to receive appropriate therapeutic intervention it is necessary for there to be an accurate assessment of obesity; a medical assessment to rule out other complications; and a behavioural and psychological assessment to determine patterns and reinforcers for behaviour as well as identification of psychological factors associated with eating and exercise behaviours. At the end of such a full assessment the practitioner would then be able to outline the need for any immediate therapeutic intervention and be able to educate the child and family about the risk factors for cardiovascular disease, diabetes and other obesity related problems and implement appropriate interventions (Barlow & Dietz, 1998).

Obesity and medical assessment. The Paediatric Obesity Expert Committee considers that a Body Mass Index greater than or equal to the 95th percentile for age and gender will identify children who have a significant likelihood of remaining obese into adulthood (Barlow & Dietz, 1998). The medical assessment should include a personal and family medical history of similar and related disorders. Additional medical conditions and secondary complications related to weight (e.g., genetic syndromes, endocrinological disorders, Type 2 diabetes, sleep disorders, cholesterol problems, and dysfunctional thyroid) should also be investigated (Barlow & Dietz, 1998).

Behavioural and psychological assessment. Jonides and colleagues (2002) highlight the importance of thorough behavioural, psychological, and emotional evaluations prior to treatment for child obesity. An in-depth assessment of children's eating habits and physical activity levels is essential in order to inform treatment approaches, such as the reduction of high kilojoule food and the increase in energy expenditure (Barlow & Dietz, 1998). As the foundation of effective treatment of obesity requires the modification of eating habits and activity, obesity treatment will always involve psychological and behavioural change. Psychological factors that need to be evaluated include child and parents' lifestyles, readiness to change, concerns about weight and weight-related teasing, and the assessment of the child's self-esteem, self-efficacy, depression, anxiety, and eating disorders.

Barriers to Treatment

Essential to successful treatment is the client's and family's readiness to change. Jonides et al. (2002) found that a lack of motivation and not being ready to change was one of the major barriers to successful treatment. Lack of readiness is reported to more likely lead to failure, which can frustrate all involved and perhaps prevent future attempts to control weight (Barlow & Dietz, 1998). Additional reported barriers to the treatment of obesity by practitioners include lack of parent involvement, lack of support services, treatment futility, and lack of health practitioner treatment skills (Story et al., 2002). Identification and removal of barriers to treatment of obesity by practitioners can increase the feasibility of implementing interventions.

Attitudes towards Obesity

Previous research into adult obesity indicates that attitudes of health care professionals toward their patients and the management of obesity are often negative (Story et al., 2002). Very little is known about health care professionals' attitudes, in relation to the assessment and treatment of childhood obesity (Story et al., 2002). It is important to identify how practitioners conceptualise child obesity and also whether practitioners believe treatment will be effective, as this will influence their approach to the assessment and treatment of child obesity.

Current Study

New Zealand's approach to health care is different from larger countries such as the United States. It has fewer specialist services and children are more likely to be seen by their general practitioner or a general paediatrician. Whether or not health practitioners are responding appropriately to child obesity is not yet known. Therefore, this research project aimed to identify current assessment strategies for child and adolescent obesity and treatments used by health professionals in the Waikato region, as well as their perception of barriers to relevant treatment of children or adolescents who are obese. In addition, this study aimed to identify health practitioner's attitudes towards the management of child and adolescent obesity, and their perceived personal skills for managing child and adolescent obesity.

Method

Participants

New Zealand registered general practitioners, paediatricians, public health nurses, and dietitians who practice in the Waikato region were invited to participate in a questionnaire study examining the management, assessment, and treatment of childhood and adolescent obesity. Of the 250 practitioners invited to participate, 72 participants returned the questionnaire and 56 completed the questionnaire (22.4% response rate). Of the 56, 44 were general practitioners working in either a private practice or a community based service, 4 were paediatricians working for the District Health Board, and 8 were dietitians, public health nurses or other child health practitioners.

Measure

The questionnaire used in this study was adapted for the New Zealand context from a research programme conducted by the working group of the Maternal and Child Health Bureau, National Centre for Education in Maternal and Child Health and Harris Interactive, Inc (Barlow & Dietz, 2002; Barlow, Dietz, Klish et al., 2002; Barlow, Trowbridge, Klish, & Dietz, 2002; Jonides et al., 2002; Story et al., 2002; Trowbridge et

al., 2002). Respondents were asked to self-report on five-point Likert scales (range: "most of the time," "often," "sometimes," "rarely," or "never.") the frequency of their assessment strategies for child and adolescent obesity. Using the same Likert scale, attitudes towards overweight and obesity were assessed by participants rating whether they agreed with eight attitudinal statements (e.g., overweight children will outgrow their overweight). Treatment recommendations were assessed using a three-point Likert scale ("often", "sometimes", and "never"). For all Likert scales ratings of "often" and "most of the time" indicated acceptable responses. Practitioners also rated how often 16 potential barriers were important to hindering effective treatment (e.g., lack of parental motivation). Practice and practitioner characteristics were also gathered.

Procedure

Ethical approval was obtained from the Psychology Human Research and Ethics Committee, University of Waikato, and the Waikato Ethics Committee before the study commenced. To ensure the principles of the Treaty of Waitangi regarding protection and participation were upheld, consultation was undertaken with a leading Māori consultant prior to the research commencing. All sampled professionals received the mailed questionnaire with a stamped return-addressed envelope. To encourage participation non-responders received a follow-up postcard.

Results

Of the 250 questionnaires mailed out to participants, there was a 22.4% response rate. Data analysis was conducted using SPSS for Windows. Frequency distributions were conducted on all variables. Comparisons were also made between practitioners' responses and published evaluation and treatment recommendations and guidelines for childhood obesity.

Assessment of Overweight in Children and Adolescents. The vast majority of participants used "clinical impression" to assess excess weight in children and adolescents (95%). Approximately half of all participants used weight and height measurements including body mass index, weight for age percentiles, and weight for height percentiles. Only one participant used skinfold thickness and waist-hip ratio as a measurement of overweight in children and adolescents (see Table 1).

Table 1
Methods Used To Assess Excess Weight

Assessment Method	Percentage Respondents
Clinical impression	95
Weight for age percentile	54
Weight for height percentile	55
Change in weight velocity	23
Body Mass Index	50
BMI percentiles	25
Skinfold thickness	2
Waist-hip ratio	2

Medical Assessment. Very few general practitioners or paediatricians in the current sample (6%) followed published recommended evaluation practices and guidelines for the assessment of medical history and physical examination of overweight children and adolescents, and only one practitioner completed the laboratory assessments guidelines.

Family History Assessment. Overall, 14% of the sample followed the recommended guidelines in terms of asking about the family's medical history. A family history of being overweight was most often asked about (84%), followed by diabetes mellitus (71%). A family history of gallbladder disease was the least asked about (21%).

Psychological and Emotional Evaluation. Approximately three-quarters of the whole sample "often" assessed patients and parents' "readiness to change", and patients "concern about weight" (see Table 2). "Parents concern about weight" was the most commonly asked psychological variable by practitioners (84%). Just over one fifth of the sample adhered to the recommended guidelines for psychological evaluation of overweight children and adolescents.

Assessment of Physical Activity. Two-thirds of the sample adhered to the guidelines for assessing frequency, type and duration of physical activity. Organised physical activity was the most often assessed activity. Sedentary behaviour was the least often asked about, although this was still by more

Table 2
Psychological and Emotional Evaluation

Psychological Evaluation	**Percentage of Respondents**
Parent's concern about weight	84
Patient/client's readiness to make changes to manage weight	75
Parent's readiness to make changes to manage child or adolescents weight	77
Patient/client's concern about weight	73
Patient/client's eating disorders	57
Patient/client's poor self-esteem	55
Family dynamics	54
Patient/client's depression	41
Patient/client's anxiety	38
Patient/client being teased about weight	31
Recommended evaluation	23
History of abuse	20

Table 3
Percentage of Responders Who Recommended Each Eating Intervention

Patient Groups		Preschool	School	Adolescents
Changes in eating patterns	O	82	88	92
	S	16	10	6
Limitations of specific foods	O	73	82	88
	S	26	14	12
Low-fat diet	O	37	39	69
	S	45	42	22
Modest calorie restriction	O	45	47	59
	S	49	49	41
Very low-calorie diet	O	0	10	2
	S	16	2	26
Commercial diet	O	2	2	4
	S	16	16	29
Recommended intervention		57	64	82

Note: O = Often Recommended; S = Sometimes Recommended

than 70% of the sample.

Diet History. The majority of the sample obtained a diet history when seeing an overweight child or adolescent (88%). The most frequently used method of obtaining a diet history was usual or typical food intake. Approximately one third used 1-day recall, diet diary, and/or eating patterns, and frequency of specific foods.

Treatment Procedures for Overweight Children and Adolescents

A change in eating patterns was the most commonly recommended eating intervention for all three age groups (see Table 3). More than 80% of participants followed the recommendations for eating interventions for adolescents as suggested by the Expert Committee. This was lower for school children at 65% and even lower for preschool aged children at 57%.

Ninety-five percent of practitioners followed the recommendations for physical activity interventions for all three age groups (see Table 4). Close to 90% of all practitioners recommended all of the physical activity interventions for adolescents and school aged children. An increase in unstructured physical activity was the most recommended physical activity intervention for preschool aged children.

Initiation of Treatment. Fifty-two percent of practitioners would initiate treatment in overweight adolescents with no medical complications "often" or "most of the time". Forty-eight percent would do this with children. Very few practitioners endorsed initiating treatment "often" or "most of the time" with either overweight children (7%) or overweight adolescents (11%) who do not want to control their weight.

Barriers to Effective Treatment. Lack of patient motivation and lack of support services were the most heavily endorsed barriers to effective treatment in childhood or adolescent obesity (see Table 5). These were followed by the value of health, food, and exercise in the family/whānau. Close to a third of practitioners cited treatment futility as a barrier "often" or "most of the time" to effective treatment. Surprisingly, lack of parental involvement was sixth on the list of barriers to effective treatment.

Attitudes and Perceptions

Attitudes towards Obesity. The vast majority of participants thought childhood obesity (88%) and adolescent obesity (93%) needed treatment "often" or "most of the time". Sixty-six percent of practitioners thought children who were overweight would outgrow their excess weight "often" or "most of the time". This is compared to only 4% who thought the same way for adolescents. Energy dense food and drink was the most heavily endorsed reason for playing a role in overweight children or adolescents "often" or "most of the time" (98%). Approximately one-third of all participants thought childhood and adolescent obesity is more amenable to treatment than adult obesity.

Perceived Proficiency. Practitioners rated themselves as low proficiency in the use of psychological strategies (61%) and behavioural modification strategies (48%). Forty-three percent of practitioners rated themselves as having a high proficiency in assessing the degree of overweight.

Table 4
Percentage of Responders Who Recommended Each Physical Activity Intervention

		Percentage Respondents		
Patient Groups		Preschool	School	Adolescents
Increases in organised activities	O	84	90	92
	S	14	10	8
Increases in unstructured physical activity	O	88	96	96
	S	12	4	4
Increases in routine activity	O	84	94	96
	S	14	6	4
Decreases in sedentary behaviour	O	77	88	94
	S	20	8	2
Recommended intervention		94	96	96

Note: O = Often Recommended; S = Sometimes Recommended

Table 5
Perceived Barriers to Treatment of Overweight Children and Adolescents

Barrier	Percentage Responding
Lack of patient/client motivation	75
Lack of support services	75
The value of food in the family/whānau culture	64
The value of exercise in the family/whānau culture	64
The value of health in the family/whānau culture	64
Lack of parent motivation	55
Lack of clinician time	52
Family/Whānau hospitality practices	50
Lack of parental involvement	48
Lack of community resources	45
Family/Whānau financial constraints for food	38
Treatment futility	32
Lack of treatment skills	30
Lack of clinician knowledge	27
Family/Whānau financial constraints for exercise	27
Eating disorder concerns	13

Discussion

The aim of this study was to identify the methods and strategies used by practitioners in the Waikato region to manage, assess, and treat childhood and adolescent obesity. Overall findings indicate that very few practitioners are following the recommended guidelines available for the assessment and treatment of childhood and adolescent obesity.

Assessment of Overweight Children and Adolescents

Clinical impression was by far the most commonly used method, regardless of the fact that objective measures are not complex to conduct. In addition, clinicians rated themselves as having a moderate or high skill level in the assessment of obesity. This raises concern because only extremely overweight children are being identified as needing further intervention. The number of practitioners following recommended guidelines for the medical assessment to rule out other complications was extremely poor (6% - medical assessment; 2% - laboratory evaluation). Possible reasons for this include the time and cost associated with such tests, as well as the possible absence of other overt indicators of potential underlying syndromes. New Zealand practitioners need to be more cognisant of the medical complications associated with childhood obesity and also the future complications that can come about when obesity is not identified and treated early.

Although the number of New Zealand physicians following the recommended guidelines for psychological and behavioural evaluation of childhood obesity was higher than any other area, it was still markedly below that of the US practitioners (Jonides et al., 2002). A possible reason for this includes a lack of knowledge as to what to ask, and a lack of tools such as psychometrics or monitoring forms that enable information to be collated effectively. Lack of time in a typical general practitioner (GP) consultation may also limit the assessment to screening for concerns. In a recent revision of the recommendations for child and adolescent obesity (Barlow & Expert Committee, 2007), acknowledgement is made of the difficulties in a primary care setting to assess and intervene with chronic problems.

Treatment of Overweight Children and Adolescents

Although research is limited into the efficacy of interventions that have been developed to target childhood overweight and obesity (Spear et al., 2007), it is recognised that behaviour change through diet and physical activity are key to any intervention. It is therefore encouraging that treatment recommendations were for behaviour change. Waikato practitioners routinely recommended changes in eating patterns and limitations of specific foods more often than the three United States samples (paediatricians, paediatric nurses, registered dietitians; Barlow, Trowbridge et al., 2002). This is a positive finding in terms of behaviour change, as these two eating interventions are more able to be sustained than low fat diets or kilojoule restrictions (Moran, 1999). Over 80% of practitioners followed eating intervention recommendations for adolescents and over 55% of practitioners followed the recommendations for preschool and school aged children. Behaviour change early in life is successful when implemented properly, therefore early intervention in this younger group of children with obesity would be beneficial. Physical activity interventions were the most commonly recommended treatment for childhood obesity, with 95% of the sample following the recommended guidelines for preschool, school, and adolescent aged youth.

Barriers to Treatment

Lack of motivation was rated as a significant barrier for successful treatment, but no respondent indicated that motivation in and of itself was a target for change. It is important to engage families early on, as changing eating and activity patterns while the child is young is easier than when they are older and have more serious health complications. There was also an indication that practitioners do not know who needed to be motivated to change. Clinicians said they would not initiate an intervention in children or adolescent who did not want to control his/her weight; however the current gold standard treatment for childhood obesity is family based treatment where parents are considered the agent of change (Barlow & Expert Committee, 2007; St. Jeor, Perumean-Chaney, Sigman-Grant, Williams, & Foreyt, 2002). Therefore, if the parents are motivated to change regardless of whether the child is, there is likely to be a positive outcome for the child. This theory does not necessarily apply for adolescents however, as

Figure 1.
Chronic care model applied to obesity (Barlow & Expert Committee, 2007).

forcing an adolescent to partake in therapy may increase their resistance (Barlow & Dietz, 2002; Barlow & Expert Committee, 2007).

Lack of support services was also heavily endorsed as a barrier to effective treatment for childhood obesity, and is a valid concern. New Zealand intervention options at a primary care level are increasing (Blair, 2004), however, most of these provide education about nutrition and activity and do not follow the recommended guidelines for behaviour change in childhood obesity. Applications of the chronic care model (Bodenheimer, Wagner, & Grumbach, 2002) outlined in Figure 1 by Barlow & the Expert Committee (2007), is one such way that health services, families, and community agencies can combine resources to assist in the prevention and treatment of child and adolescent overweight and obesity.

Psychology in Childhood Obesity Intervention

There was recognition by participants that psychological principles underlie the success of many treatment programmes, however, practitioners rated themselves as having a low proficiency in the use of psychological and behavioural strategies. This is not a surprising finding, considering that medical training does not cover the use of such strategies. Options for integrating psychological knowledge and tools into primary care management of childhood obesity need to be considered. Particularly those surrounding readiness to change and motivational interviewing techniques, which have been applied to many different health disorders (Miller & Rollnick, 2002). The application of psychological principles into primary care practice for obesity is also endorsed in the revision of the expert committee recommendations (Barlow & Expert Committee, 2007). It is recommended that practitioners have the ability to identify whether the patient and/or family have the means and motivation to change, as well as being able to identity appropriate target behaviours. Psychological interventions recommended by the Expert Committee in the primary care setting include motivational interviewing, monitoring and reinforcement techniques, goal setting, and conflict resolution.

One approach to address these issues may be training for medical practitioners and allied health staff in the use of psychological strategies. The use of such skills in day-to-day practice would need to be carefully evaluated to see if they "fit" within the typical GP context. Creating multi-disciplinary GP teams that include psychologists also requires consideration. One childhood obesity intervention model that could be adapted to primary care is the Waikato District Health Board Bodywise Intervention (Galyer et al., in submission). The team includes clinicians who are already established at the primary care level (i.e., doctor, community dietitian, Sport Waikato activity specialist) with a clinical psychologist who contributes knowledge and tools for behaviour change.

Conclusions

Overall this study indicates that there an awareness of the appropriate areas for assessment and treatment of childhood obesity, but this is not translating into practice. This study provides information as to where further development is required for the successful management of childhood obesity, including the assessment of possible medical complications associated with childhood obesity, psychological factors for individual and the family, and behaviour change techniques to encourage both children and their parents to change eating and activity patterns. There is a useful role for psychology in addressing this important problem, as a trainer and as a primary care team member.

References

Barlow, S. E., & Dietz, W., H. (1998). Obesity evaluation and treatment: Expert Committee recommendations. *Pediatrics,* 102, e29

Barlow, S. E., & Dietz, W. H. (2002). Management of child and adolescent obesity: Summary and recommendations based on reports from Pediatricians, Pediatric Nurse Practitioners, and Registered Dietitians. *Pediatrics, 110,* 236-238.

Barlow, S. E., & Expert Committee (2007). Expert Committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary Report. *Pediatrics*, *120*, s164 – s192.

Barlow, S. E., Dietz, W. H., Klish, W. J., & Trowbridge, F. L. (2002). Medical evaluation of overweight children and adolescent: Reports from Pediatricians, Pediatric Nurse Practitioners, and Registered Dietitians. *Pediatrics, 110*, 222-228.

Barlow, S. E., Trowbridge, F. L., Klish, W. J., & Dietz, W. H. (2002). Treatment of child and adolescent obesity: Reports from Pediatricians, Pediatric Nurse Practitioners, and Registered Dietitians. *Pediatrics, 110*, 229-235.

Blair, N. (2004). A stock-take of interventions and programmes aimed at childhood obesity prevention and management in New Zealand. Paediatric Society of New Zealand. URL: www.paediatrics.org.nz, accessed January 2009.

Bodenheimer, T., Wagner, E. H., & Grumbach, K. (2002). Improving primary care for patients with chronic illness: The chronic care model, Part 2. *Journal of American Medical Association, 288*, 1909 – 1914.

Freedman, D. S., Khan Kettel, L., Serdula, M. K., Dietz, W. H., Srinvasan, S. R., & Berenson, G. S. (2005). The Relation of Childhood BMI to Adult Adiposity: The Bogalusa Heart Study*, Pediatrics, 115,* 22 – 27.

Galyer, K., Faucett, R., Barbour, M., Lourens, R., & Stockman, H. (2009). *Bodywise Family-Based Intervention for Childhood Obesity: Evaluation of a NZ Adaptation*. Manuscript submitted for publication.

Goran, M. I. (2001) Metabolic precursors and effects of obesity in children: a decade of progress, 1990–1999. *American Journal of Clinical Nutrition, 73*, 158–71.

Jonides, L., Buschbacher, V., & Barlow, S. E. (2002). Management of child and adolescent obesity: Psychological, emotional, and behavioral assessment. *Pediatrics, 110*, 215-221.

Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people to change addictive behavior* (2nd ed.). New York: Guilford Press.

Ministry of Health. (2008). *A Portrait of Health: Key results of the 2006/2007 New Zealand Health Survey*. Wellington, NZ: Ministry of Health.

Moran R. (1999). Evaluation and treatment of childhood obesity. *American Family Physician. 59*, 861-863

Spear, B. A., Barlow, S. E., Ervin, C., Ludwig, D. S., Saelens, B. E., Schetzina, K. E., & Taveras, E. M. (2007). Recommendations for treatment of child and adolescent overweight and obesity. Pediatrics, 120, S254 - S288. URL: http://www.pediatrics.org/cgi/content/full/120/Supplement 4/S254. Accessed January 2009

St. Jeor, S. T., Perumean-Chaney, S., Sigman-Grant, M., Williams, C., & Foreyt, J. (2002). Family-based interventions for the treatment of childhood obesity. *Journal of the American Dietetic Association*, *102*, 640–644

Story, M. T., Neumark-Stzainer, D. R., Sherwood, N. E., Holt, K., Sofka, D., Trowbridge, F. L., & Barlow, S. (2002). Management of child and adolescent obesity: Attitudes, barriers, skills, and training needs among health care professionals. *Pediatrics, 110*, 210-214.

Trowbridge, F. L., Sofka, D., Holt, K., & Barlow, S. E. (2002). Management of child and adolescent obesity: Study design and practitioner characteristics. *Pediatrics, 110*, 205-209.

Acknowledgements:

This project was made possible by a Waikato Medical School Summer Studentship.

Corresponding Author:

Joanna M. McClintock, PhD
Clinical Psychologist
Waikato Diabetes Service
Health Waikato
Private Bag 3200
Hamilton
New Zealand
+64 7 859 9180
+64 7 838 3788
mcclintj@waikatodhb.govt.nz