

**EVALUATION OF THE MODIFIED MEND OBESITY PROGRAM FOR
CHILDREN WITH DISABILITY:
24 WEEK POST PROGRAM EVALUATION
MIND EXERCISE NUTRITION....DO IT!**



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Executive Summary

Problem

Childhood obesity has been described as a worldwide epidemic by the World Health Organisation (2000) and in New Zealand 22.5 percent of children and young people are overweight and 13.0 percent obese (Ministry of Health, 2010). When adjusted for ethnicity these rates are Pacific (35.7%), Māori (20.6%), New Zealand European / Other (9.0%) and Asian (7.1%) (Ministry of Health, 2010). Obesity has been linked to co-morbidities such as diabetes, asthma, and cardiovascular disease later in life and has been identified as one of the most modifiable risk factors (Ministry of Health, 2006).

A group at risk of obesity are children with disabilities. In New Zealand 11.4 percent of children under the age of 15 years of age have a disability (Ministry of Health, 2005). Disability along with obesity limits children's participation in many school and social activities (Ministry of Health, 2005, 2006). Parents report that it is often difficult to access appropriate health services to have their child's health needs met (Ministry of Health, 2005). The Auckland District Health Board (ADHB) Child Development Team had identified the need for a weight management program for children with disability in the community. Through extensive consultation they sought to provide realistic and practical solutions for children with disabilities and their families.

Rationale

Programmes aimed at the management and treatment of obesity in the general child population, are often not appropriate for children with disability. Identification of interventions to manage obesity, increase physical activity and healthy food choices is critical to address the health issues of these children. ADHB in collaboration with MEND Australia and United Kingdom, the Mount Richmond and Sommerville schools in Auckland, piloted a modified Mind Exercise Nutrition...Do it! (MEND) programme to help children and families learn how to improve their health, fitness, diet and wellbeing. This was the first time a modified MEND programme was implemented and evaluated in New Zealand or with a population with disability.

A brief overview of the modified MEND

The 10 week programme comprised of 20 sessions (2 hours twice a week) of exercise, healthy eating and motivational skills. The approaches, material and resources had been modified to meet the specific

cultural and disability needs of the children and their families.

The main goal of the programme was to: assist school age children with disabilities and their families manage their weight using a family centred multi-component weight management approach.

The main objectives of the programme were to:

- Improve knowledge of healthy physical activity, eating and positive behavioural strategies for weight management among participating families
- Increase the range of strategies available to manage healthy eating and activity behaviours at home
- Increase the level of physical activity undertaken each week for participating families to the level recommended by MEND
- Improve healthy food choices of participating families

The purpose of the 24 week evaluation was to determine the sustainability of the programme by comparing results between the week 10 completion (post 1) and week 24 follow-up (post 2). The main objectives of the evaluation were to:

- Identify the sustained behaviours and improvements at 24-week follow-up
- Understand the challenges and successes associated with maintaining healthy behaviours
- Examine the prevalence and perceptions of families in maintaining healthy behaviours

Recommendations

The recommendations from this evaluation are that:

- A funded weight management program is needed for children with disability at risk of obesity and their family
- The program needs to include the three lifestyle factors (healthy food choices,, physical activity and motivation) and be family focused
- Future programs are tailored to the specific needs of each child and family

- Family and community consultation needs to occur in relation to the location and delivery of the program.
- Programs need to have strong cultural, family, community and school links
- Resources and activities need to be appropriate and relate to the abilities of the children
- People working with children in the program need to have expertise and skills in working with children and families with disability, understand healthy food and activity behaviours and be prepared to act as a role model for these in their own behaviours
- Future evaluations need to include both quantitative and qualitative measure (tailored to particular groups) and cost benefit analysis



SECTION I

INTRODUCTION

Background

Children and obesity

Thirty years ago obesity was rarely seen in children but is now described as a worldwide epidemic (World Health Organisation, 2000). New Zealand recently has surpassed Australia in the prevalence of overweight / obese children to become one of the top leaders in the world for these rates (OECD, 2009). In New Zealand 8.3% of children (2-14) are obese and 20.9% (2-14) are overweight. For Pacific and Maori children the prevalence of obesity is 2.5 and 1.5 times higher than the general population (Ministry of Health, 2006). Higher rates of obesity for children are also linked to areas of socio economic deprivation with rates of obesity for children (aged 2 – 14 years) living in the ADHB area higher than the national average at 9.7%. Higher risks of obesity in children have been linked to a positive association between BMI, ethnicity and socio-economic deprivation (Ministry of Health, 2008).

Children with disability

In New Zealand 11.4% of children under the age of 15 years of age have a disability, with 45% having medium support needs and 14% having high support needs (Ministry of Health, 2005; Statistics New Zealand, 2006). When adjusted for ethnicity Maori and Pacific children represented 27% and 21% respectively of the total general population with disability, whilst European children represent only 9% of the total population with disability (Ministry of Health, 2001). Pacific people with disability have much higher proportion of severe disability (24%) than non Pacific people (12%) (Ministry of Health, 2005). Pacific children with disability were less likely to have their developmental and educational needs met than non Pacific children (Ministry of Health, 2005).

Children with obesity and disability

Although there is little research to date that has compared prevalence of obesity / overweight and disability in children in New Zealand, overseas studies suggest that prevalence rates for obesity and overweight are consistently higher for people living with disability than for the general population (Chen, Kim, Houtrow, & Newacheck, 2009; Curtin, Bandini, Perrin, Tybor, & Must, 2005; De, Small, & Baur, 2008; Ells, et al., 2006; Lin, Yen, Li, & Wu, 2005; Liou, 2008; Lobstein, Baur, & Uauy, 2004; Marshall, McConkey, & Moore, 2003; Martin, Roy, & Wells, 1997; Stewart, et al., 2009; Velez, et al., 2008).

The risks of obesity is thought to be higher in children with disability due to lower levels of physical activity, inappropriate eating or eating behaviours associated with their disability, medication and related chronic health conditions (Ells, et al., 2006; Lobstein, et al., 2004; Martin, et al., 1997). Health issues linked to children with disability include difficulty participating in activities of daily living, fatigue, pain, social isolation, depression and perceived cognitive and athletic inability (Rimmer, Rowland, & Yamaki, 2007). Co-morbidities associated with obesity (diabetes and asthma) and disability (respiratory disease, cardiovascular disease, gastrointestinal disorders and kidney disorders) all impact on long term health outcomes for children (Denney-Wilson, 2008). Severe health issues are much higher for Maori and Pacific children than in the general population and risk was increased markedly when combined with co-morbidities of disability and higher rates of obesity (Ministry of Health, 2005, 2006).

Disability and obesity limits children's participation in many school and social activities (Ministry of Health, 2005, 2006) and in many cases limits their rights as set out by the United Nations Convention on the Rights of the Child (United Nations, 1989). Parents report it is often difficult to access appropriate health services to have their child's health needs met (Ministry of Health, 2005). Accessing health services that were appropriate to meet the health care needs of a Maori child with disability was identified as an issue for caregivers / parents (Ministry of Health, 2005). Twenty two percent of parents reported unmet needs compared to 15 percent reported by caregivers / parents of non Maori children (Ministry of Health, 2005). Many of the barriers identified by parents relate to the appropriateness, accessibility, cost and effectiveness of interventions and services for their child (McCallin, Dickinson, & Weston, 2007).

For Pacific children with disability and obesity this not only impacts on their long term physical health outcomes but also on their ability to participate in social activities that promote physical activity and well being. Caregivers, parents and children with disability reported barriers in participating in activities such as school sports, playing at school, school outings / camps and opportunities to make friends (Ministry of Health, 2005). These barriers increase markedly for those children with disability who require technical aids (Ministry of Health, 2005). Barriers to participating in social activities impact not only on the children's physical health but also on their psychological / emotional wellbeing.

identified that local access was pivotal however unlike the current modified MEND program the participants

Overweight / obesity weight management programmes for children in New Zealand.

At present there are many obesity prevention programs for children in Auckland (Auckland Regional Public Health Service, 2004) however many of these programs were piloted for a specified period and did not have weight related outcome measures. Projects / programs that specifically measured weight as an outcome measure include: Food with Attitude; Kids in Action; and Pacific Heart Beat. All three programs included a child and family approach and education on nutrition, however only the Kids in Action program included physical activity.

Kids in Action (through the South Seas and Ta Pasefika Primary Health Organisation (PHO)) offer an integrated program for overweight children and families who are referred by specialists, General Practitioners (GPs), Public Health Nurses (PHN), school principals, teachers or families. In this program each child is screened, assessed, enrolled and given a specific assessment outcome that the whole interdisciplinary team are aware of. Many of the children in this program have high needs such as complex health problems and global development delay. This program has been developed to offer a culturally appropriate program for mainly Pacific children and families.

Overweight / obesity weight management programmes for children internationally.

The MEND program in the United Kingdom (on which the ADHB current program has been based) is a national community based healthy life style program for children and families in the general population. Established in 2004 through Great Ormond Street Hospital, the MEND program is now fully funded by the NHS and offered in over 400 settings.

Another program offered in the United Kingdom is WATCH IT. WATCH IT is a community based weight management program for obese 8-16 year old children (general population). It utilises the HELP program which incorporates healthy eating for young people and their families and promotes active lifestyles and emotional wellbeing. This program is underpinned by motivational and solution based approaches recognising the young person / family as the expert to identify what works. Prior to the implementation of this program consultation with health professionals and families

wanted this away from schools and health settings (Rudolf, et al., 2006). The program is delivered in local sports and community settings and like the modified MEND has group activity sessions lasting one hour once a week, and group parenting sessions. Unlike the modified MEND program provision was made for frequent motivational counselling appointments for the young person and parents.

A recent systematic review of the most effective interventions for childhood obesity, (H. Oude Luttikhuis, et al., 2009) concluded that a combination of lifestyle interventions (dietary; physical activity and behavioural therapy) that are family based (rather than just individual or school based) are the most effective in sustaining weight loss for children beyond a six month period.

Planning an intervention

The ADHB Community Child Health and Disability Service (CCHADS) identified that many of the children referred to their service in relation to their disability were also presenting as overweight or obese. They recognised that there were no clearly identified or appropriate programs to meet the needs of these children and families. The availability of extra funding for a pilot programme led to CCHADS exploring weight management programs appropriate to this group. The multi-component MEND (Mind, Exercise, Nutrition...Do It!) program designed in the United Kingdom for children between 7 - 13 years of age was chosen and modified for children with disability with moderate to high support needs. Modification of the program took place in consultation with the MEND program developers in the UK and Australia, however it was recognised that in some areas, particularly the child component, the changes were so substantial that the program should be referred to as a modified MEND program to avoid any direct comparisons with the MEND program.

In planning a weight management program the key stakeholders were aware of the ethnic and cultural diversity amongst the population and that any interventions would have to be appropriate to differences in family makeup, activity styles, dietary habit, cooking practices, range of disability and communication challenges. Extensive cultural consultation was undertaken, particularly with Maori

and Pacific Island groups, to ensure that the resources and strategies planned were appropriate for the families involved.

The aims of the pilot programme were to:

- Assess the suitability of the modified MEND program for children with disabilities and their families / carers
- Improve knowledge of healthy physical activity, eating and positive behavioural strategies for weight management among participating families
- Increase the range of strategies available to manage behaviour at home
- Increase the level of physical activity undertaken each week for participating families to the level recommended by MEND
- Improve nutritional intake for participating families

The program was piloted at two special needs schools in Auckland. Mt Richmond in Otahuhu (Decile 2) and Sommerville in Point England (Decile 5). Children attending the schools that were over the age of 7 years, were overweight or obese and had at least one family member able to attend the program with them were recruited. The families attended two sessions, (two hours duration) per week over a ten week period February to May 2009 (total 20 sessions.) Baseline data and outcome measures relating to healthy food choices, physical activity, and children's self esteem were collected pre and post the program. Qualitative data related to the programs strengths and challenges were collected via questionnaires and semi structured interviews of parents, carers and teachers. Interviews were analysed thematically, and questionnaires and individual physical measurements were coded and documented by MEND Australia. An individual report was generated for each child. Results are available in a report by Alexander and Penman (2009).

The current report was commissioned to evaluate the impact of the modified MEND programme 24 weeks after completion of the programme.

Previous Evaluation at 10 weeks

Notable results of the 10 week programme included:

- BMI was maintained at 27 kg/m².
- The 6-minute walk test utilised as an alternative to the step test, showed an improvement, as indicated by an additional 8 metres walked by the end of the programme
- Families reported that the child and family were more active and motivated to exercise. School teachers also perceived that the children were more willing to exercise at school.
- The nutritional score as reported on a self administered questionnaire increased from 21.1 to 24.1 points. Increases in nutrition score were indicative of substantial improvements in eating habits and nutritional intake.
- Lunch box photos post programme showed reductions in the number of bought items (38 to 24) by 15 students and an increase for 1 student. The decrease in bought items shows a commitment from parents to try and use less MEND unfriendly processed foods representing a decrease in fat and sugar.
- Overall, the modified MEND programme was well received by families and host schools and some positive indicators of success were measured. The modified MEND programme had many advantages for use with special needs groups of children of school age but modifications were needed to all components of the programme to make them more appropriate and relevant for children.



Current Evaluation at 24 weeks

Participants

Twenty two participants provided data for the 24 week follow up. There were 10 females and 12 males. Forty five percent of the participants were of Pacific descent, 27% NZ European, 23% Asian and 5% Maori. While there was variation in the level of cognitive and physical disability amongst the children all had a Global Developmental Delay to the degree that required attendance at a special needs school. The participant group included families who had been enrolled in the program however not all of the participants completed the entire program.

Objectives

The purpose of the 24 week evaluation was to determine the sustainability of the outcomes of the programme by comparing results in the measures between post-programme implementation and follow up at week 24. The objectives were to:

- Identify the sustained behaviours and improvements at 24 week follow-up
- Recognise the challenges and successes associated with maintaining healthy behaviours
- Examine the prevalence and perceptions of families in maintaining healthy behaviours

Method

Design:

For the 24 week evaluation, the Framework for Programme Evaluation in Public Health (Centre for Disease Control and Prevention, 1999) was utilised, a proven organisational strategy that places emphasis on assessing practical, ongoing health initiatives. The six major steps that shape the framework were: (1) engaging stakeholders, (2) describing the programme, (3) focusing the evaluation design, (4) gathering credible evidence, (5) justifying conclusions, and (6) disseminating results.

Step 1: Engaging Stakeholders

Key stakeholders in the MEND programme included: general practitioners, physical activity providers, teachers, teacher-aids, school principals, Maori and Pacific health advisors, and participating families. ADHB program leaders, participating schools, a General Practitioner, Public Health Nurse, Maori and Pacific Advisors were consulted in all aspects of the evaluation.

Step 2: Describing the Programme

This was the first time the modified MEND programme was implemented in children with disability. Program adaptations were identified and described. See Alexander and Penman (2009).

Step 3: Focusing the Evaluation Design

The evaluation was categorised into formative, process, and outcome phases to ensure a comprehensive assessment of the modified MEND programme.

Formative Evaluation: The baseline assessment of children's physical activity, dietary patterns, and attitudes/perceptions/motivators were reviewed.

Process Evaluation: Twenty-four weeks after participation in the MEND programme, families were asked to comment on the specific elements of the programme and those factors which facilitated or challenged their participation in the program.

Outcome Evaluation: The primary goal of the MEND programme was to improve the health status of children by motivating them to be physically active and make healthy food choices. Thus, the most important indicator of success was whether there was a sustained increase in children's daily physical activity levels and improved healthy food choices. We assessed whether maintenance and/or changes in these key outcomes took place over time.

Step 4: Gathering Credible Evidence

To effectively fulfil the objectives of the modified MEND evaluation, a combination of qualitative and quantitative measures were employed.

Qualitative measures included:

- Wellbeing and behaviour questionnaire (parents and providers)
- nutrition questionnaire (parents)
- lunch box analysis
- semi structured interviews with parents, school teachers and modified MEND providers

Quantitative measures included:

- physical activity questionnaire and log (children and parents)
- 6-minute walk test/perceived exertion
- Body measures weight/BMI/waist circumference

Step 5: Justifying Conclusions

The conclusions drawn from this evaluation were justified by comparing the results with other agreed-upon values or standards set by the key stakeholders. Systematic data procedures were employed to ensure thorough analysis and interpretation.

Data Analysis

Qualitative

Interviews were recorded and transcribed verbatim. Thematic analysis identified patterns by searching common ideas with similar meaning and then grouped into themes identified by the researchers (Morse & Field, 1995).

Quantitative

- Data were entered in excel spreadsheets and checked for data entry errors
- Data were then tabulated and stratified by variables such as site, age, and ethnicity
- Statistical comparisons were made to determine differences between pre-post and follow-up tests
- Data were then graphed or arranged in tables for clear interpretation.

Interpretation of Results

Results were interpreted by asking the following questions:

- What do the themes, numbers, frequencies, averages, and statistical test results actually say about the modified MEND program?
- Are the results similar to what was expected? If not, why are they different? Are there alternative explanations for the results?
- How do these results compare with those of similar and overseas programmes?
- What are the limitations of the evaluation? How well does the evaluation reflect the programme as a whole?



SECTION II

QUANTITATIVE ANALYSIS

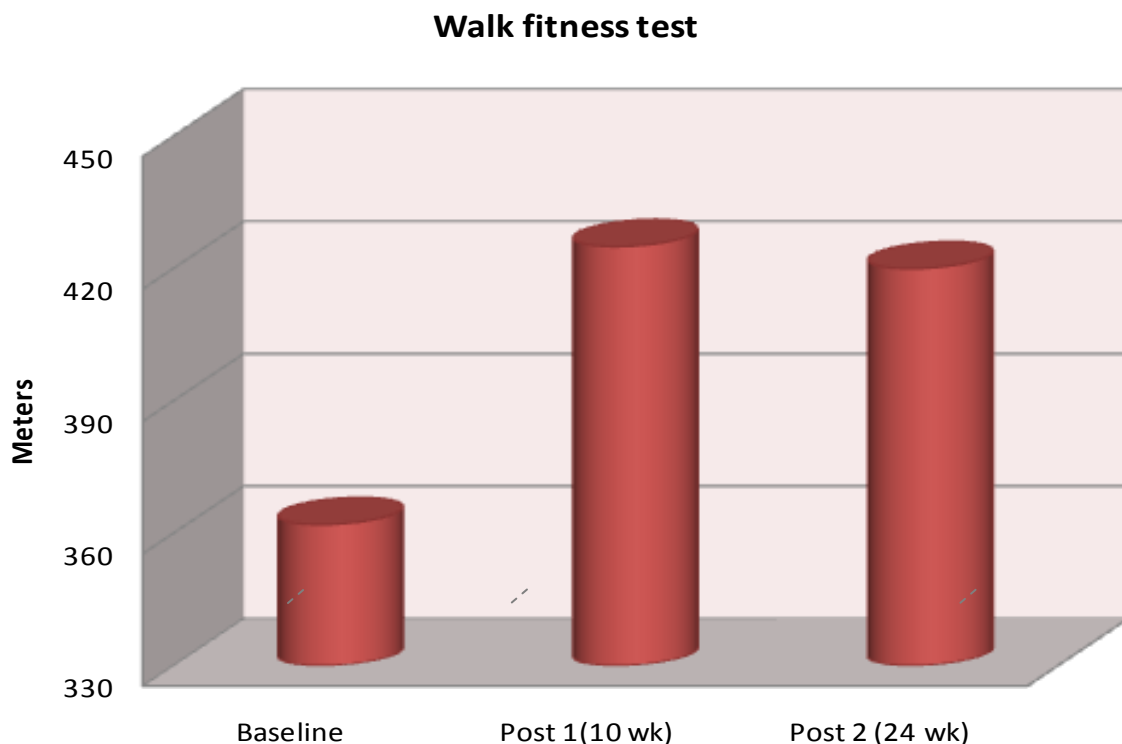
Physical Fitness

Physical fitness was assessed via the six-minute walk test. The objective of this test was to walk as far as possible within the six minute time limit. At baseline, children were able to walk on average 363 ± 148 (mean \pm SD) meters. On follow-up, immediately after the intervention, children were able to walk on average 425 ± 120 meters. At 24 week follow-up, children maintained the distance; 420 ± 113 meters. Although the mean difference between baseline and 24 week post test was 48 meters, this difference was not statistically significant ($p=0.103$) due to the small sample size. However, there was a trend towards improvement. A larger group of children will be needed to observe statistically significant results.



The modified MEND programme is likely to have a positive effect on children's walking.

FIGURE 1. Comparing meters walked in a six minute walk test at baseline, after the intervention and six months post intervention.



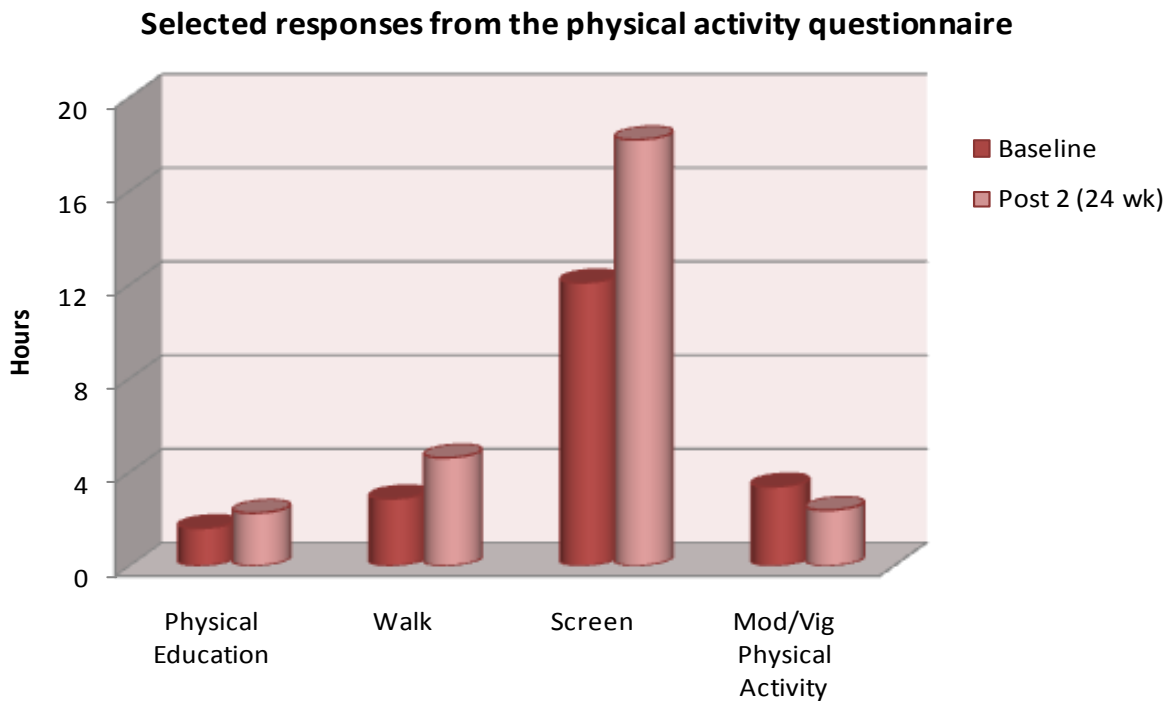
Physical Activity Questionnaire (proxy)

Physical Education at School

Each child's parent/carer completed a physical activity questionnaire at each measurement point. Parents were asked to report the average amount of time their child

spent participating in physical education (PE) at school. There was a significant increase ($p=0.05$) in the amount of physical education children received at school at 24 week post intervention (2.25 ± 0.63 hours) compared to baseline values (1.16 ± 1.14 hours).

FIGURE 2. Comparing hours reported per week spent in physical education, walking, screen time and Moderate Vigorous Physical Activity (MVPA) between baseline and six months post intervention.



Walking

There was an increase in walking by 1.7 ± 3.8 hours per week at 24 week post intervention compared with baseline values. The difference was not significant but indicated a trend towards improvement. Children on average walked 2.9 ± 2.4 hours per week at baseline compared to 4.6 ± 4.0 at 24 week post intervention.

Screen Time

Time spent watching television, DVDs, video, playing on the computer or video games increased (18 ± 13 hours per week) compared to baseline (12 ± 8). The increase

was not significant. It seems that the intervention did not target total screen time or the strategies used to reduce screen time were not as effective.

Moderate-Vigorous Physical Activity

Moderate-vigorous physical activity for 60 minute or more during the week decreased at 24 week post intervention in comparison with baseline values. The difference however was not significant ($p=0.529$). On average between the two time points there was one hour difference.

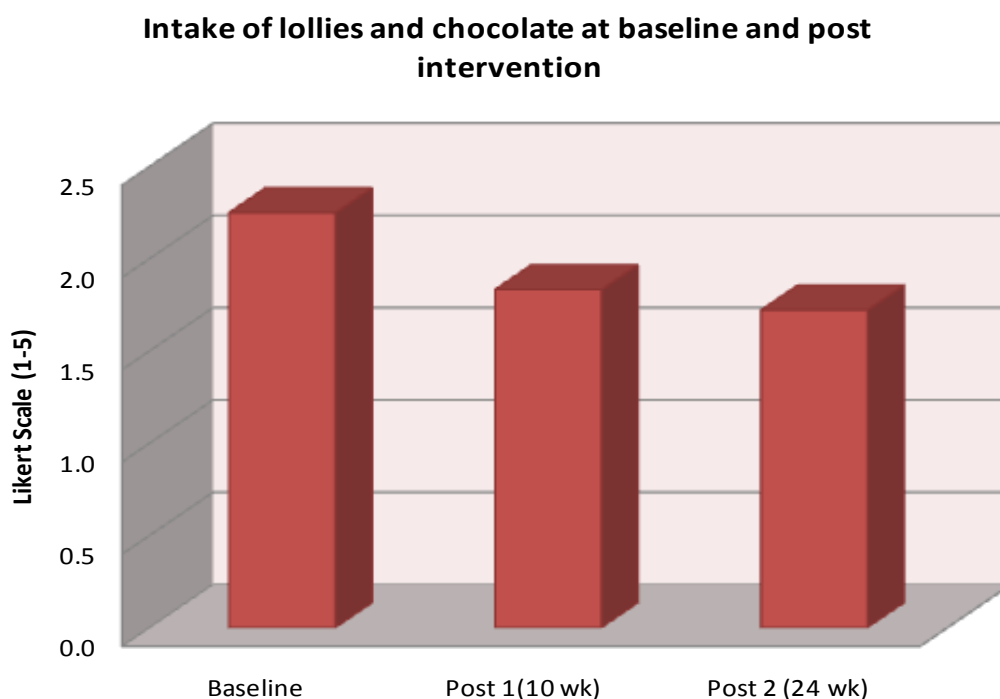
Nutrition Questionnaire (proxy)

Consumption of lollies and chocolates

Most of the behaviours were maintained or there was a favourable shift towards improvement 24 weeks following intervention. The most notable result from the proxy nutrition questionnaire was the shift towards a decreased consumption of lollies and chocolates. At baseline most parents (44%) reported that their child consumed lollies and chocolates a few times a week, 19% once a week and 31% rarely. Following the

intervention 33% parents stated that their child was consuming lollies and chocolates a few times a week, 17% once a week and 50% rarely. Twenty-four weeks post intervention over 80% of the parents reported that their child consumed lollies and chocolates once a week or rarely. The decrease observed was significant. It seems that the programme messages on reduction of lollies and chocolate had a substantial impact on the families of the modified MEND intervention.

FIGURE 6. Decrease in the consumption of lollies and chocolates.



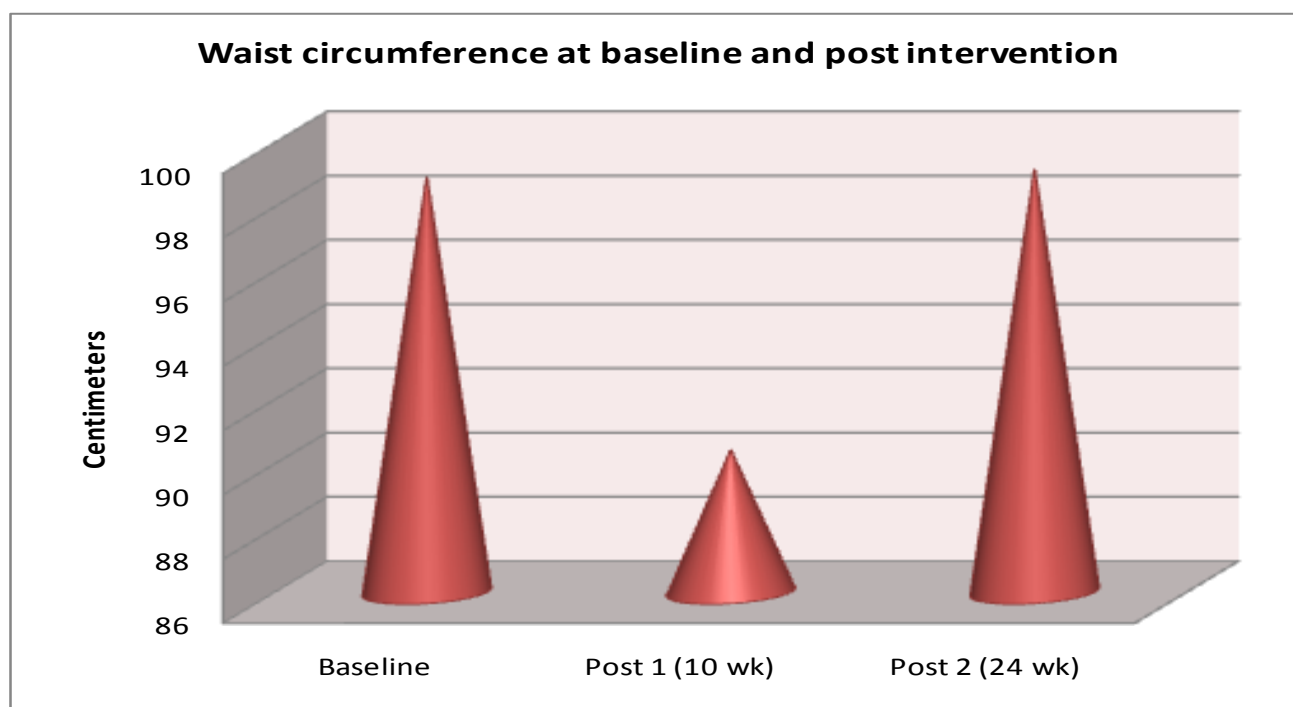
Body measurements

Waist Circumference

The modified MEND programme had a significant effect on waist circumference in children. The baseline value of 99 ± 20 cm decreased to 90 ± 14 cm. However, this significant change was not maintained following testing 24 weeks post intervention. In fact, waist circumference reached baseline levels (99 ± 18 cm). Adjusting for height did not make any difference to the results. It

seems that a sustained programme is needed in this population of children to ensure maintenance of healthy behaviours for the reduction of waist circumference.

FIGURE 7. Waist circumference returns to baseline levels



Key Points

1. Physical Fitness was maintained 24 weeks after implementation of the modified MEND programme
2. There was an increase in walking by ~2hr per week compared to baseline values.
3. The programme did not seem to have an effect on screen time.
4. Eighty percent of the parents reported that their child consumed lollies or chocolates once a week or rarely
5. The modified MEND programme had a substantial reduction on waist circumference but this reduction was not maintained 24 weeks post intervention.



SECTION III

QUALITATIVE ANALYSIS

Theme 1: Health Gains

One of the key themes in the qualitative data was that participation in the programme had resulted in health gains not only for the individual children participating but also for the family and in some cases the wider school community. Program leaders, parents and teachers all reported perceived health gains in relation to:

- *Being more active*
- *Being more aware of healthy food choices*
- *Improved physical health*

Being more active

While there was some variation between the children the general consensus amongst the program leaders, teacher and parents was that prior to participating in the program the children were not very active and for some even walking short distances or undertaking the activities within the program was challenging. However, definite improvements in the activity levels of the children had been seen and in most cases these activity levels had been sustained or improved. As one mother enthusiastically reported:

Before this program my son couldn't walk from here out to the road, and now he can run. Now he can run!

Twenty four weeks post program parents and teachers were still reporting the children as being more active both within the school environment and at home. This they attributed to family and teacher involvement in the program which had enabled them to see how active these children could be. Alongside of this was the realisation that physical activity did not necessarily have to be an organised exercise program, game or team sport but could be simple activities such as walking or riding a bike, activities which could be easily incorporated into everyday life.

This growing realisation and confidence of the family in incorporating more physical activity within family life and encouraging the children to be more active was now being reflected 24 weeks post program in some children organising their own activities both in the school and home environment.

Just looking around on the playground and things like that they are definitely more active and freely active without being told (Teacher)

He'd come home, get changed, boom, gone for the gear outside before we knew it because he really began to enjoy it. (Family)

Twenty- four weeks post program families were still endeavouring to ensure that the children remained active mostly through everyday family activities such as playing games together, walking and swimming and for some the modified MEND program had resulted in a perceived improvement in the activity levels of the whole family.

Being more aware and making healthy food choices

Twenty-four weeks post program families reported that as a family they were much more aware of healthy food choices and this was influencing the food which was purchased and made available to the children within the home. For many there had been small but significant changes in the family diet which in most cases had been sustained. Families attributed these changes to the education they received during the program in regard to food composition and potential healthy alternatives and the support and encouragement they had had from the program dietician to modify the family diet. While they acknowledged they did not always follow directly the advice received they had become more confident in experimenting and making changes to the family diet.

Before we would always buy chips, lollies, but since we started on the (modified) Mend programme then I cut most of those things out.

We hate brown bread but now we all like brown bread. Even my kids they don't like vegetables and now they do. My oldest son says "oh Mum, I like that one because it's healthy. I like healthy food". Even the milk we changed from dark blue to light blue.

Several families noted that some of the children were now able to distinguish healthy and unhealthy food choices, although this was dependent on the level of disability. However, it was agreed that even if the children did not understand the notion of healthy or unhealthy foods they had become more accepting of healthy alternatives. The influence of children, often siblings, in monitoring the families' food purchasing, diet, and the acceptance of the children of healthy

alternatives was often seen as providing the added motivation needed by parents to maintain good nutrition within the home. The 'whole family' approach taken in the modified MEND program was often seen as a significant factor in improving healthy food choices within the family. Families also noted that the support of the school and the school environment in supporting healthy food choices was important although there appeared to be some variation in perception as to how well the schools were currently doing this.

Improved physical health

Another important health gain noted by the families and school teachers was the improved physical health of the children. This group of children are often more vulnerable to illness and several of the children participating had a history of school absences or repeated hospitalisations particularly during the winter period. However since completing the modified MEND program the families had noted a significant improvement in their child's health with fewer illnesses and a reduction in hospitalisations. From their perspective the gains made in relation to physical activity and nutrition through participation in the modified MEND program had made their children more resilient and this had a significant impact on the health of their child and their ability to develop and participate in life.

Alan's health was a lot better through the winter period. So, he wasn't going to hospital, or wasn't having time off school, sick. He's a lot more resilient to the bugs going around. And there were a few. Making the investment (in the modified MEND program) was worth it, because there wasn't the toll, you know, from our side, on the health system, at the back end of it. Because Alan tends to, when he gets sick he's sick and he's in hospital.

One young lady out there is probably like your son, is very prone to getting anything, but actually has not had a day off school since this program.

For some families this outcome alone had made their participation and investment in the program worthwhile. They reflected that up until now often the approach taken with their children's health had been reactive to problems and reflected a 'bottom of the cliff'

approach but this program had allowed them the opportunity to take a proactive approach to improving the physical health of their children in a supportive and positive environment.

Theme 2: Social Gains

Alongside of the health gains the qualitative data analysis revealed significant social gains for the children and families. For many of these children and their families socialisation and the ability to participate in group activities and the wider community is challenging. Twenty-four weeks post program parents and teachers reported that participation in the modified MEND program was contributing to expanding the families social support networks and their participation in the wider community. This was reflected in the two subthemes:

- *creating a supportive community*
- *being able to participate*

Creating a supportive community

When developing the program the providers had in consultation with key stakeholders made a decision to deliver the program in the school environment in which the child/family were familiar. The program was well supported by the schools in relation to purpose built facilities for children with disability and the provision of teachers and teachers' aides who knew the children and could assist the program providers. For many families the provision of the program within the school environment was pivotal to their decision to commit to the program. Twenty-four weeks post program the parents and teachers were still reporting how important this was in relation not only to the success of the program but also the creation of a supportive community which could continue to assist and support the child and family post program.

The school provided a safe and comfortable place where children and families could come together to participate, learn and support each other. From the parents' perspective the school was a place where people were tolerant and understood the challenging behaviours of the children. Where as one mother described "they (the child) can meltdown and no one will actually notice or bat an eyelid". This acceptance resulted in bonds forming between families. While the families no longer meet formally, they continue to see each other around the school and are able to share experiences, encourage and support each other. Parents were surprised by the how close they became and how beneficial these relationships have been.

While for some contact has been very intermittent just knowing there is a supportive community of parents and teachers available continues to be very important to these families.

That was certainly beneficial I was surprised, as I think a lot of parents were, surprised at the sort of closeness if you like or the relationships that you built up with other parents, because you do see them intensively for two hours twice a week. There was a lot of information sharing and just getting together with the same people twice a week. That was certainly beneficial.

I see a lot of the mums around here anyway and some of us have even stopped and had little chats at the gate about the (modified) MEND programme etc.

It is difficult to gauge the degree to which the children feel part of this community but some teachers and parents were sure that the children had developed a sense of belonging and that this was enabling them to continue to progress in relation to activity and healthy food choices.

I think he felt part of a regular little team, a regular group. He enjoyed that aspect of it. A sense of belonging. Part of a team. That was certainly something that he got out of it. It hadn't really occurred to me prior but when I saw him in action here jumping around with the other kids that was quite evident.

Being able to participate

For many parents, particularly those who had children with Autistic Spectrum Disorders, there were real concerns regarding the child's ability to participate in the program particularly in the team activities. However, the support and reassurance of the program leaders and some adaptation of activities had allowed all the children to participate.

Most of the families, 24 weeks post programme, recognised that they had underestimated their child's ability to participate in activities and the importance of their role in engaging in activities with the children.

They were often surprised by how well the children did. The realisation of what their child was capable has given them growing confidence to developing new ways of 'playing' with their children at home and encouraging and pushing the children to achieve more.

We don't give them the chance to do it. You know. And I think if we do it, then they will do it!

While for some motivating the children to be active is still proving challenging just knowing what can be achieved has encouraged them to continue to find ways to keep the children active. Twenty-four weeks post program the behavioural challenges of these children were most frequently noted as barriers to children's participation and this is an area in which families would like to see more emphasis in the program and on-going support.

Twenty-four weeks post-program most families were largely continuing to manage the activity and healthy food choices within the security of the family and school environment however for a few the modified MEND program had given them the confidence to, as one father described, 'take it to the next level' by enrolling their children in sport clubs and community gyms. The acceptance of their children and their behaviours within these environments was often pivotal to the success of this transition. Two of the families now had their children enrolled in mainstream community programs and this transition they attributed to their participation in the modified MEND program as well as the support and encouragement of the program leaders and school teachers. The modified MEND program was seen by some as one of the stepping stones to these children becoming independent.

I sense that it might not have happened yet but the program contributes to them becoming more independent. Seeing it as a possibility. It takes it to the next level, encourages the kids to sort of go on and look at their own self sufficiency. I think giving them credit to what they can do, we don't give them the credit that they, allow them to do it.

It was recognised by parents and teachers alike that the degree of participation and independence varies depending on the extent of the child's disability. The

modified MEND program appears to provide another avenue for these children to learn skills and activities which will assist them in participating within the family, school and wider community environment.

Theme 3: A program that fits

When reflecting on the programme, teachers and parents (even those who did not complete the programme), continued to be enthusiastic about the need for a programme specifically tailored to assist children with disability in improving their physical fitness and healthy food choices. There was an appreciation that the modified MEND programme had required considerable modification to fit the needs of this group of children. Twenty-four weeks post programme, the programme facilitators, teachers and parents were still reflecting on areas for improvement.

There was discussion during interviews about the appropriateness of a highly structured program such as the modified MEND programme for children with global developmental delay. There seemed to be general agreement that the modified MEND programme had provided a useful framework from which to develop a programme.

Parents, teachers and program leaders identified the following as important components to the success of the program:

- Location within the school environment
- Experienced program leaders and facilitators
- Adaptability of the program to individual and group needs
- Commitment of families and school

Linking into an already established community was really important. The resources that the school provided, the organisation of the teachers and the teacher aids helping us out with the programme was invaluable, we couldn't have done it without them. That was a real plus really. I think it made parents that may not have come along to a community event like in a hall or something, they came along to the school. (Program leader)

The program was facilitated by a physiotherapist and a dietician who had experience of working with children

with disability. These program leaders were supported by teachers and teachers' aides who worked with the children in the school environment. Having a consistent and committed team who were experienced in working with children with disability and their families was seen as pivotal to the success of the program. Families appreciated the availability of the program leaders and their interest and follow up between sessions. Even families who did not complete the program or were not regular attendees appreciated the continued interest of program leaders and teachers in their child's progress.

They knew the kids so well, especially Lara.... She could anticipate each one, each child's mood and act before they even did it. She was fantastic! (Parent)

I thought she (the leader) was really good. I didn't know of any questions but she was continuously ringing us at home and asking us how things were going. Even though her mum wasn't available for the programme, she was really good at getting in touch with us. (Family member)

Another factor considered to be important was having a program which could be adapted (often at short notice) to take into account the individual needs of each child. All of the children in this group had global developmental delay and this meant that their behaviours could be challenging and difficult to predict. Maintaining the co-operation and participation of all the children during group activities was often difficult and so it was important that the program was adaptable enough to allow for a change in approach when required. Having a variety of activities was important, as well as having helpers available to do 'one-to-one' coaching and manage behaviours when required. While the families and teachers recognised the benefits of group activities it was also noted that it was not always possible to engage all the children all the time. Despite the best efforts of everyone some children at times, especially those with Autistic Spectrum Disorders, became overwhelmed by the program and were not able to participate. It was a difficult balancing act, balancing the needs of the individual and the needs of the group.

Some kids really thrived from having music and then some kids as soon as you turn the music on they ran out of the room. It's challenging. (Program leader)

Having a program that can accommodate such variability was seen as essential by program leaders, teachers and parents alike.

It was noted by all participants in the evaluation that successful completion of the modified MEND program was dependent on the full commitment of the family and school to participate and support the program. The commitment required from teachers and family members in coming along regularly to an intense program at the end of a busy work/school day cannot be underestimated. For some the families the intensity of the program appeared often overwhelming but the commitment of the families to making the most of the opportunities offered was evident. Those who did not complete the program related this to competing priorities rather than a lack of commitment to the program itself.

It was just like having a gift isn't it really, you want to accept it. People were really drinking up that. If they missed a week they were really intent on getting the information from the previous week. (Parent).

The perception of the participants was that the willingness to invest and commit time to the program, as well as the involvement of siblings, caregivers and other family members program and activities was an important factor in determining the child/families progress with activity and healthy food goals.

There was support from all those interviewed for continuing the modified MEND program but also mutual recognition that the ability to deliver the program to these children was dependent on the on-going commitment and good will of the schools and district health board staff to support the program.

Sustainability of the program:

From the perspective of the participants in the evaluation the greatest challenge to the sustainability of the program was the funding and resource required to

deliver this program to special needs children. The program was recognised as being resource intensive and had relied heavily on the good will of teachers to commit time and energy (often unpaid) to the program. While the pilot had developed resources which could be used for future programs, it would continue to require significant teacher and school support. Teachers in particular noted that this would need to be appropriately funded and resourced so that it did not place unnecessary strain on already limited time and resources.

We did need a few extra staff and I know the two contacts at each school, they did a lot of organisational work, sending out letters to parents and just co-ordinating it. It was extra and I'd say it would be difficult to sustain it so I think, I don't know how you could do that because schools are already so busy. It would be a difficult thing to know how to sustain it, unless you had it set up and a properly funded part of the curriculum where you are not putting extra strain, it was just sort of integrated into their nutrition and health curriculum somehow.

Parents, teachers and the program leaders identified the on-going need for an activity and healthy food choices program to support families of overweight/obese disabled children, and the development of the modified MEND program was seen as having the potential to meet this need. However, teachers and the program leaders identified the sustainability of the program would require adequate funding and consideration of more integration of some aspects of the program into the existing health curriculum of the school.

Key Points

1. Families and teachers perception was that those who participated in the modified MEND program were, more active and more aware of healthy food choices.
2. Children who participated had improved physical health with a reduction in hospitalisations and absences from school related to illness.
3. The program assisted the development of a supportive community network and children's abilities to participate in family/community activities.
4. An activity and nutrition programme for children with disability needs to be family orientated, semi-structured and responsive to the individual needs and behaviours of the children, located in a familiar environment such as the school and delivered by staff who are familiar to the children and experienced in working with special needs children.
5. Sustainability of such programs is dependent on adequate funding and resourcing. Consideration needs to be given to more integration with the existing school health curriculum.



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SECTION IV

DISCUSSION

Discussion

The modified MEND programme was a collaborative project among two special needs schools, children and families, and the ADHB. This is the first time a MEND program was used and modified for children with disability. The results of this evaluation support and inform future development of an integrated weight management program for children with intellectual disabilities. The modified MEND was successful in achieving the main objectives of the program which were to improve family knowledge, and develop strategies and behaviour for healthy activity and eating.

In evaluating physical activity, the study showed that children were able to maintain an increase in walking distance 24 weeks following the programme as determined by the 6-minute walk test (moderate physical activity). Positive results were also observed in Physical Education (PE) and walking. Parents reported that the amount of PE and walking children engaged almost doubled. The increase in physical activity could be attributed to parents and teachers increased awareness of the children's ability to participate. There was a decrease in the amount of time spent in moderate-vigorous physical activity (i.e. skipping rope or star jumps) however, the results were not significant.

Improvements in the children's understanding of physical activity and healthy food choices was difficult to assess due to the lower cognitive abilities of many of the children and the use of "proxy" data collection tools, however there is certainly indicators that behaviours around activity and healthy food choices did improve.

Similar programs such as the MEND program for obese 7-11 year olds in the general population in the UK showed sustained changes in waist circumference and cardiovascular fitness over one year however as in this evaluation, BMI lost significance over time (Sacher, et al., 2005). Programs where BMI was sustained over one year such as WATCH IT, allowed for continued engagement beyond the initial 12 weeks (Rudolf, et al., 2006). The continued engagement in the program could explain the differences in results of BMI and is something which needs to be considered in relation to the duration of future programs.

Although there was no decrease in screen time in this evaluation, Minihan, Fitch and Must (2007) suggest there are differing reasons for time spent in these activities for children with disability. For children with Autistic Spectrum Disorder (ASD), video modelling may provide more effective social learning opportunities that are not available to the child through direct peer interaction. The virtual world or cyberspace may also be one place where a child's disability does not matter (Minihan, et al., 2007). In the general population, screen time spent is used as an outcome measure to assess the degree of sedentary behaviour amongst children which may account for its use as an evaluation tool in the MEND program. However, we agree with Miniham *et al*, (2007) that sedentary behaviours, other screen time, need to be explored in relation to children with disability.

The nutrition questionnaire revealed some changes in eating behaviours maintained after 24 weeks. The most notable change was the marked reduction in the consumption of lollies and chocolate. While there was a significant decrease in waist circumference after the programme, this decrease was not maintained. In fact waist circumference returned to baseline levels. These results need to be considered in the context of the behavioural and physical challenges parents of children with disability and obesity face around food. For example children with ASD may have colour and texture preferences and aversions which can be influential in food choices. Many parents may use food as a reward and strategy for behavioural control, and at times other behavioural modification, such as brushing teeth may be emphasised over healthy eating (Minihan, et al., 2007). For young people with physical disabilities the reasons given for choosing less healthy foods may be, as Steele et al (1996) suggests, because they were easier to handle and consume. Although fruit and vegetables could be easy to

handle, other factors such as problems with swallowing or mobility need to be considered. Therefore development and evaluation of programs need to consider these factors.

Unexpected outcomes of the evaluation were the improved overall physical health of the children and the impact participating in the program had in building participatory and social skills. Parents reported that as a result of the program their children had a reduction in illness episodes and hospitalisation. Reduced illness episodes, absences from school and hospitalisation had not been considered as an outcome measure for this program and should be considered in future evaluations. This is significant given the poor physical health of many children with disability. The influence of medications on weight management and activity was not addressed within the modified MEND program and needs to be included in future programs.

We believe that there were three reasons for increased participation and building of social networks. Firstly, the modified MEND program was delivered in a safe, familiar and comfortable environment. Secondly, the families participating had children of similar abilities and challenges. Thirdly, the staff delivering the program had expertise in managing physical and behavioural challenges. Others have found that when the environment is not appropriate for children with disability and behavioural problems, they may be excluded from social and physical activities, becoming even more socially isolated (Minihan, et al., 2007). Rudolf, Christie and McElhone (2006) in an evaluation of the WATCH IT program for young people and families in the general population confirm that an environment where young people feel accepted and can be themselves contributes to increased self esteem and establishing friendships. A result of participating in the modified MEND program was that not only did the children develop their participatory and social skills, but also the families established strong social networks that have continued post program.

In relation to whether the modified MEND programme was suitable, this evaluation suggests that the resources and activities require considerable modification to meet the needs of children with disability and their family. In particular, further development is needed, in relation to communication tools used to engage the children in the material presented. Minihan, Fitch, and Must (2007) found similar challenges in that teachers trying to incorporate physical activity programs into the classroom for children with disability were often hampered by unadapted materials, lack of specialised resources / equipment, extra support (aides / staff) and time needed. We would suggest rather than further modification of current programs, new programs and resources should be developed that are family based and tailored specifically to the children's disabilities.

The participants felt that a 10 week program was the right amount of time, however it was suggested by some families and teachers that a post modified MEND program would assist in supporting continued improvement in physical and healthy food choice behaviours. This they believed would not need to be as intense as the initial 10 week program. Families' preference was that these programs should not be run in the winter months.

This evaluation also indicated that the program is resource intensive particularly in relation to staff required to run the program effectively. The pilot program was facilitated by a physiotherapist and dietician (funded by ADHB through special project money) and supported by additional teaching staff from the school (unfunded). This was seen by the schools as unsustainable in the long term unless the program was appropriately funded and/or integrated within the existing health curriculum of the school. Specialist nutritional, behavioural and physical activity expertise, from professionals who understood the specific needs of children with disability was seen as essential to the success of a program. The availability of additional support from psychological services, as required, would also be beneficial in providing the individualised support these children and families often require.. While we believe the family focus of the program is very important, the role of the school and school environment should not be underestimated. This evaluation would support the continuation of a collaborative program between the family, school, and health service.

The findings of this study support the conclusions of a systematic review by Oude Luttikhuis et al. (2009) that programs that combine lifestyle interventions (dietary; physical activity and behavioural therapy) that are family based (rather than just individual or school based) are the most effective in sustaining weight loss for children. Oude Luttikhuis *et al.*(2009) also highlighted the need for qualitative data to provide children, families and provider perspectives. In the current evaluation it was the qualitative data that provided strong arguments to the success of this program for teachers and families beyond what was anticipated in the outcome measures and questionnaires.

In New Zealand and internationally, there are similar programs that include a family approach and combine all three lifestyle factors, however, it appears that only the Kids in Action program (New Zealand) included children with mild disability or high needs. The Kids in Action program incorporated many of the components that were identified as being important in this evaluation. As well as being family based and including all three lifestyle factors, Kids in Action was culturally tailored (for Pacific children and families) and connected to the community. It had a specialist team that planned individual programs tailored to children's health needs and abilities. The program leaders of the modified MEND program spent considerable time modifying resources to fit the cultural needs of the participants however it was recognized, that despite this, ensuring regular engagement of some Maori and Pacific families within the program was often difficult. The Kids in Action may provide a useful reference point to ensure that future programs not only have culturally appropriate resources but are delivered in a way which ensures the engagement of Maori and Pacific families. In developing a program for children with disability and obesity, consideration should also be given to inclusion of the motivational individual interviewing of the WATCH IT program which may address the specific individual needs identified by the parents in this evaluation. Both the Kids in Action and WATCH IT programs have been developed and offered in the general population but could contribute to the development of a specialised program for children with disability and families.



SECTION V

RECOMMENDATIONS

The way forward

From this evaluation the recommendations are:

- A funded weight management program is needed for children with disability and obesity and their family
- The program needs to include the three lifestyle factors (food choice, physical activities of daily life and motivation) and be family focused
- Future programs are tailored to the specific needs of each child and family
- Family and community consultation needs to occur in relation to the location and delivery of the program
- Programs need to have strong, cultural, family, community and school links
- Resources and activities need to be appropriate and relate to the abilities of the children
- People working with children in the program need to have a good understanding in regard to food and activity and be knowledgeable and have expertise and skills in working with children and families with disability.
- Future evaluations need to include both quantitative and qualitative measure (tailored to particular groups) and cost benefit analysis

References

- Alexander, J., & Penman, L. (2009). *A pilot project report: using a modified MEND programme with a group of school students with special educational needs and their families*. Community Child Health & Development Service, Auckland District Health Board. Auckland.
- Auckland Regional Public Health Service. (2004). *The burden of overweight and obesity in New Zealand children*: Auckland Regional Public Health Service.
- Centre for Disease Control and Prevention. (1999). *Framework for Program Evaluation in Public Health*. Atlanta: Centre for Disease Control and Prevention. Retrieved from <http://www.cdc.gov/nmwr/preview/mmwrhtml/rr4811a1.htm>
- Chen, A. Y., Kim, S. E., Houtrow, A. J., & Newacheck, P. W. (2009). Prevalence of Obesity Among Children With Chronic Conditions. *Obesity*, 18(1), 210-213.
- Curtin, C., Bandini, L., Perrin, E., Tybor, D., & Must, A. (2005). Prevalence of overweight in children and adolescents with attention deficit hyperactivity disorder and autism spectrum disorders: a chart review. *BMC Pediatrics*, 5(1), 48.
- De, S., Small, J., & Baur, L. A. (2008). Overweight and obesity among children with developmental disabilities. *Journal of Intellectual & Developmental Disability*, 33(1), 43-47.
- Denney-Wilson, E., Hardy, L.L., Dobbins, T., Okely, A.D. & Baur, L.A. . (2008). Body mass index, waist circumference and chronic disease risk factors in Australian adolescents. *Archives of Pediatric Adolescent Medicine*, 162(6), 566-573.
- Ells, L. J., Lang, R., Shield, J. P. H., Wilkinson, J. R., Lidstone, J. S. M., Coulton, S., et al. (2006). Obesity and disability - a short review. *Obesity Reviews*, 7(4), 341-345.
- Lin, J.-D., Yen, C.-F., Li, C.-W., & Wu, J.-L. (2005). Patterns of Obesity among Children and Adolescents with Intellectual Disabilities in Taiwan. *Journal of Applied Research in Intellectual Disabilities*, 18(2), 123-129.
- Liou, T. H., Pi-Sunyer, F.Z., & Laferrere, B. (2008). Physical disability and obesity. *Nutrition Reviews*, 63(10), 321-331.
- Lobstein, T., Baur, L., & Uauy, R. (2004). Obesity in children and young people: a crisis in public health. *Obesity Reviews*, 5, 4-85. doi:10.1111/j.1467-789X.2004.00133.x
- Marshall, D., McConkey, R., & Moore, G. (2003). Obesity in people with intellectual disabilities: the impact of nurse-led health screenings and health promotion activities. *Journal of Advanced Nursing*, 41(2), 147-153. doi:10.1046/j.1365-2648.2003.02522.x
- Martin, D. M., Roy, A., & Wells, M. B. (1997). Health gain through health checks: improving access to primary health care for people with intellectual disability. *Journal of Intellectual Disability Research*, 41(5), 401-408. doi:10.1111/j.1365-2788.1997.tb00727.x
- McCallin, A. M., Dickinson, A. R., & Weston, K. (2007). *Family Support Study: Time for Action*. Auckland: AUT University.
- Minihan, P. M., Fitch, S. N., & Must, A. (2007). What Does the Epidemic of Childhood Obesity Mean for Children with Special Health Care Needs? *The Journal of Law, Medicine & Ethics*, 35(1), 61-77. doi:10.1111/j.1748-720X.2007.00113.x
- Ministry of Health, &. (2001). *New Zealand Disability Strategy*. Wellington: Ministry of Health,.
- Ministry of Health. (2005). *Living with disability in New Zealand: A summary*. Wellington: Ministry of Health,. Retrieved from <http://www.moh.govt.nz>
- Ministry of Health. (2006). *An analysis of the usefulness and feasibility of a population indicator for childhood obesity*. Wellington: Ministry of Health. Retrieved from <http://www.moh.govt.nz>
- Ministry of Health. (2008). *A portrait of health. Key results of the 2006/07 New Zealand Health Survey*. Wellington: Ministry of Health,.
- Ministry of Health. (2010). *A National Survey of Children and Young People's Physical Activity and Dietary Behaviours in New Zealand: 2008/09 - Key Findings*. Wellington: Ministry of Health. Retrieved from www.moh.govt.nz/moh.nsf/indexmh/national-survey-cyp-physical-activity-dietary-behaviours
- Morse, J. M., & Field, P. A. (1995). *Qualitative research methods for health professionals*. Thousand Oaks: Sage Publications.
- OECD. (2009). Organisation of Economic Co-operation and Development Health Data.
- Oude Luttikhuis, H., Baur, L., Jansen, H., Shrewsbury, V. A., O'Malley, C., Stolk, R., P, et al. (2009). *Interventions for treating obesity in children (Review)*: Cochrane Collaboration,.
- Oude Luttikhuis, H., Baur, L., Jansen, H., Shrewsbury, V. A., O'Malley, C., Stolk, R. P., et al. (2009). Summary of 'Interventions for treating obesity in children'. *Evidence-Based Child Health: A Cochrane Review Journal*, 4(4), 1730-1733. doi:10.1002/ebch.427
- Rimmer, J. H., Rowland, J. L., & Yamaki, K. (2007). Obesity and Secondary Conditions in Adolescents with Disabilities: Addressing the Needs of an Underserved Population. *Journal of Adolescent Health*, 41(3), 224-229.
- Rudolf, M., Christie, D., McElhone, S., Sahota, P., Dixey, R., Walker, J., et al. (2006). WATCH IT: a community based programme for obese children and adolescents. *Archives of Disease in Childhood*, 91(9), 736-739. doi:10.1136/adc.2005.089896

- Sacher, P. M., Chadwick, P., Wells, J. C. K., Williams, J. E., Cole, T. J., & Lawson, M. S. (2005). Assessing the acceptability and feasibility of the MEND Programme in a small group of obese 7–11-year-old children. *Journal of Human Nutrition and Dietetics*, *18*(1), 3-5. doi:10.1111/j.1365-277X.2004.00578.x
- Statistics New Zealand. (2006). *2006 Disability Survey*: Statistics New Zealand. Retrieved from <http://www.stats.govt.nz>
- Steele, C. A., Kalnins, I. V., Jutai, J. W., Stevens, S. E., Bortolussi, J. A., & Biggar, W. D. (1996). Lifestyle health behaviours of 11- to 16-year-old youth with physical disabilities. *Health Educ. Res.*, *11*(2), 173-186. doi:10.1093/her/11.2.173
- Stewart, L., Van De Ven, L., Katsarou, V., Rentziou, E., Doran, M., Jackson, P., et al. (2009). High prevalence of obesity in ambulatory children and adolescents with intellectual disability. *Journal of Intellectual Disability Research*, *53*(10), 882-886.
- Convention on the Rights of the Child, 27531 C.F.R. (1989).
- Velez, J. C., Fitzpatrick, A. L., Barbosa, C. I., Diaz, M., Urzua, M., & Andrade, A. H. (2008). Nutritional status and obesity in children and young adults with disabilities in Punta Arenas, Patagonia, Chile. *International Journal of Rehabilitation Research*, *31*(4), 305-313.
- World Health Organisation. (2000). *Obesity: preventing and managing the global epidemic* (894). Geneva: World Health Organisation. Retrieved from <https://apps.who.int>