Executive summary

Obesity and Intellectual disability in New Zealand

International research has found that the rates of obesity are increasing in economically developed countries. Obesity has been described as a leading cause of preventable death, and research has found that there are a number of significant health risks associated with obesity including: coronary heart disease, some types of cancer, type 2 diabetes, gallstones and osteoarthritis.

In New Zealand, the rates of obesity have been increasing over recent years and New Zealand now has the third highest rate of obesity in the OECD. Aside from the difficulties that individuals face due to the associated health risks there is also a financial impact and the Ministry of Health has suggested that the cost to the New Zealand each year is NZ$303 million.

When considering the rates of obesity published by the World Health Organization and the New Zealand Ministry of Health, it is important to recognise that there are people within the population who are at higher risk of developing obesity. One such population is adults who have an intellectual disability. Research specific to this population has been carried out in the UK, US and Australia and has consistently shown that adults who have an intellectual disability have higher rates of obesity when compared to the rates reported for the general population. Despite obesity being identified as an important issue for this population overseas, currently there is no published information looking at the rates of obesity in adults who have an intellectual disability living in New Zealand. There has also been a lack of research into the reasons why there are higher rates of obesity in adults who have an intellectual disability and consequently, at this stage, the reasons for the higher rates of obesity are unclear.

It is important to recognise that there is no biological reason that would explain why this population is over-represented in obesity statistics. On that basis, it is important to consider the diagnosis of intellectual disability and recognise that the issue of weight management is the same as for people who do not have an intellectual disability. It could simply be that the ability of the individual to understand and translate relevant health information into behaviours that could assist in managing their weight over time may be reduced or impaired. It is also possible that any supports, currently in place, are not adequately targeting the issue of obesity within this population and the role of support setting (e.g., residential, insitution) requires further research.

The high rates of obesity reported for this population overseas and the lack of research into this population in New Zealand is a concern, especially considering that adults who have an intellectual disability are an already marginalized group and given the well documented health risks associated with obesity. To address this issue we accessed a database containing anonymous health data on 141 adults who have an intellectual disability. Ninety-eight people of the 141 had complete and up-to-date data. We used the body mass index (BMI) to estimate the rates of obesity. The BMI was chosen because it is the standard measure used internationally in these types of studies. The use of the BMI also allowed comparison with previous population studies and in particular the estimated figures for the whole New Zealand population published by the Ministry of Health in 2008.

Using the information from the database we compared the rates of obesity of the adults who have an intellectual disability with the rates of obesity reported for the general population by the New Zealand Ministry of Health in 2008, using each of the BMI categories; underweight (< 18.50), normal (18.50–24.99), overweight (25–29.99)

and obese (≥ 30) . Obesity was further broken down into classes one, (30–34.99), two (35–39.99) and class three (≥ 40).

As has been previously reported in international studies, we also found significantly higher rates of obesity (BMI ≥ 30), in adults who had an intellectual disability (50.98%; general population 26.50%). When we looked at the different classes of obesity we also found that there were more adults who had an intellectual disability in all three of the BMI classes (class one, class two, & class three), with the largest difference being class three. These differences were greater than would be expected by chance alone.

Previous studies have identified women who have an intellectual disability as being at a higher risk of obesity. We found similar results in this study with an overall obesity rate for women who have an intellectual disability of 65.63%, compared to the rate of 30.20% for women in the general population. Of particular concern is that the largest differences for women were found in class two and class three, whereas more of the men with intellectual disability were in class one of obesity.

The results of this study support overseas research and indicate that adults who have an intellectual disability are at an increased risk of obesity. It is hoped that this study will stimulate interest and research into the causal factors and potential interventions relevant to this population. Based on the results presented in this study, interventions to promote and maintain weight loss in adults who have an intellectual disability are warranted.

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Obesity and intellectual disability in New Zealand

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Abstract

International literature indicates that the rates of obesity are increasing in OECD countries and that there are significant health risks to individuals who are classified as obese. Research has also highlighted that obesity is likely to be more pronounced in people who have an intellectual disability (ID). Despite this association there has been little research into the reasons why this population is overrepresented in obesity statistics. Furthermore, except for the brief report derived from this thesis (Stedman & Leland, 2010), there are no published New Zealand data on the rates of obesity among people who have an intellectual disability.

In the present study I accessed a database containing anonymous data for a sample of New Zealanders who have an intellectual disability. Ninety-eight participants out of 141 in the database had complete and up to date data. The group with complete data did not significantly differ from the group with incomplete data in gender or hours of staff support. Participants' body mass index (BMI) was used to estimate rates of obesity within the sample. Comparisons were made with the general rates of obesity in adults reported by the New Zealand Ministry of Health (2008) using each of the BMI categories; underweight (< 18.50), normal (18.50 – 24.99), overweight (25.00 – 29.99) and obese (≥ 30.00). Obesity was further broken down into classes one (30.00 – 34.99), two (35.00 – 39.99) and three (≥ 40.00).

There were significantly higher rates of people with a BMI ≥ 30.00, in the group who had an intellectual disability (50.98%; general population 26.50%). There were significantly more adults who had an intellectual disability in all three BMI classes, with the most significant difference in class three.

While there were more obese men and women who have an intellectual disability in this sample than would be expected, women were found in higher than expected rates in class two (BMI 35.00 – 39.99) and class three (BMI ≤ 40.00). Research into the causal factors and potential interventions specific to men and women in this population to promote and maintain weight loss are warranted.

Introduction

Overview

Body fat or adipose tissue serves an important function in human survival; it serves as a source of energy and insulation (Saladin, 2001). Paradoxically, a considerable body of research has identified that excessive levels of adipose tissue (otherwise known as obesity) is predictive of the onset of many serious health conditions (Ebbeling, Pawlak, & Ludwieg, 2002; Mann & Truswell, 2007) and is highly correlated with increased mortality (McGee, 2004). Research has also indicated that individuals who are classified as obese using their body mass index (BMI) experience higher health care costs (Thompson, Brown, Nichols, Elmer, and Oster, 2001).

The Organisation for Economic Co-operation & Development (OECD) reported that the prevalence of obesity in economically more developed countries is increasing, and based on statistics from 2007, reported that New Zealand is the OECD country with the third highest rate of obesity (OECD, 2010). The increasing prevalence of obesity was also confirmed by a population study conducted by the New Zealand Ministry of Health (2003), which projected a further increase by 73% in the rate of obesity by 2011. Based on figures published by the World Health Organization (WHO), there is a significant annual cost to New Zealand due to obesity (New Zealand Ministry of Health, 2003). Research such as this, combined with the reported health risks, highlights that the increasing rates of obesity need to be addressed.

Within the reported rates of obesity for the general population there are groups of people who are at a higher risk of becoming obese, including people who have an intellectual disability (Draheim, Stanish, Williams & McCubbin, 2007; Emerson,

2005; Marshall, McConkey & Moore, 2002; McGuire, Daly & Smyth, 2007; Moore, McGillivray, Illingworth, & Brookhouse, 2004; Melville, Hamilton, Hankey, Miller, & Boyle, 2007; Merriman, Haw, Kirk & Stubbs, 2005; Rimmer, 1995; Rimmer & Yamaki, 2006; Robertson et al., 2000, Takeuchi, 1994, Yamaki, 2005). With some studies indicating that the prevalence of obesity in populations of adults who have an intellectual disability is over 60% (Rimmer & Yamaki, 2006; Marshall et al., 2002). It appears that this higher prevalence has existed within this population for at least several decades (Yamaki, 2005). It has not been possible to consider this issue in a New Zealand and this is reflected on the New Zealand Ministry of Health (2003) website, which cites results from population studies that have been conducted overseas to indicate that this group could be at an increased risk.

The reasons for the higher rates of obesity found in adults who have an intellectual disability are unclear. An individual's weight is not a component of the diagnosis and, as with the issue of prevalence, there is little in the way of research that examines the reasons for the over representation. It can be posited that if obesity is considered as a multifaceted condition, then deficits in Intelligence Quotient (IQ) and adaptive behaviour may exacerbate factors relevant to the general population and consequently increase the risk of obesity for people who have an intellectual disability.

There is controversy in relation to the most accurate way to measure obesity. Most of the current tools, including the body mass index (BMI), skinfold tests and waist-to-hip ratio are indirect measures and they only produce estimates of adiposity. With advances in technology, techniques such as magnetic resonance imaging (MRI) and dual energy x-ray absorptiometry (DEXA) have been shown in research to be some of the most accurate measures of obesity available. The BMI is seen as a simple,

and effective screening tool that provides an estimate of an individual's ideal weight by dividing a person's weight by their height squared (kg/m^2). The use of the BMI has been questioned, with some researchers suggesting that due to differences in body build, the BMI may not be a valid tool for assessing the rates of obesity (Deurenberg, Deurenberg-Yap, Wang, Lin & Schmidt, 1999). Others have suggested that it should be used with caution, particularly when comparing people of differing ethnicity, gender and age (Messiah, Arheart, Lipshultz & Miller, 2008; Dietz & Belizzi, 1999; Pietrobelli et al., 1998). Despite the reservations of some researchers, there are studies that support the use of the BMI not only for prevalence studies but also as an indicator of increased risk of adverse health outcomes (Stevens et al., 1998).

The aim of the present study is to assess the issue of prevalence of obesity for adults who have an intellectual disability in a New Zealand context. An existing database belonging to an intellectual disability service provider in the Otago and Southland regions was used to estimate the prevalence of obesity within this population. The data were compared to the rates of obesity reported for the New Zealand general population (New Zealand Ministry of Health, 2008). The potentially important variables age, gender, and level of staff support were also investigated as explanatory variables.

Obesity

1.2.1 Negative impact of obesity

Obesity has become a very prevalent issue in many economically more developed countries with the focus generally relating to the impact of obesity. Concerns generally focus on the negative effect obesity has on the health and wellbeing of individuals. This is captured in the World Health Organization's

definition of obesity: an "abnormal or excessive fat accumulation that may impair health" (WHO, 2006, ¶1). Aside from the often reported impact on an individual's physical health there are potentially negative psychological and economic effects of obesity.

From an evolutionary perspective the ability to store energy is vital to survival (Saladin, 2001) and in human beings excess energy is stored as fat (also known as adipose tissue). However, higher levels of adipose tissue (i.e. being classified as obese) have been shown to have a negative impact on the health of an individual (World Health Organization, n.d. a). This position is supported by research which has consistently identified a number of serious illnesses, health risks and/or debilitating conditions that are correlated with obesity including: type 2 diabetes, hypertension, cholesterol problems, gallstones, liver problems, coronary heart disease, sleep disorders, infertility, osteoarthritis and some forms of cancer (New Zealand Ministry of Health, 2008b; Ebbeling, Pawlak & Ludwieg, 2002). Together with the identified health problems, an elevated BMI could reduce an individual's life expectancy. Stevens et al. (1998) examined the relationship between mortality and obesity by using data collected between 1960 and 1972 for the American Cancer Societies' Cancer Prevention Study 1. The study included a sample of 62,116 men and 262,019 women and the analysis indicated that being classified as obese using the BMI was strongly correlated with mortality from physiological causes until 75 years of age. These findings are further supported by a study conducted by the New Zealand Ministry of Health and the University of Auckland (New Zealand Ministry of Health 2003), which concluded that a higher than optimum BMI ($\geq$ 25.00), contributed to approximately 3,200 deaths of New Zealanders in 1997.

For some people the impact of obesity may not only be physical. There are other negative effects that need to be considered, including the psychological and financial impact. In some cultures being obese is viewed as a reflection of an underlying character flaw (New Zealand Ministry of Heath, 2003). Stigmas such as these can impact on an individual's mental wellbeing and research has shown that obesity is highly correlated with negative psychological outcomes such as reduced levels of self-esteem and increased incidence of depression and anxiety (Merriman, Haw, Kirk & Stubbs, 2005; Puhl, Andreyeva, & Brownell, 2008). In a recent review of the obesity-related research, Puhl and Heuer (2009) reported that people who are overweight or obese are the subject of discrimination across a number of settings including health, education and employment.

Individuals who are classified as obese may also be disadvantaged due to higher health care costs and poorer employment opportunities. Thompson et al. (2001) found that adults who are obese face significantly higher health care costs. Specifically, being classified as obese (BMI $\geq$ 30.00) resulted in people experiencing higher personal costs for pharmaceutical treatments (105%) and higher costs for primary health care visits (39%). The negative financial impact may be further compounded by reduced employment opportunities and comparatively lower remuneration which are reflective of the obesity-related stigmas and stereotypes within society (Puhl & Heuer, 2009).

In summary, unused energy from food is stored as adipose tissue (Saladin, 2001). There is an abundance of research indicating that obesity is highly correlated with a number of serious illnesses and increased rates of mortality. Aside from the well documented physical symptoms it is also evident that people who are classified as obese also experience a number of negative psychological and financial outcomes.

1.2.2 Changes in the prevalence of obesity

Obesity has become an increasingly prominent issue in economically more developed countries including New Zealand (OECD, 2010). The increased awareness is due to the growing number of population studies that have indicated that the rates of obesity are increasing in these economically more developed countries. The World Health Organization (2006) estimated that in 2005 there were 400 million people worldwide who met the criteria to be classified as obese. To emphasize the increasing prevalence, the World Health Organization (n.d. a) used the term "Globesity" to describe what could be considered an obesity pandemic. In a report that examined the rates of obesity in New Zealand, the Ministry of Social Development (2005) reported that the prevalence had doubled between 1977 and 2003. More recent studies have reported that New Zealand has one of the highest rates of obesity when compared to countries that belong to the OECD (New Zealand Ministry of Social Development, 2008). From the published population studies it appears that the rates of obesity have increased in economically more developed countries like New Zealand. There are concerns in relation to the current high prevalence of obesity but also the relatively short period over which this increase has occurred. Moreover, within the general population there are groups of people who are considered to be at a higher risk of developing obesity. One at-risk group identified by the New Zealand Ministry of Health (2003) are people who have an intellectual disability.

Intellectual disability

The available evidence highlights that there is a significant difference between the rates of obesity found in adults in the general population when compared with adults who have an intellectual disability (Rimmer & Yamaki, 2006). Due to the well

documented health risks associated with obesity there is a need to examine the factors that could contribute to the differences between these populations and this can only be achieved after intellectual disability has been clearly defined. It is important to recognise that there are differences in the processes used internationally to diagnose a person with an intellectual disability but that there are recognised and accepted diagnostic criteria that examine three common variables, namely: 1) their age; 2) their score on an intelligence test; and 3) an assessment of the individual's adaptive behaviour skills.

1.3.2 Diagnosis of intellectual disability in New Zealand

When considering the diagnosis of intellectual disability in a New Zealand context the criteria for diagnosis is embedded in the eligibility criteria for support services specific to intellectual disability. These criteria outline that a diagnosis of intellectual disability is determined following an assessment conducted by a psychologist using the processes outlined in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM IV TR) (American Psychiatric Association, 2000) and/or the American Association on Mental Retardation (AAMR, 2002). It is important to recognise that the DSM IV TR (American Psychiatric Association, 2000) uses the term 'mental retardation' and that this is interchangeable with 'intellectual disability', which is the term now preferred by the AAMR (Schalock et al., 2007) and used in practice by disability support services in New Zealand.

1.3.2 Diagnostic criteria of intellectual disability

Intellectual disability is defined by the AAMR (2002) as "a disability characterised by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual social and practical adaptive skills. This disability originates before age 18" (p. 19). As stated there are three important variables within the AAMR (2002) and DSM IV TR definitions that need to be considered. Firstly, the most easily measured variable would be age, using the criterion from both the AAMR (2002) and DSM IV TR, to be diagnosed with an intellectual disability any identified deficits need to have been apparent prior to the person's 18th birthday. This arbitrary cut-off is based on an assumption that at 18 years of age people have completed the various stages of brain development and from that point on they are considered to be an adult.

The second variable, a persons intellectual functioning, is determined through the use of a standardised intelligence test such as the Wechsler Adult Intelligence Scale III (WAIS–III) and the Stanford-Binet. Following the completion of the test an individual's performance is compared against the performance of other people of a similar age and ethnicity in a given population. In tests such as the WAIS–III, deviations around a norm or mean score of 100 are used to indicate the individual's level of intelligence, and a score of below 70 is required to be diagnosed with an intellectual disability. It is important to recognise that this score is not regarded as a precise measure and variance can occur for a number of reasons, including the performance of the individual and errors of measurement (AAMR, 2002).

The guidelines published by the AAMR (2002) make it clear that performance on an IQ test is not enough to give a person a diagnosis of intellectual disability. The third, and potentially the most relevant variable required in the AAMR (2002) criteria,

is an assessment of the person's adaptive behaviour. Essentially this is an assessment of the individual's ability to live independently and considers skills such as, the ability to socialise, meal preparation, budgeting and accessing community resources. In practice, adaptive behaviour scales are used to identify deficits in three broad skill areas: conceptual, social and practical. The scales are designed to identify areas of need and attempts to identify if the deficits are related to the individual not knowing the skill, not knowing when to apply the skill or are reflective of other "motivational factors" (AAMR, 2002, p. 74). This part of the assessment will not only identify the needs of the individual but will also highlight the skills that a person has and if necessary should guide the development of future support plans.

As stated, for an individual to receive support from an intellectual disability service provider in New Zealand they need to have been diagnosed with an intellectual disability as defined by the DSM IV TR or AAMR (2002). Although the current study did not directly assess each individual's intellectual functioning, all of the adults in the sample were receiving support and as such have previously been diagnosed with an intellectual disability.

Obesity and Intellectual Disability

There is a limited amount of research focusing on obesity and intellectual disability. Internationally, researchers have consistently reported higher rates of obesity in adults with an intellectual disability when compared to those found in the general population (Draheim et al., 2007; Emerson, 2005; Marshall et al., 2002; McGuire et al., 2007; Moore et al., 2004; Melville et al., 2007; Merriman et al., 2005; Rimmer, 1995; Rimmer & Yamaki 2006; Robertson et al., 2000; Takeuchi, 1994; Yamaki, 2005). A review of the limited research that is available highlights that this is

not a new health risk for this population. Furthermore, aside from the journal article generated as part of this thesis (Stedman & Leland, 2010) there is no published research that examines this problem in a New Zealand context.

1.4.1 Prevalence of obesity has increased over time

Adults who have an intellectual disability have had an elevated risk of developing obesity for an extended period of time. Research as far back as the 1960s indicated that the rates of obesity were higher in people with an intellectual disability when compared to the general population (Takeuchi, 1994). Studies that have examined this issue over time have also highlighted that obesity has been a consistent and increasing problem for adults who have an intellectual disability. Yamaki (2005) used the results from the National Health Interview Survey completed annually between 1985 and 2000, to investigate the body weight status of adults who have an intellectual disability in the United States of America (US). By extracting self-reported data from the survey in four year periods, Yamaki (2005) compared the rates of obesity in adults who had an intellectual disability with the rates of obesity in the general population. The results indicated an overall percentage increase in the rates of obesity in the US between 1985 and 2000. Further analysis revealed that there were consistently higher rates of obesity found in people who had an intellectual disability over the 15 year period. Between 1985 and 2000 the rate of obesity for adults who had an intellectual disability increased by 15.2% to 34.6%, in comparison the rate in for the general population increased by 9.2% to 20.6%. When comparing the two populations' rates of obesity for the period 1997 to 2000, the estimated rate for adults with an intellectual disability was 14% higher than that found in the general

population (Yamaki, 2005). No systematic research on obesity among this population has taken place in New Zealand.

1.4.2 Prevalence of obesity in New Zealand

In New Zealand, often the families and staff who support people with intellectual disabilities will suggest that there appears to be a higher incidence of obesity in populations of people who have an intellectual disability (A. Higgins, personal communication, 6/6/2008). Despite the concerns of people who provide care for these populations there are only a limited number of studies internationally that look at the prevalence of obesity in this population and, as such, the potentially important factors related to this group have not been subject to rigorous evaluation. This position is evidenced by the information published by the New Zealand Ministry of Health (2003) on its website, which acknowledges the higher rates of obesity that have been found in this population, but uses obesity estimates from research carried out in Finland and the US as an indication, citing a range of 29 to 50%.

1.4.3 Comparisons with Australian data

A study conducted in Australia by Moore et al. (2004) could be considered more relevant to New Zealand than the research cited by the Ministry of Health (2003). This is because, at the time of their research, the rates of obesity in the general population in Australia (18.2%) were comparable to those reported by the New Zealand Ministry of Health for the general population of New Zealand (17%) (New Zealand Ministry of Social Development, 2004). Moore et al. (2004) collected BMI data from 93 adults (41 women and 52 men) aged between 18 and 63 years of age. All of the participants were supported by four intellectual disability service providers in

Melbourne, Australia. They found that there were higher rates of obesity in both men and women who had an intellectual disability when compared with the general population. The total rate of obesity in their sample was 33.3%, with 30.8% of the men and 36.6% of the women classified as obese. This was 15.1% higher than the figure estimated for the general population of Australia (18.2%). The results also indicated that there were significantly more women who had an intellectual disability, classified as overweight. This is a concern considering people classified as overweight are also at an increased risk of health problems and the increased probability that people who are classified as overweight could gradually become obese over time (Orzano & Scott 2004).

1.4.4 Overview of related factors; obesity and intellectual disability

As outlined according to the DSM IV TR (2000) and the guidelines published by the AAMR (2002) the measurement of adipose tissue is not required for a diagnosis of intellectual disability. Indeed, despite the consistently higher rates the available research has not established a causal link between intellectual disability and obesity and the reasons for the differences in the rates of obesity are not clear. As with the issue of prevalence, despite the identified need for it there is little in the way of research investigating the specific factors related to the differences in these populations (Hamilton et al., 2007; Marshall et al., 2002; Rimmer & Yamaki, 2006; Takeuchi, 1994).

Findings from the limited research indicate that there are differences in the rates of obesity when comparing the restrictiveness of the setting that people live in. The differences in prevalence of obesity across settings could reflect that levels of autonomy, staff knowledge, and access to health promotion material are important

variables. The American Dietetic Association (Riper & Wallace, 2010) argue that the disease prevention techniques for people who have an intellectual disability do not differ from the general population, this includes nutrition, physical activity and access to health care. Based on this argument, the reasons for the higher rates of obesity in adults who have an intellectual disability are more likely to be due to impairments in the adaptive behaviours that are necessary in these three identified areas.

1.4.5 Higher rates of obesity in less restrictive settings

The AAMR guidelines for the diagnosis of intellectual disability suggest that the focus and purpose of a diagnosis should be to identify areas of need and, where necessary, implement the relevant supports. Based on this any deficits in adaptive skills should be minimized in a context of support and, higher levels of support should result in equivalent or better health outcomes. However, the available literature indicates that there is not a simple relationship between the amount of support and the prevalence of obesity. It appears that the environment or context in which the support is delivered is a more important variable. One study by Rimmer, Braddock, and Marks (1995), compared the rates of obesity (BMI $\geq$ 30.00) found in 329 adults who were living in one of three types of services. Those who were living with at least one family member; those living in a community-based group home; or, those living in an institution. The results indicated that the risk of becoming obese was higher for people who lived in the community-based settings. Considering all three of these environments included some form of support the results suggest that the environment and the rationale that underpins the support arrangement could be influencing the rates of obesity rather than simply the availability of support.

1.4.6 Potentially protective factors within restrictive settings

Research has indicated that there is a correlation between a less restrictive setting and higher rates of obesity (Melville et al., 2007; Rimmer & Yamaki, 2006; McGuire et al., 2007). Many developed countries implemented a policy of deinstitutionalisation through the 1980s and 1990s. As part of this process the function of institutions shifted to that of supporting people who are not coping in the community. By design, institutions provide support in a more controlled manner when compared to community-based settings. More often than not institutions are hospitals that have a unit designated to meet the specific needs of people who have an intellectual disability and as such are funded within the health sector. Given this context there is often a strong focus on health and this influences the goals of the support arrangement, for example how decisions regarding nutrition and exercise are managed on a day-to-day basis. Being based in the health sector also influences the type and level of staff qualifications and opportunities for ongoing training. It could also be assumed that, within institutions, there is an ability to readily access relevant professionals such as doctors, enabling a higher level of monitoring and feedback in relation to an individual's health status and the management of risk factors. In this type of environment the components of an individual's diet are often overseen by someone with specialist knowledge, for example a dietician, who would be responsible for the quality and quantity of food that is on the menu. This was the case in the study conducted by Rimmer et al. (1995), where the diets of the individuals living in the institutions were overseen by three dieticians. In contrast, people who live with family members or in community-based services, such as those provided by the service provider in the current study, higher levels of autonomy and lower levels of staff expertise would be expected. Further, within community-based settings health

issues such as weight gain tend to be dealt with retrospectively rather than proactively and contact with health professionals is often on an as required basis. The people living in community-based settings potentially have more opportunities than people residing in institutions to make decisions in relation to nutrition and, with a focus on increased autonomy, the staff may have a reduced ability to restrict access to certain types of food such as fast food, snacks and sweets.

In summary, an examination of the differences between the environments could assist in isolating the potentially relevant variables for this population. The presence of family or paid support alone does not appear to be a protective factor. Lower rates of obesity have been reported in environments such as institutions that are funded by the health sector, and as such would be in a better position to provide food that is based on an assessment of the individual's needs. This indicates that staff training and a focus on health promotion are important variables (Hamilton et al., 2007) and provides some direction for future research. It is equally likely that institutions, by their restrictive nature, have tighter controls in relation to availability of food; indicating that autonomy is also a variable that warrants further investigation. In the current study the amount of support that an individual received was compared. Based on previous findings it was hypothesized that people with lower levels of support would have higher levels of obesity.

1.4.7 Differences in the rates of obesity reported for men and women

According to population studies carried out in other countries (Lee et al., 2010), and the New Zealand health survey (New Zealand Ministry of Health, 2008), there are differences in the prevalence rates of obesity for men and women. Specifically, women are more likely to be extremely obese, with higher rates than

men in obesity classes two and three. Related research on the prevalence of obesity and gender in adults who have an intellectual disability living in the United Kingdom has highlighted similarities with the patterns observed in the general population. Specifically, there are also differences in the rates of obesity for men and for women; however, the differences are greater for women who have an intellectual disability. Melville et al. (2008) completed a health screening of adults who had an intellectual disability, part of which was an assessment using the BMI. The findings were consistent with those reported in other published research. There were higher rates of obesity found in the people who had an intellectual disability when compared to the data for the general population of the greater Glasgow region of Scotland. When they examined gender as a factor they found that there were higher rates of obesity for both women and men. Further analysis highlighted that there was a larger difference between the women in the general population and women who have an intellectual disability than there was for the men. Findings such as these confirm that adults with an intellectual disability have an increased risk of developing obesity-related diseases and identify women with an intellectual disability as being at an even greater risk (Bhaumick, Watson, Thorp, Tyler, & McGrother, 2008; Melville et al., 2007; Robertson, et al.,2000), both when compared to the general population and to men who have an intellectual disability. The current study examines this issue in a New Zealand context by comparing the observed rates of obesity for women and men who have an intellectual disability with the rates for women and men in the general population.

1.4.8 Obesity throughout the lifespan

When researching the rates of obesity an important variable is age, or more specifically asking whether or not the prevalence of obesity changes as a function of age. Research in the US indicates that the prevalence rates for obesity increase with age (Lee et al., 2010). The rates of obesity are higher in the age groups 40 years and above and that this has been found for both men and women (Wang & Kumanyika, 2007). In New Zealand the prevalence rates of obesity also increase with age (New Zealand Ministry of Health, 2008). This increase occurs until men reach 65 years and women reach 75 years. The prevalence rates peaked for men between the ages 55 and 64 years, whereas the highest rates for women were recorded between the ages of 55 and 74 years (New Zealand Ministry of Health, 2008). Again it is difficult to draw comparisons between the rates of obesity found in older adults who have an intellectual disability and those for the general population. This is due to the limited amount of research available on the health needs of older adults who have an intellectual disability; the lack of research is further highlighted when the search is refined to incorporate obesity. Many of the studies that have examined obesity in this population have not addressed age. This could be related to a number of factors, including this being an marginalised population, but when examining age and adults who have an intellectual disability it is important to consider that they make up a very small proportion of the general population and that in 2005, on average, a person with an intellectual disability was only expected to live until they were 66.1 years old (Fisher & Kettl, 2005). To address this the current study compared the rates of obesity found in the sample with the general population using the same age categories (25–34, 35–44, 45–54, 55–64, 65+) reported by the Ministry of Health (2008).

In summary, from the research that is available, it appears that the rates of obesity do increase with age in the general population. However, these findings need to be viewed with some caution as it is not possible to draw conclusions about changes in bodyweight across the lifespan for individuals from cross-sectional data. It is difficult to find research specific to populations of adults who have an intellectual disability that would allow comparisons to be made. This could be due to adults with an intellectual disability being an already small proportion of the general population and further compounded by the historically lower life expectancy of this population. On this basis further research is warranted and the current study will investigate the rate of obesity for men and women aged 25 to 75 years.

Measuring obesity

1.5.1 Overview

According to Kuczmarski (2007), the only direct way to measure adiposity is on a cadaver using dissection, during which all of the adipose tissue is separated from other tissue such as muscle, removed and weighed. Obviously this is not a viable option when attempting to assess the proportion of adipose tissue an individual has or when conducting population studies. Aside from dissection all other methods are considered to be indirect assessments of body composition and as such are estimates of the amount of adipose tissue. Researchers and organisations interested in obesity have raised concerns with the use of the BMI as a measure of adiposity. Despite this the BMI is still one of the more commonly used measures as opposed to other surface anthropometry techniques such as a skinfold test, waist-to-hip ratio and waist circumference. With developments in technology, there are now procedures that could be considered to be more accurate than the anthropometry techniques in assessing the

levels of adipose tissue, such as magnetic resonance imaging (MRI) and dual energy x-ray absorptiometry (DEXA). Despite this, current research on the prevalence of obesity suggests that the BMI is a simple and valid tool for measuring obesity in population studies.

1.5.2 Body Mass Index (BMI)

The BMI is considered to be one of the simplest ways of estimating obesity (WHO, 2006). The BMI is calculated using two simple measures, an individual's height and weight and the equation, weight/height squared (kg/m²) or calculations can also be made by using a chart as shown in Figure 1.

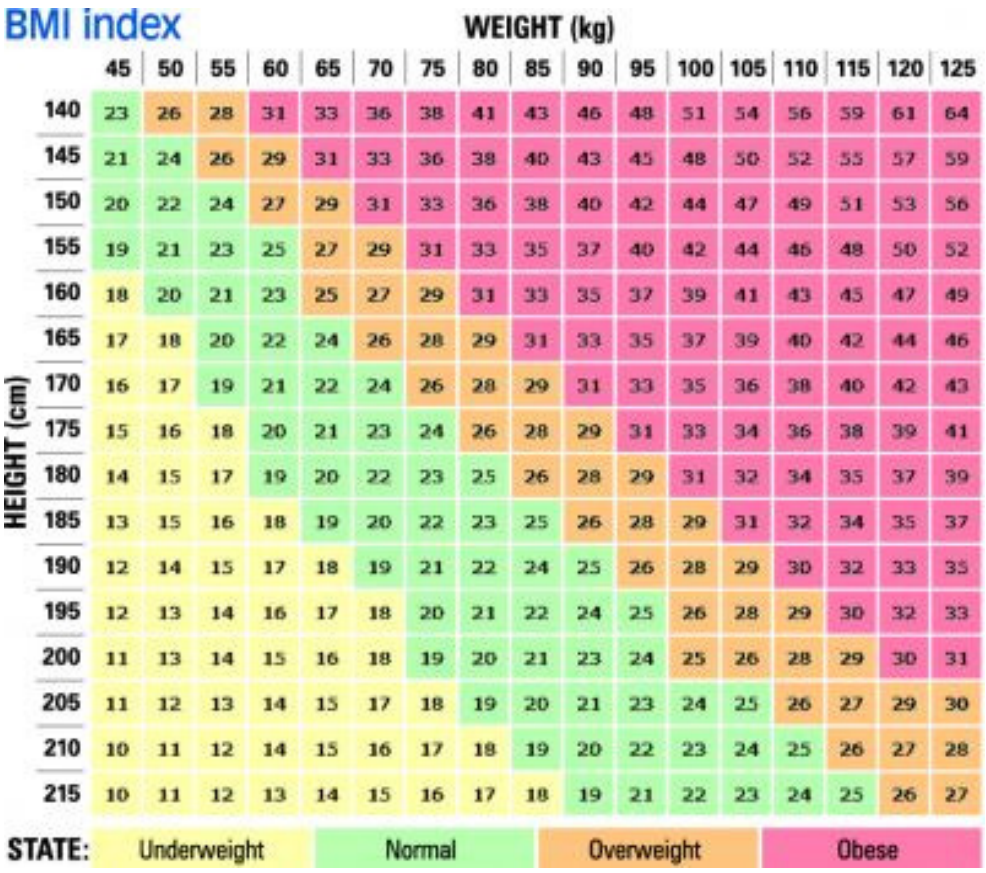

Figure 3. Body mass index (BMI) chart. (Otago Daily Times, n.d.)

The BMI uses four classifications as shown in Table 1. Of interest in obesity studies are the people who have a BMI between 25.00kg/m² and 29.99kg/m², as this classifies them as overweight, and the people who have a BMI, greater than or equal to 30kg/m², as these people are considered to be obese (World Health Organization, n.d. b). The classification of obese (BMI ≥ 30.00) is separated into the classes 1, 2 and 3, with class 3 (Table 1) used to indicate the people who are considered to be at the highest risk of suffering from serious illness and/or debilitating conditions that are related to obesity.

Table 1.

Principal BMI cut-off points for adults aged 18 years and over

New Zealand classification	BMI value (kg/m^2)	Risk of health conditions
Underweight	< 18.50	Low risk
Normal range	18.50–24.99	Average risk
Overweight	25.00–29.99	Increased risk
Obese	≥ 30.00	Substantially increased risk
Obese (class I)	30.00–34.99	Moderate risk
Obese (class II)	35.00–39.99	Severe risk
Obese (class III)	≥ 40.00	Very severe risk

(Adapted from New Zealand Ministry of Health, 2008)

In spite of concerns raised by some researchers about the validity of the BMI, it is still widely used in population studies. It was described by Meeuwsen, Horgan, and Elia (2010) as "the most commonly used indicator of proportion of body fat"

(p. 1) and is the tool recommended by the World Health Organization (WHO, 2006) to examine the rates of obesity in different populations internationally. The BMI is also the tool used by the New Zealand Ministry of Health (2008) to estimate obesity. In any research there are always considerations in relation to the measurement of the dependent variable, and due to its frequency of use it would be a reasonable expectation that the BMI is an accurate tool for measuring the variable of interest, the amount of body fat (or 'adipose tissue') an individual has. Despite the ubiquitous nature of the BMI in research and its adoption by the WHO, there are concerns in relation to its use. One of the more common issues raised relates to the accuracy of the BMI when it is used to measure the rates of adiposity in groups who have higher proportions of muscle mass and skeletal mass (Freedman & Sherry, 2009). Furthermore it has also been found that the accuracy of the BMI can vary across age, gender and ethnicity (Kennedy, Shea & Sun, 2009, Deurenberg & Deurenberg-Yap 2003). These reservations are not the result of recent research: Dietz and Robinson (1998) cited studies that had identified concerns due to these variables. Despite this the BMI continues to be the measure used both in New Zealand and by the World Health Organization to monitor the rates of obesity.

One of the identified problems when using the BMI is that there may be physical differences between people of various ethnicities and this may result in some people being misclassified as obese or not (Deurenberg & Deurenberg-Yapp, 2003). To address this issue some researchers have recommended that cross ethnic population studies be carried out and adjustments of the BMI be made, so that the cut-off points are ethnically specific (Deurenberg-Yapp & Deurenberg, 2003). In New Zealand, the National Heart Foundation (2005), supports adjusting the BMI to allow for physical differences based on ethnicity. This is highlighted in their assessment

guide which recommends a BMI of ≥ 32 as opposed to a BMI of ≥ 30 for Māori or Pacific Island people. The basis for this consideration are the physical differences in body composition of New Zealanders and in particular the differences between people of Pacific Island and European descent. Another issue identified by researchers when using the BMI to measure obesity is how the data are collected. Kuczmarski, Kuczmarski, and Najjar (2001) studied the effects of self-reports on the validity of the BMI. Their results indicated that when using self-report to assess an adult's BMI, practitioners and researchers should use caution as people tend to give inaccurate estimates of height and weight.

To examine the accuracy of the BMI in identifying the amount of body fat in individuals Okorodudu et al. (2010) conducted a systematic review and meta-analysis. The review assessed 25 studies of 32 samples from 12 different countries. The findings highlighted that the BMI had good specificity (on average 90%), but poor sensitivity (approximately 50%). This would indicate that using the BMI could lead to false negatives or the under recognition of obesity and a number of people who did have excess body fat may not be captured by the BMI. An example of this would be taller people with poor muscle tone and excess body fat. This research also indicates that use of the BMI could result in a number of false positives or people who are categorised as obese but have low body fat. False positives include people who weigh more, but where the weight is due to higher proportions of muscle rather than fat mass for example strength athletes, such as body builders. But with good specificity the BMI was found to be a highly accurate measure for people who were classified as obese. Okorodudu et al. (2010) therefore concluded that the BMI was a valuable tool in population studies but cautioned that it should not be the only tool used when screening individuals for obesity.

An often reported and accepted, limitation of the BMI is that it is seen as an overall measure of obesity and not of adiposity distribution. The ability to assess where fat tissue is stored on the body might be considered more relevant than an overall estimation of the amount of adipose tissue when assessing an individual's health. This is highlighted in men where high levels of adiposity around the abdomen indicates that an individual is at a higher risk of experiencing obesity-related diseases (Kuczmarski, 2007). The continued use of the BMI, in spite of the concerns raised by some researchers, is explained in comments by the World Health Organization, who state that the BMI is "the most useful population measure" but also that it should only be used as a "rough guide" (WHO, 2006, ¶2) as it may not account for differences between individuals. The reasons for its widespread use are probably related to the BMI only requiring a height and weight measurement, and therefore it is considered to be a simple, noninvasive and inexpensive tool for measuring body fat when compared to other screening tools (Daniels, 2009). Research also suggests that the BMI is a valid tool, but should be used with caution when comparing people of differing ethnicity, gender and age (Dietz & Belizzi, 1999; Pietrobelli et al., 1998), and despite concerns about its accuracy for individuals the use of the BMI as a screening tool is supported in the research (Kuczmarski, 2007; Orzano & Scott, 2004).

1.5.3 Waist Circumference and Waist-to-Hip Ratio

The waist circumference is also used in the assessment of obesity, the advantage of using this measurement is that it can assist in identifying the areas with higher levels of adiposity in particular the amount of abdominal fat. On this basis the waist circumference measurement is regarded as a necessary addition when

conducting a full assessment that would follow an initial screening using the BMI. This is reflected in the treatment guidelines published by the (US) National Institutes of Health (1998) that state the gender-specified waist circumference measurement is important when an individual has a BMI of 25.00 – 34.99.

The BMI, and the waist circumference are both inexpensive and simple techniques for measuring obesity; however, there are some drawbacks with the waist circumference when compared to the BMI. For example, specific training is required in order to accurately use the waist circumference measurement (Freedman et al., 2010). There is also the possibility of participant discomfort and embarrassment as accurate measurement requires the removal or lifting up of clothing, and at times the slight lowering of underwear. This was highlighted by Wills and Bhopal (2009) when describing ethical considerations in their research. They also highlighted the importance of taking the measurements on bare skin, which could be considered necessary based on their finding that light clothing can make a clinically significant difference to measurements. As with other measures like the skinfold test, there can be some issues with the use of waist measurement as it requires identification of specific locations on the body and incorrect identification of these points will lead to inaccurate results and misclassification of individuals.

The waist circumference is also used in other calculations such as the waist-to-hip ratio. The waist-to-hip ratio is the circumference of the waist divided by the circumference of the hips (American College of Sports Medicine, 2006). As with other anthropometric measures like the BMI, results are then assessed against population based norms to assess obesity. To calculate the waist-to-hip ratio, the circumference of the hips is divided by the circumference of the waist. The American College of Sports Medicine testing guidelines (2006) state that health risks increase

with increases in waist-to-hip ratio (p. 59). As with the simple waist circumference the advantage of this measure is its assessment of adiposity around the abdomen and vital organs, as opposed to total body fat.

Although the assessment of the waist circumference is recommended following an initial screen using the BMI, there is research indicating that the BMI may be as accurate as waist circumference at identifying individuals who are obese and at an increased risk of experiencing related health complications (Aslam et al., 2009). Using a sample of 1391 Thai adults, Pangiagua et al. (2008) compared the accuracy of the BMI at identifying cardiovascular disease risk factors with other anthropometric measures including the waist circumference. They found that the BMI had predictive validity as it performed at least as well as the waist-to-hip ratio, waist-to-height ratio and percent body fat at identifying people at risk of developing cardiovascular disease.

1.5.4 Skinfold tests

Skinfold tests are also anthropometric measures that could be used as an alternative to the BMI. Skinfold tests involve the use of skin callipers to test the levels of adiposity at specified locations on the body. One of the biggest drawbacks is that they are prone to measurement errors. The test requires the separation of the adipose tissue from the muscle, the difference between which can be difficult to separate and equally difficult to distinguish. The American College of Sports Medicine testing guidelines (2006) require repeated measurements to be taken at up to seven different specified sites and recommend repeated measurements if retests are not within 1-2 mm of each other. In a study by Freedman et al. (2010), testers using callipers were required to take three measurements, which needed to be within 1mm of each other.

Other measurement errors that can lead to misclassification include the use of untrained or inexperienced testers and the need to make sure that callipers are calibrated before testing. Aside from the potential for measurement error there are also issues relating to the potential discomfort that the participant experiences. Skinfold callipers can cause an uncomfortable pinching sensation and as with the waist circumference participants are required to remove clothing which has the potential to make people feel uncomfortable or embarrassed. It cannot be ignored that this is an intrusive test and that even if all of the factors outlined are controlled for, this test is based on an assumption that the layer of subcutaneous fat is indicative of the fat stored elsewhere in the body and, as with the BMI, still only provides an estimation of the percentage of body fat. There is also research that indicates that the BMI is as accurate as skinfold tests. Freedman et al. (2010) compared the BMI with tricep and subscapular skinfold thickness tests using data from 4911 participants who were part of the Bogalusa heart study in the US. They found that the BMI was at least as strongly related to cardiovascular risk factors as the skinfold tests. Research has also indicated that accuracy may not be improved by using this measure instead of the BMI. When considering the factors outlined above the BMI could be viewed as a more desirable measure it is a less invasive technique, it will cause less discomfort, it is less likely to be effected by operator or measurement error and has been found to be at least as accurate as skinfold tests.

1.5.5 Bioelectrical impedance

The methods discussed until this point have required researchers to make estimates of adiposity based on surface measurements. Advances in technology have lead to the development of measures that attempt to estimate the levels of adipose

tissue more directly. It is important to recognise that these measures are still only estimates and as such may not provide an improvement over measures such as the BMI.

Bioelectrical impedance analysis (BIA) utilises an electrical current running between two electrodes placed at specific points on the body to estimate levels of adipose tissue. BIA is based on the assumption that 73% of the body is made up of water (Lee & Gallagher, 2008) and to estimate the level of adipose tissue it measures the time that the current takes to travel through from one electrode to the other. It is regarded as a quick and simple tool (Norgan, 2005), in some cases it can be as simple as standing barefoot on a set of scales that are actually made up of two separate plates.

As with the other measures discussed, analysis using BIA is still simply an estimate based on other measures such as height and weight (Norgan, 2005) and as such may not be any more accurate at measuring the levels of adipose tissue. Similar to other measures that use newer technology such as the DEXA, there have been concerns with the reliability of BIA. Specifically different machines can give different estimations of obesity (Norgan, 2005). It is also possible for a machine to produce varying estimations for one individual over the course of a day. This is because the BIA cannot account for variations in the amount of fluid retained by an individual at any given point. For example false positives can occur if a person is dehydrated. This suggests that over the course of a single day the estimation of the levels of adipose tissue for an individual could change. For this reason some manufacturers have a standardised testing procedure that includes fasting and limiting alcohol (Norgan, 2005). Although these may increase the reliability of the measure it also reduces its usefulness particularly if it was to be used in a population study.

1.5.6 MRI and DEXA

To date two of the most accurate measures of obesity currently in use are the Dual energy x-ray absorptiometry (DEXA) and Magnetic Resonance Imaging (MRI). The DEXA is more commonly used to assess the deterioration of bone due to diseases and growth disorders such as osteoporosis (Lee & Gallagher, 2009). Due to the way DEXA assesses these diseases it has also been found as an accurate way to measure body composition using a three component model: bone mineral, fat free mass and fat mass. DEXA can be used to assess the whole body, but it can also be used to assess the specific composition of a particular area of the body, such as limbs and the abdomen. The scan takes between 10 to 20 minutes to complete and requires the person to lie still while a scanner passes over them (Laskey & Phil, 1996, Norgan, 2005). DEXA has been described as one of the most accurate measures available (Flegal et al., 2009) but it has not yet replaced the BMI as the method of choice for assessing the rates of obesity within populations. The main drawback with measures such as magnetic resonance is the availability and the expense; this argument is supported by Heymsfield (2008), who also suggested that they are usually only available in hospitals, and further, the use of the equipment and analysis of results would generally require a multidisciplinary team at considerable expense.

Researchers have expressed reservations in relation to use of this technology in obesity research. Laskey and Phil (1996) reviewed the available research on DEXA. They concluded that DEXA could not be used as the gold standard for measuring obesity. As has been the case with the BIA, they reported that scanners from different manufacturers did not give the same results. They also highlighted that there were differences in the reference data provided by the manufactures and this could lead to different or inaccurate diagnoses being made. Similarly, 10 years later

Norgan (2005), suggested that DEXA was still relatively new technology, and that there had been "frequent software upgrades requiring re-analysis of data". Other identified concerns about DEXA included a lack of industry standard for calibration and the inability to compare results produced by scanners from different manufacturers. Another potential drawback is that the amount of error increases with trunk thickness (Lee & Gallagher, 2008) and accuracy decreases as the amount of limb fat increases (Scherzer et al., 2008). This indicates that the DEXA becomes less accurate with the variable of interest, increasing levels of adiposity. There are also limitations in its use when people are extremely obese as they may not fit in the machine. Genton et al. (2006) found that 40% of the women that they classified as obese were too large for the scanning table.

For the reasons outlined in the research above and specifically the lack of availability of MRI and DEXA technology, at this point its usefulness in population studies is limited, particularly if researchers are aiming to compare their findings to international data.

1.5.7 Summary of measurement techniques

As stated above, the BMI has been widely used to assess the rates of obesity in population studies. The use of the BMI has remained consistent in obesity research despite reservations that have been highlighted in some research about its accuracy as an assessment tool for individuals and in population studies. There is research that questions the use of the BMI, much of this relates to the inability of the BMI to distinguish between lean muscle and adipose tissue, and whether or not the BMI should be adjusted for different populations. However, it appears that many of the concerns highlighted in the research including those relating to measurement error are

relevant to all of the alternative techniques. Comparatively the BMI, is simple to use, is an inexpensive screening tool, has good specificity and readily allows comparison with previous studies, that the BMI continues to be used in population studies. On this basis the BMI was selected for the current study.

Current study

Archival data on 141 individuals aged 18 to 74 years, diagnosed with an intellectual disability was accessed. The data were drawn from a database that holds information relating to the health status of individuals currently receiving services from an intellectual disability service provider in the Otago and Southland regions of New Zealand. It was predicted that the prevalence of obesity would follow international trends with higher rates of obesity found in populations of adults who have an intellectual disability. It was hoped that the findings would provide support for further investigations into the reasons for the differences in the rates of obesity found when comparing adults (25 years to 74 years) who have an intellectual disability with adults in the general population.

Hypothesis 1;

It was anticipated that the rates of obesity would be higher in adults with an intellectual disability (aged 25 to 74 years) when compared to the New Zealand general population.

Previous research has reported higher rates of obesity in women who have an intellectual disability. In New Zealand women aged between 55 and 64 years have the highest rate of obesity (35.9%). Data relating to gender were collected and analyzed using previous research on the general population of New Zealand.

Hypothesis 2;

It was hypothesized that the rates of obesity would be higher for women with an intellectual disability, with those aged 55 years and older having the highest rates of obesity, when compared to women in the general population of New Zealand.

Orzano and Scott, (2004) suggested that obesity should be evaluated as a lifelong condition and research in New Zealand has indicated that the prevalence of obesity increases with age (New Zealand Ministry of Health, 2008). On this basis the ages of the people in the sample were collected to enable a comparison with the rates of obesity in each of the age bands reported by the New Zealand Ministry of Health.

Hypothesis 3;

It was predicted that the rates of obesity among adults with an intellectual disability, in each age band, would be higher than those estimated for the general population.

Based on the AAMR (2002) guidelines, a diagnosis of intellectual disability should identify any deficits that an individual has and, following this, a plan should be implemented to specifically target these areas. Based on this diagnosis higher levels of staff support should increase an individual's opportunities to access and apply important health-related information and resources. Therefore, people who receive higher levels of staff support should have lower levels of obesity when compared to people who receive lower levels of support.

Hypothesis 4;

It was anticipated that the prevalence of obesity would be lower among adults with an intellectual disability who received higher levels of staff support (> 5 hours), compared to those who received less than 5 hours of support per week.

Method

2.1 Design of the study

A population-based retrospective cohort study was carried out in order to compare the rates of obesity in a sample of adults who have been diagnosed with an intellectual disability with the rates obesity reported for the general population of New Zealand.

2.2 Demographics of the local population

The present study was conducted using data from an intellectual disability service provider in the Otago and Southland provinces, located at the south end of the South Island in New Zealand. Most of the people supported by the service provider live in one of the two main urban centres, Dunedin and Invercargill. Population data for the two centres from the 2006 census (Statistics New Zealand, 2006) are shown in Table 2. In 2006 Otago's population was 193,803. With 4.8 percent of the population Otago is the seventh largest of the sixteen regions in New Zealand. With a population of 90,873 Southland is ranked as the 11th largest region in New Zealand.

Table 2.

Total population of Otago, Southland and New Zealand in 2006.

	Otago	Southland	New Zealand
Males	94,734	45,171	1,965,618
Females	99,069	45,702	2,062,329
Total population	193,803	90,873	4,027,947

When considering the ethnic make up of these two regions, both have similar proportions of people who identify as being of European or Pacific Island decent, as shown in Table 3. Compared to the rest of the nation these statistics indicate that there are higher proportions of New Zealand Europeans in these regions and lower proportions of people who identify with Pacific Island and Asian ethnicities. Otago also has a lower proportion of people who identify as Māori (6.6%), whereas the proportion of those who identify as Māori, living in Southland (11.6%) is closer to the national average (14.6%; Statistics New Zealand, 2006).

Table 3.

Percentage of ethnic groups in Otago, Southland and New Zealand in 2006.

	Otago	Southland	New Zealand
New Zealand European	79.6%	78.6%	67.6%
Māori	6.6%	11.8%	14.6%
Pacific Islanders	3.4%	3.3 %	6.9%
Asian	8.2%	2.6 %	9.2%
Other	2.2%	3.7%	1.7%

2.3 Description of the Service provider and the participants

An intellectual disability service provider that supports 141 adults in the Otago and Southland area of the South Island of New Zealand was approached. The service

provider agreed to our use of anonymous participant data that was held in database of health-related information. All of the adults receiving services had previously been referred to the service provider by a needs assessment agency and, as such had been assessed as having an intellectual disability. All services that the clients received from this organisation were community-based, with people typically living in rented accommodation. The level of staff support provided ranged from one to one support 24 hours a day, to less than 5 hours of support a week. The type of support was determined by the needs of the individual as assessed by the local needs assessment agency. The services range from helping some individuals with their budgeting and problem solving to helping others with aspects of their primary care. The service provider differentiates the service description by hours of support.

Independent Living (< 5 hrs per week)

People supported in this type of service live in their own accommodation in the community. Typically people live in flats by themselves, or with others, but some individuals still live with family. They are visited by support staff at a time and location of their choice. The funding level for individuals supported in this service is generally set at less than 5 hours per week. The level of support is flexible and can vary depending on the needs of the individual in any given week. The most common goals of support are related to budgeting, gaining employment and problem solving.

Supported Living (5 - 24hrs a day)

People supported in this type of service have greater levels of staff involvement. There is usually a staff bedroom/office in the flat with staff who sleep on the premises. The level of staff support depends on the needs of the individuals.

Generally there is more staff involvement in day-to-day decision making. Often budgeting is managed with dual authority on bank accounts that require the signatures of both the individual and the support staff. The supported living services can be divided by two broad definitions. Firstly individuals who have a severe to profound level of disability and require support in most aspects of their lives including personal care. The second type of service is for people who have a history of (or increased risk of) exhibiting behaviours that are challenging. This group also includes people who usually live relatively autonomously but have been charged with committing an offence and therefore have come under the supervision of the courts.

2.4 Access to health checks

The intellectual disability service provider does not provide specialist health services such as nurses and doctors but will encourage and support people to access these resources in the community as necessary. To assist in this process the organisation uses the *Ok Health Check* (Mathews, 2003), a health screening tool. As the screening tool is quite comprehensive, some doctors prefer the support staff to complete as much of the screen as possible, with the client, before scheduling an appointment. Often this involves answering basic questions around health-related behaviours. The *Ok Health Check* assists staff and clients in identifying health-related issues that may need attention and in developing plans to address these issues. The tool is comprehensive and covers many aspects of an individual's health. The information collected through these checks is entered into a database. The database allows staff to track progress, alerts staff that items need to be reviewed, and contains formulas that highlight risk factors. One such formula calculates the individual's BMI, and, as such, indicates whether or not there needs to be further investigation into

the person's weight. It is important to recognise that this is only used as a screening tool that highlights the potential need for further investigation and is not used as the sole basis for an intervention.

2.5 Procedure

Following ethical approval from the University of Otago, and written consent from the service provider, the specific anonymous data required to calculate each individual's BMI, their level of staff support, age and gender was made available to the author. For the purposes of this study it was determined that, to be relevant, all of the data needed to have been updated within the past six months. The database was reviewed and in situations where an individual's data had not been updated in the last six months or was incomplete, the individual was contacted by the agency and offered the opportunity to have their health assessment updated. In total, data on 141 adults with an intellectual disability were initially drawn from the database. After updating the age, height and weight data there were complete records for 101 individuals. As the service provider only supports people over the age of 18 it was not possible to make a direct comparison with the data for people between 15 and 25 years published by the New Zealand Ministry of Health (2008). To address this, data for three individuals aged below 25 years of age were excluded, leaving a sample of 98 individuals with complete data, which equates to 69.50% of the original sample.

To test whether or not the selected sample of 98 people was representative of the original database of 141 people, the sample data were compared to the original database on the variables; age, gender, and hours of support, using *t* test and chi

square goodness of fit. All calculations were carried out using an online calculator (Lowry, 2009).

The proportion of men and women (34.69%) in the sample did not significantly differ from the proportion of men and women (30.43%) in the database ($\chi^2(1)$, $N = 98$) = 0.01, $p = .92$). When considering age as a factor potentially associated with inclusion in the sample, the age range for the sample was 25 to 68 years for men, and 25 to 67 years for women with the mean age of the sample being 42.50 years. There was not a significant difference between the mean age of the 98 people in the sample and the mean age of the 141 people in the database, $t(97)= 0.03$, $p= 0.97$.

The data were split into two categories which were defined by the pragmatic amount of support people received. The two categories used were: people who received more than 5 hours of staff support a week (supported living) and people who received less than 5 hours of staff support a week (independent living). There were 29 participants over the age of 25 who received more than five hours of support a week in the database of 141 clients, which equated to 22.66%. This was compared to the final sample of 98 participants, in which there were 26 people (26.53%) who were receiving more than 5 hours of support a week. Analysis using a chi square test indicated that the levels of support people in the sample received, were not significantly different $\chi^2 1$, $N =98) = 0.71$, $p = .40$) from the levels the people in the original database received.

In most cases, the data held in the database were collected by agency staff, including myself, or by the individual's doctor. Measurements of height taken by the service provider were made to the nearest centimeter using a measuring tape, with the individual standing, without shoes, against a wall. Weight was recorded in kilograms

(kg) and measured by service provider staff using digital scales (Weight Watchers, model WW34) or by comparable measures made by the individual's doctor.

2.6 Body Mass Index (BMI)

The BMI was selected due to its ease of use, and its relatively low expense in terms of time, training and equipment. A decision was made not to use an adjusted BMI that took into account differences in ethnicity, primarily because the protocols used for the New Zealand Health Survey in 2006 and 2007 did not use an adjusted BMI. In the protocols used for the survey a number of factors were presented by Turley (2008) as justification for this, including recommendations from the World Health Organization (2006) which state that the measure is used to identify population subgroups and not an individual's level of adiposity. Based on this, the data in the present study were not adjusted as this allows it to be more readily compared with other research, both in New Zealand and internationally. The ability to compare the results with previous, current and future research was also a major consideration. Of most relevance was the data reported by the New Zealand Ministry of Health (2008) which used the BMI to estimate the rates of obesity in New Zealand.

2.7 Data Analysis

The proportions of people with intellectual disability in each BMI classification were compared to those in the general population (New Zealand Ministry of Health, 2008). Chi square goodness of fit analyses were used to compare the data on the 98 people obtained from the database with the expected number, which was calculated using data reported for the general population in total and across the variables: age, gender, and hours of support.

Results

3.1Overall rate of obesity

The percentage of people from the sample in each of the BMI categories was calculated from the data, and are displayed in Figure 2.

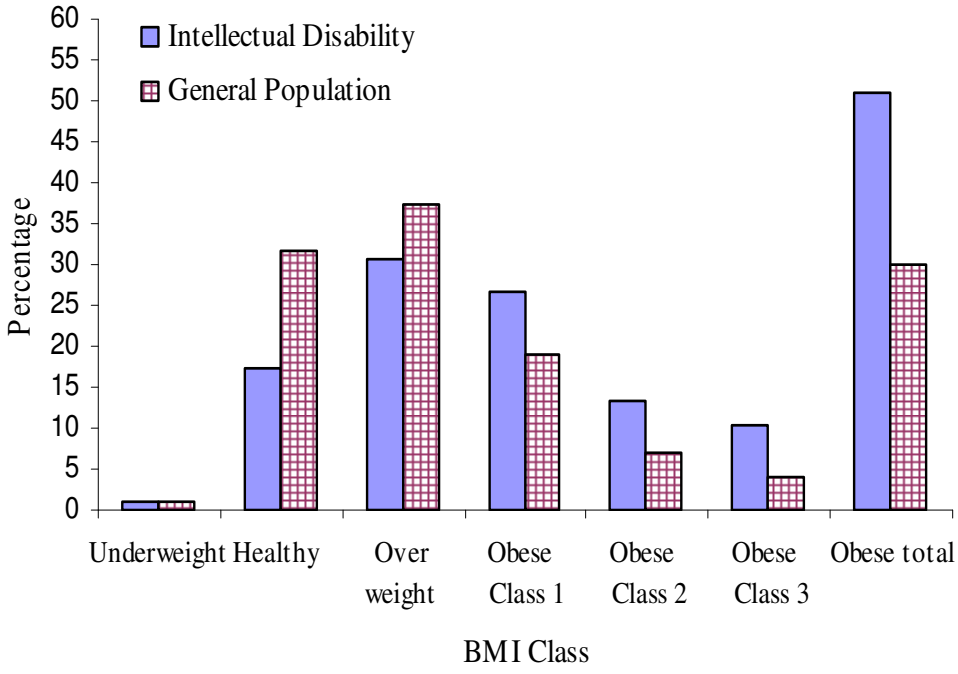

Figure 2. Estimated prevalence of obesity among adults in the general population (NZ) and adults who have an intellectual disability (ID) aged 25 years and over.

(Source: New Zealand Ministry of Health, 2008)

There was one person who was classified as underweight (1.02%). This was similar to the rate expected in the general population (0.9%). There were significantly more people in the general population who met the criteria for the normal weight range (31.7%) when compared to the present sample (17.35%). When considering all of the obesity classes (BMI ≥ 30) together, there were significantly more obese

individuals in the total sample (51.02%), compared to those reported for the general population by the New Zealand Ministry of Health (2008) (29.99%), $\chi^2(1, N = 98) = 19.74, p < .0001$.

Further analysis of the people who were rated as obese using, the World Health Organization (n.d. b) categories, class one, class two and class three, showed that there were significantly more people with an intellectual disability in each of the classes of obesity when compared to the general population. Of the 50 people rated as obese in the sample, 27 were classified as class one (BMI 30.00–34.99). This significantly differed from the expected number of people in the general population classified as class one, 18.67 (per 98 people) that was calculated using the reported proportion (New Zealand Ministry of Health, 2008) of men and women in the general population, $\chi^2(1, N = 98) = 4.05, p < .05$. Further analysis yielded similar results for class 2 obesity, with 13 people in the sample having a BMI of between 35 and 39.99, compared to an expected rate of 6.86 (per 98 people) in the general population, $\chi^2(1, N = 98) = 5.06, p < .05$. There were 10 people from the sample who met the criteria for class 3 obesity (BMI > 40.00). Again this was significantly greater than the rate calculated for the general population of 3.92 (per 98 people), $\chi^2(1, N = 98) = 8.42, p < .01$.

3.2 Results for Women

Analysis of the data for women who have an intellectual disability indicated that there were significantly fewer women in the sample who met the criteria for a normal weight (12.5%) when compared to the rates estimated for women in the general population (36.89%).

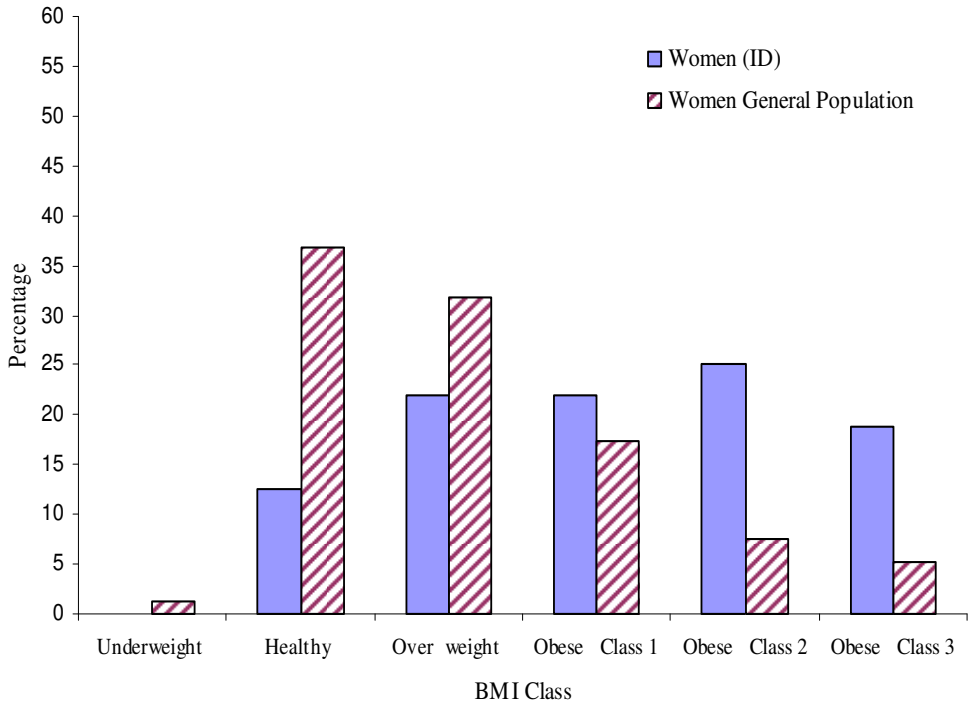

Figure 3. Estimated prevalence of obesity among women in the general population (NZ) and women who have an intellectual disability (ID), aged 25 years and over. (Source: New Zealand Ministry of Heath, 2008).

When considering all three obesity classes together (BMI ≥ 30) there were higher proportions of obese women, 65.63% versus 30.20% of women in the general population, $\chi^2(1, N = 32) = 17.41$, $p < .001$. Further analysis using the chi square goodness of fit test for each of the three classes of obesity indicated that there was not a significant difference between the proportion of women in the sample and proportion of women in the general population who met the criteria for class one obesity, $\chi^2(1, N = 32) = 0.19$, $p < .66$. As shown in Figure 3, the highest proportion of women in the sample met the criteria for class two obesity. This was also found to be

significantly higher than was expected based on the figures for women in the general population (7.55%), $\chi^2(1, N = 32) = 11.57$, $p < .001$. Similarly, the number of women from the sample who met the criteria for class three (18.75%) was significantly higher when compared to the expected rate from women in the general population of 5.30%, $\chi^2(1, N = 32) = 9.01$, $p < .003$.

3.3 Results for Men

Similarly the results for male participants with an intellectual disability were compared to the rates estimated for men in the general population. There was a significantly higher proportion of men with an intellectual disability who had a BMI of greater than 30. In total 43.94% of the male participants were classified as obese compared to 29.72% in the general population, $\chi^2(1, N = 66) = 5.72$, $p < .02$.

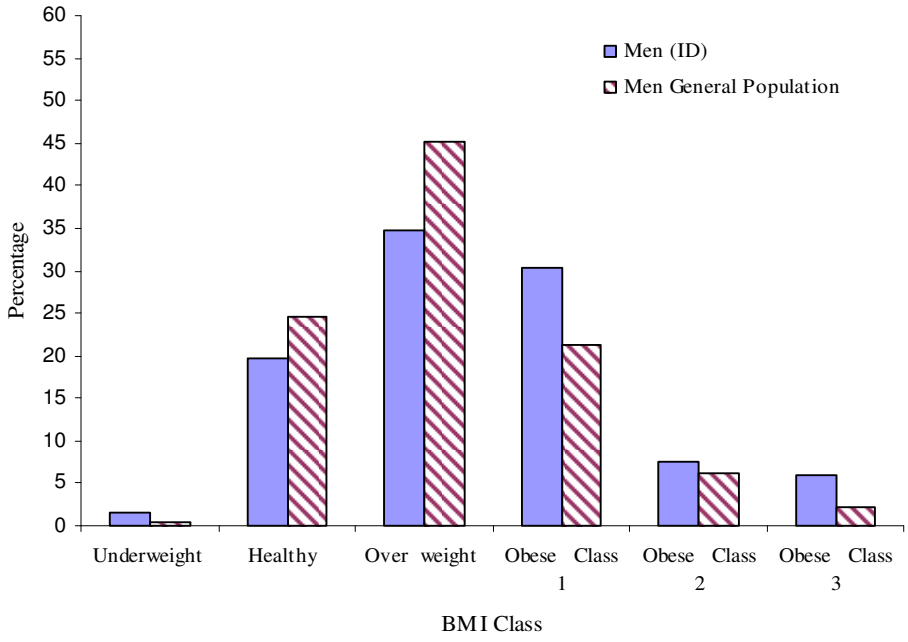

Figure 4. Estimated prevalence of obesity among men in the general population (NZ) and men who have an intellectual disability (ID), aged 25 years and over.

(Source: New Zealand Ministry of Heath, 2008).

Further analysis indicated that the differences were not in the same classes as those found in the women nor were they as marked. As shown in Figure 4, the highest rate of obesity for men was found in class one with 30.30%, $\chi^2(1, N = 66) = 2.64$, $p < .10$, as opposed to classes two and three for the women. The men were further differentiated from the women, because despite the significant difference in the total rate of obesity, there were no significant differences among the three obesity classes for men.

3.4 Rates of obesity for each age band

The rates of obesity were then compared across age categories and then by age and gender. In total 18 out of the 31 people (58.06%) aged between 25 years and 34 years were in the obese range. Analysis using a chi square goodness of fit test indicated that this was significantly higher than the rate expected in the general population for this age group (24.40%), $\chi^2(1, N = 31) = 17.26$, $p < .0001$. There were 30 people aged between 35 and 44 years, of these 11 were classified as obese (36.67%). Although in an absolute sense, this was higher than the rate in the general population (28.40%), it was not found to be significantly different. There were 21 people aged between 45 and 54 years in the sample, 11 were classified as obese (52.38%). This was not significantly more than the proportion expected in the general population (30.50%) but did approach significance, $\chi^2(1, N = 21) = 3.77$, $p < .053$. There were 14 people aged between 55 and 64 years, 9 were classified as obese (64.29%), which was not a significantly higher rate than that reported for this age group in the general population (35.90%) but did approach significance, $\chi^2(1, N = 14) = 3.74$, $p < .053$. There were only two people aged 65 years or above, one of whom

met the BMI criteria for obesity, so this category was not considered for further analysis.

3.5 Rates of obesity, age and gender

Using the variables age and gender produced 10 sets of data for comparison. The total number of adults who have an intellectual disability in each age band and the number expected from the general population statistics are displayed in Table 4. Due to the size of the samples three categories (women 45–54, men and women 65+) were not considered for comparison with the general population using chi square goodness of fit. Of the seven that were analysed, three categories were found to be significantly different from the general population.

Of the 31 people from the sample aged between 25–34 years, 22 were male and nine were female. Of the 22 men, 12 or 54.55% were classified as obese. This was significantly higher than the rate expected in the general population (22.20%), $\chi^2(1, N = 22) = 11.52$, $p < .001$. Of the nine women in this age band six were obese, this was also significantly more than the number reported in the general population (26.60%), $\chi^2(1, N = 9) = 5.49$, $p < .05$. In the 55–64 years age group there were eight women, seven of whom (87.50%) were classified as obese. This was also significantly higher than the rate reported for the general population (35.90%), $\chi^2(1, N = 8) = 7.15$, $p < .01$.

There were 18 men and 12 women aged between 35 and 44 years. The number of men (n = 6, 33.33%) and women (n = 5, 41.67%) who were rated as obese did not differ significantly from the rate for the men (29.90%) and women (26.9%) in the general population, in this age band. In the age band 45 to 54 years there were 19 men. Again there was no significant difference between the proportion of men

classified as obese in this age group, and the data reported for the general population. Due to the limited size of the samples, the data for the women aged 45 – 54 (n = 2) and for both the men (n = 1) and women (n = 1) aged 65 years and over were not compared to the expected values derived for the general population.

Table 4.

Proportion of males and females, who have an intellectual disability and in the general population (NZ) classified as obese, in each age band

	Age categories				
	25 – 34 years	35 – 44 years	45 – 54 years	55 – 64 years	65+ years
Male participants	54.55%*** (12/22)	33.33% (6/18)	47.37% (9/19)	33.33% (2/6)	0/1
NZ Men	22.2%	29.9%	30.8%	35.9%	29.9%
Female participants	66.67%* (6/9)	41.67% (5/12)	100% (2/2)	87.50%** (7/8)	100% (1/1)
NZ Women	26.6%	26.9%	30.2%	35.9%	35.7%

* $p < .05$, ** $p < .01$, *** $p < .001$

3.6 Hours of support

There were 72 participants in the sample who received less than five hours a week of staff support and 26 participants who had access to on site staff support 24 hours a day. Of the participants who received less than 5 hours of support a week, 35 (48.61%) participants were classified as obese and 23 (31.94%) were overweight as shown in Table 5. Of the 35 participants classified as obese, 18 were classified as class one, 10 were class two and seven met the criteria for class three. Of the seven participants who met the criteria for obesity class three, five people had a BMI greater than 45.

Table 5.

The proportion of adults who have an intellectual disability, who receive more or less than 5 hours of staff support per week, in each BMI class.

	Under-weight	Normal weight	Over-weight	Obese total	Class one	Class two	Class three
> 5 hours of staff support	0.00% 0/1	23.53% 4/17	23.33% 7/30	30.00% 15/50	33.33% 9/27	16.67% 2/12	36.36% 4/11
< 5 hours of staff support	100% 1/1	76.47% 13/17	76.67% 23/30	70.00% 35/50	66.67% 18/27	83.33% 10/12	63.37% 7/11

When considering the participants with higher levels of staff support (> 5 hours a week) 15 (57.69%) were obese and seven (26.92%) were overweight, see Figure 5. Of these participants, nine met the criteria for class one, two met the criteria for class two and the remaining four were in class three.

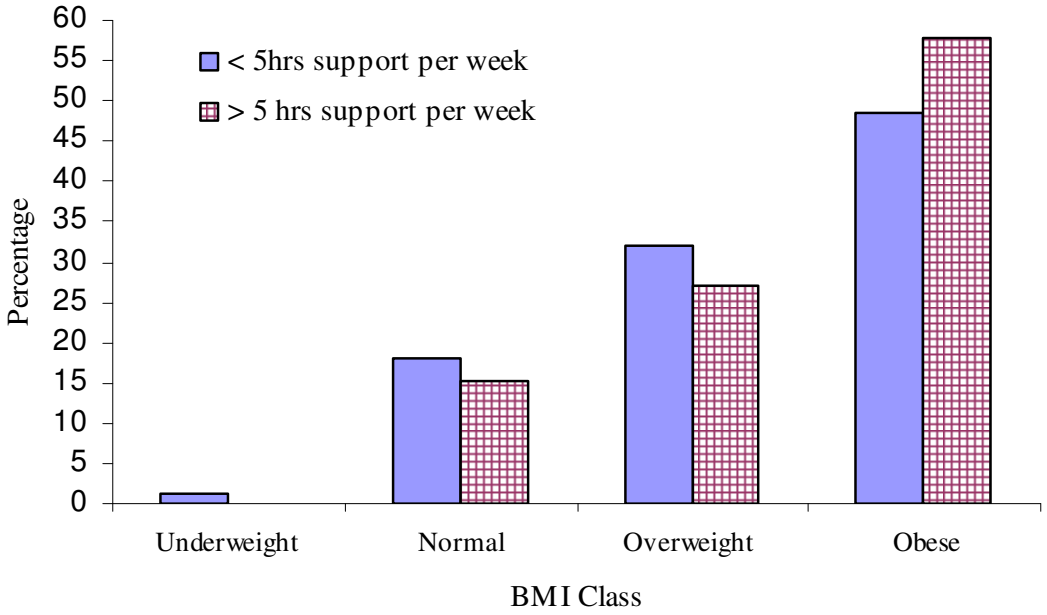

Figure 5. The level of staff support (< or > 5 hours per week) adults who have an intellectual disability receive in each of the BMI classes.

To assess the level of support as a factor, a chi square test was conducted on the proportion of people classified as obese in each group. This indicated that there was no significant difference between the proportion of people who were obese, who received less than five hours of support a week and those classified as obese who received more than five hours a week, $\chi^2(1, N = 98) = 2.94, p < .09$.

Discussion

4.1 Summary of findings

The present study involved the collection of anonymous data from 98 adults who had an intellectual disability. The data allowed the individuals' weight to be classified by BMI. The proportion of people in each BMI classification was then compared with the rates of obesity reported for the general population of New Zealand. Further analysis allowed comparisons with the general population on the variables age, and gender. The influence of staff support that an individual received on the rate of obesity was also investigated. The findings of the present study add support to the results of previous research conducted in other countries in which a disproportionate number of adults who have an intellectual disability have been found to meet the criteria for obesity (Draheim et al., 2007; Emerson, 2005; Marshall et al., 2002; McGuire et al., 2007; Moore et al., 2004; Melville et al., 2007; Merriman et al., 2005; Rimmer, 1995; Rimmer & Yamaki 2006; Robertson et al., 2000; Takeuchi, 1994; Yamaki, 2005). Further analysis highlighted that there were significantly more adults with an intellectual disability in all three of the BMI classes. Despite the finding of a higher overall rate of obesity for males and females who have an intellectual disability, the results indicated that the rates for men were not statistically different across the different BMI classes. However, when the results for women with an intellectual disability were compared to the women in the general population there were significant differences in Classes 2 and 3. When the participants were compared to the age- and sex-matched statistics for the general population both young males and females were over-represented, but with 87.50%, the largest difference was found in females aged 55 to 64 years. The rates of obesity for participants who received more than 5 hours of staff support each week were not significantly different to rates of

obesity estimated for the participants who received less than 5 hours of staff support each week.

4.2 Relationship between gender and obesity

Previous research on the general population of New Zealand indicated that the rates of obesity are higher for women than for men (New Zealand Ministry of Health 2008). Bhaumik et al. (2008) found that this bias was mirrored in populations of adults who have an intellectual disability living in the United Kingdom. This was also observed in the current study, with women in the present sample being found to be twice as likely to be obese as women in the general population. This significant difference was larger than that found for the male participants who were 1.5 times as likely to be obese when compared to the men in the general population. Due to the elevated level of risk of health complications associated with higher levels of adipose tissue the finding that there were a disproportionate number of women who have an intellectual disability in obesity classes two and three would provide justification for an intervention that specifically targets women with an intellectual disability, rather than individuals who are obese in general.

4.3 Relationship between of age and obesity

There were higher rates of obesity in both male and female participants who have an intellectual disability, aged between 25 years and 34 years and women who have an intellectual disability, aged 55 years 64 years. The data for the 25–34 year age group is more useful when compared to the trends reported for the general population of New Zeaaland. Obesity has been shown to increase across the lifespan (Lee et al., 2010), and this is evident in the data for the general population of New Zealand where

the rates of obesity increase with age until 65 years in men and 75 years in women (New Zealand Ministry of Health, 2008). Based on these trends it is probable that with a larger sample of adults who have an intellectual disability the findings would mirror the trends reported for the general population. Placed in a context where obesity is considered a lifelong condition (Orzano & Scott, 2004) and with the rates of obesity expected to increase with age, an appropriate group to target in an intervention would be people younger than 25 to 34 years.

4.4 Interaction of age and gender

From the analysis that was carried out, three of the seven sets of participant data, were found to be significantly different to the rates estimated for the general population. There were higher rates of obesity for both males and females in the youngest age band, (25–34 years) when compared to the general population. As with the trends reported for the general population, the highest rate of obesity was found in women who have an intellectual disability aged 55–64 years (87.5%). As stated due to the size of the sample it is not possible to look at the issue of obesity, by gender, across the life span. The results for men aged between 35 and 54 years, that were higher in an absolute sense, but not statistically significant, could reflect that obesity is a life long condition and it can rise and fall across an individual's lifespan (Orzano and Scott, 2004).

4.5 Level of support

To evaluate the influence of staff support, the sample was split into two categories, people who received less than five hours of staff support per week and those that received more than five hours of staff support per week. It was

hypothesized that the people who had higher levels of support (> 5 hours per week), would have lower levels of obesity when compared to the people receiving lower levels of staff support (< 5 hours per week). This would assume that any deficits in adaptive behaviours for example meal planning, choosing healthy options and community participation would be mediated by the presence of staff. The results did not support the hypothesis and indicated that the proportions of people who were classified as obese were not significantly different across the two levels of support (< 5hr or > 5hrs per week).

One explanation for this result could be drawn from the research by Rimmer and Yamaki (2006), who compared the rates of obesity found in adults who have an intellectual disability living in institutions or living in community-based settings. It is assumed that the institutions would have higher levels of expertise and support in relation to nutrition and health. On this basis it has been suggested that the higher rates of obesity in the community could be due to factors such as a lack of relevant staff training or the service provider may not being focused on health outcomes (Hamilton et al., 2007; Mcguire et al., 2007). If this was the case lower rates of obesity in the population who received higher levels of staff support would not be expected because the staff support would not be in a position to address the issue of obesity for this population.

Equally, it is possible that the service provider in the present study had a strong health focus, provided relevant resources and employed well trained staff. If this was the case autonomy could be the most relevant factor in the higher rates of obesity within this population (Rimmer et al., 1995). Specifically, the people receiving support could be choosing not to engage or accept support in relation to health and nutrition. The hypothesis assumed that people with less than five hours

support per week have higher levels of autonomy and, based on the research relating to the restrictiveness of the setting (Rimmer & Yamaki, 2006), this group was expected to have a higher rate of obesity when compared to the group of people who receive more intensive staff support (> 5 hours a week). The lack of difference between the two groups could be explained by high levels of autonomy experienced by the people receiving support and is reflected by the philosophy of the service provider, "supporting people to support themselves" (A. Higgins, personal communication, 6/6/2008). The service provider strongly advocates for the rights of the individual and the people receiving support are encouraged to exercise choice in all aspects of their lives, including what and when they eat and their levels of exercise. With a strong focus on autonomy, the level of staff support may not act as a protective factor in relation to obesity. Simply, the choice of the individual can override staff expertise and advice. Without any objective measures it is difficult to draw any meaningful conclusions in relation to the level of staff support and autonomy. These results do indicate that simply having access to higher levels of staff support is not a protective factor in relation to obesity.

4.6 Use of the BMI in the study

The BMI was found to be an effective and simple tool for estimating the rates of obesity. The BMI is widely used in obesity research including population studies and has been used in previous studies focusing on adults who have an intellectual disability (Draheim et al., 2007; Emerson, 2005; Hove, 2004; Moore et al., 2004; Melville et al., 2008; Merriman, et al., 2005; Rimmer, 1995; Robertson et al., 2000; Takeuchi, 1994). Because the BMI is the tool used by the New Zealand Ministry of Health (2008) and the World Health Organization (WHO, n.d. b) for comparing the

rates of obesity in populations across time and between countries, its use allowed comparison with current New Zealand general population data. This will allow the results of this study to be readily compared with future research both nationally and internationally.

An ethnically adjusted BMI categorisation was not chosen despite the reservations of some researchers like Deurenberg and Deurenberg-Yapp (2003), who suggested that due to the physical differences typical of specific ethnicities the BMI should be adjusted. In spite of this many population studies have not adjusted the BMI for people of different ethnicities and this includes the data published by the New Zealand Ministry of Health (2008) on the general population of New Zealand. As this was the data to be used for comparison in the study it was more appropriate to compare sets of unadjusted data.

One of the concerns with the BMI is that it not considered to be a good measure of fat distribution compared to other tools such as skinfold tests, DEXA or the MRI. Fat distribution could be considered to be an important variable as the location of body fat is a better indication of health risk than an estimate of overall obesity. However, DEXA and MRI are relatively new and as yet there are not large population studies using this technology so comparisons with other populations would not be possible. Further, on an individual basis, fat distribution would be an important consideration; however, when conducting a population study such as the current study, tools like skinfold tests would add unnecessary measurements and would not increase the accuracy of the results.

4.7 Interaction between intellectual disability and obesity

The people in this sample had been assessed using the DSM IV TR or AAMR criteria. There is not a direct causal relationship between obesity and the diagnosis of intellectual disability. The AAMR criteria include three separate elements for a diagnosis, the individual's age (> 18 years), their intelligence (IQ ≤ 70), and their adaptive functioning. Importantly this process considers areas of intellectual functioning that may increase the risk of becoming obese, specifically the individual's ability to function independently in areas such as such as meal preparation, budgeting and accessing community resources (AAMR, 2002). This assessment could provide important clues as to why there are higher than expected rates of obesity in this population. The ability to plan a meal and eat within nutritional guidelines requires a level of knowledge, awareness and a number of skills that many people who do not have an intellectual disability can find difficult. This would be especially difficult for a person with an intellectual disability where, by definition, the ability to apply, learn and adapt the necessary skills may be lower in comparison to others in the general population. The American Dietetic Association (Riper & Wallace, 2010) suggested that strategies for managing obesity in people who have an intellectual disability are to the same as those suggested for the general population. On this basis it could be beneficial to utilize more generic research as this may hold important clues for developing an effective weight loss intervention. Sharma (2007) reviewed 23 interventions carried out with adult populations (without intellectual disability) published between 2000 and 2006 and identified some potentially important factors, many of which mirrored those indicated by the New Zealand Ministry of Health for the general population. Some of the factors Sharma (2007) identified in developing an effective behavioural intervention included one-to-one sessions with trained educators

as opposed to group sessions. Effective interventions had simple goals such as managing energy intake decreasing the consumption of fats and carbonated drinks, and reducing people's portion sizes. They also found that increased exercise and consumption of fruit and vegetables were effective interventions.

The results of the present study indicate that there are a disproportionate number of New Zealand adults who have an intellectual disability and are overweight or obese. These findings can be used to compare the rates of obesity with future studies in New Zealand. This would assist in determining whether or not rates of obesity for this population are changing in New Zealand. An increase would indicate that there needs to be an increased focus on interventions specific to adults who have an intellectual disability. Conversely, a decrease in the rates might suggest that measures currently being applied for the general population are having an effect on this population. The current study could also be used to compare various regions and examine the rates of obesity across New Zealand. The study may also provide justification for research specific to adults who have an intellectual disability, into those at higher risk within this population and the potentially related factors. The results for gender indicate that women could be at particular risk especially when considering classes two and three. As people classified as class two and three obese are considered to be at higher risk of developing health complications (Ministry of Health, 2008), research exploring why there are differences between men and women is justified. Equally there is a need to investigate the variables that are associated with this higher obesity rate, as well as the factors that may mitigate obesity for women with intellectual disability. The available research indicates that levels of autonomy, deficits in adaptive behaviour and levels of staff knowledge are important variables and as such provide a good foundation for further research.

Related Factors

4.1.1 Levels of autonomy and the increased prevalence of obesity

In practice one of the outcomes of the assessment of adaptive behaviour skills should be a plan for support (AAMR, 2002). On this basis the level of support could be seen as a function of an individual's adaptive behaviour and it might be expected that autonomy generally increases as the level of support decreases. Using this model lower levels of support suggest that people have been assessed as having the basic adaptive behaviour skills required to live relatively independently and are also in a position to make their own informed choices in relation to their health and nutrition. This is supported by the AAMR (2002) who suggest that the development of services for an individual should be based on this assessment. In this context any deficits in adaptive behaviour should be addressed within the individual's support arrangement and considering health risks such as obesity, it could be assumed that support in relation to adaptive behaviour would be a protective factor. The results of the present study and previous research comparing the rates of obesity found in community-based settings and institutions, indicates that a key factor could be the levels of autonomy. For example, if there were very highly trained staff in community-based settings, it is possible that the rights based philosophies that underpin the services, or simply the rights of individuals to choose could negate any benefit of this support with regard to obesity. Rimmer and Yamaki (2006) summarised evidence that pointed to the influence of environmental factors, for example the restrictiveness of the setting. They suggested that moving away from institutions and into community-based settings has resulted in increased levels of choice and higher levels of autonomy, and that, combined with other factors such as a lack of knowledge around healthy eating, increases the potential for people to make unhealthy choices.

As stated earlier institutions are generally very controlled environments that function to counter deficits in adaptive behaviour skills. In these settings deficits in adaptive behaviour that are related to nutrition may be offset by the trained staff such as nurses, doctors and dieticians. The restrictive nature of institutions can also serve to limit the food intake of residents. On this basis the higher rates of obesity could be related to the higher levels of autonomy, or choice, that people experience in community-based settings. Specifically, adults who have an intellectual disability living in community-based settings are able to make choices that increase the probability that they will become obese. The influence of autonomy was also highlighted as a significant variable in the research by Yamaki and Rimmer, (2006) and was further supported in the literature by Hove (2004), who concluded that a reduced control of food intake could be an explanation for the higher rates of obesity. A clear example of this is the ability of people in community-based services to choose what and when they eat. In comparison, the people living in institutions may have less access to food in between meals (Rimmer et al., 1995). Community-based services generally reflect higher levels of autonomy and personal choice so even with well trained support staff, it is conceivable that the people receiving support may choose not to engage with a weight management plan. This could simply be because they want to eat foods that are unhealthy because they taste good. An obvious issue with autonomy are deficits in adaptive behaviour or specifically the ability of individuals with an intellectual disability to understand and make informed choices in relation to nutritional information (Rimmer, Rowland, & Yamaki, 2007).

4.1.2 Deficits in Adaptive behaviour

As described earlier, according to the AAMR (2002) criteria the diagnosis of intellectual disability is based on an assessment of an individual's adaptive behaviour or simply their ability to function independently in their environment. This includes a number of potentially related factors that may be contributing to the higher rates of obesity in this population. The increased prevalence of obesity could be related to deficits in intellectual functioning, where an individual's ability to learn and actively apply the necessary skills to manage important aspects of a balanced lifestyle such as nutrition, physical activity and access to health care are impaired. The New Zealand Ministry of Health (2003) has outlined a number of factors that it considers contribute to the growing rates of obesity in the general population. The factors that could be as important in a context of intellectual disability as they could be reflective of deficits in adaptive behaviour and include: sedentary lifestyles; little or no disposable income; lack of cooking skills; easier access to food outlets; larger portion or serving sizes and easier access to pre-prepared foods, which tend to be higher in fat, salt and sugar. The influence of the media was also considered a factor (New Zealand Ministry of Health, 2003). The relevance or impact of these may be greater in a context of intellectual disability where they could be considered to be reflective of deficits in adaptive behaviours. This assertion is supported by Kilgour, Starr, and Whalley (2010) who stated that an individual's intelligence impacts on their "concept of health, and can impact on their ability to plan and monitor health behaviours" (p. 100).

The ability to independently access and engage in community-based activities is seen as an important adaptive behaviour, and this is difficult for some people with an intellectual disability. An impaired ability to access or to engage with community-based activities could be directly related to how their disability manifests itself but,

for others, participation in groups or having access to activities within the community could be restricted by carers who could be focused on reducing perceived risk and consequently contribute to social isolation (Bhaumik, Watson, Thorp, Tyrer, & McGrother, 2008). Whether this is due to deficits in an individual's adaptive behaviour or due to issues within their support arrangement, limited access to the community maybe a factor that increases the risk of weight gain in this population. A logical inference would be that any weight gain can be attributed lower levels of physical activity or resulting sedentary lifestyle (New Zealand Ministry of Health, 2003), when compared to the general population. Although a difference in the levels of exercise may provide a valid explanation, it is a rather simplistic explanation and consideration should also be given to the behaviours that people engage in as an alternative to accessing community-based activities. A compounding factor could be that the time people in the general population spend engaging in physical activity is replaced with sedentary behaviours, and in particular eating, by adults who have an intellectual disability. This could be a default choice made by the individual or equally it could be by design. Carers could be using food to placate an individual who exhibits challenging behaviour or as a safe manageable alternative to a community-based activity because of a perceived risk (Bhaumik et al., 2008; Rimmer et al., 2007). It is also possible that people who have an intellectual disability and who are isolated from the community are choosing to use eating as a way of coping with the resulting psychological factors such as boredom, feelings of isolation, low self-esteem, stress or inappropriate ways of coping with stress like eating comfort foods (Takeuchi, 1994). Rather ironically and perhaps reflective of the marginalization of this population, Marshall et al. (2002) also suggest that that there is a lack of research that would justify the use of a health promotion scheme specifically targeting

individuals with an intellectual disability when the present research suggests that they may benefit from structured intervention led by their support staff.

4.1.3 Staff knowledge and engagement

Lower levels of staff knowledge and engagement in promoting a healthy lifestyle could negatively impact on the prevalence of obesity. The argument that staff knowledge is a factor in the increased prevalence of obesity was highlighted by Mcguire et al. (2007) who suggested that educating support staff would be an effective intervention. Issues of knowledge and staff training are difficult to conclude from the study by Rimmer et al. (1995) because they did not provide any information relating to the skills and knowledge of the staff in the community-based settings (group homes or with family). The authors hypothesised that the significant differences in the results from their study could be due to a reduced capacity of staff in community-based settings to assess and implement a programme that would address the individual's health needs. This hypothesis was also identified by Takeuchi (1994) who suggested that there could be a lack of knowledge and understanding on behalf of the support staff in community-based settings. The influence that support staff and carers have in lives of adults who have an intellectual disability was also emphasized by Hamilton et al. (2007) who, reviewed literature on weight management interventions and suggested that in many cases it appears that people who have an intellectual disability share their decision making with another person, for example a parent or paid support staff. On this basis at a very basic level, it could be assumed that people would be receiving some guidance in relation to nutrition and their health needs. In relation to this Marshall et al. (2002) commented that intellectual disability service providers need to make sure that people are able to make

choices based on knowing all of the potential benefits and drawbacks of their choices. Unfortunately, this does not appear to be happening, and research indicates that poor diets are consistent across settings and irrespective of the amount of support (Draheim et al., 2007), as found in the present study.

Comparing the rates of obesity found across the range of community-based settings could give an indication of the influence of staff knowledge. Lower rates of obesity in settings with high staff support such as group homes compared to higher rates for people who live quite independently could support the hypothesis that staff are a protective factor. Lower levels of obesity in environments with high staff support could reflect adequate levels of staff training and knowledge. Results from a study by Draheim et al. (2007), which examined this variable indicated that a higher level of staff support in the community may not be a protective factor. The authors assessed the dietary intake and using the BMI measured the levels of obesity in 325 individuals who had an intellectual disability, across a range of community-based settings. The sample was drawn from three types of residential setting: 1) group homes with 24 hour staffing, including night staff; 2) living with family; and 3) semi-independent services, which were simply defined as not a 24 hour service, with no night staff. They found that the rates of obesity were higher than in the general population with a range of 30% to 32% across the three types of settings. Their study also highlighted that the diets of the people living in these settings did not meet the recommended daily dietary intake. For example, in relation to consuming the recommended more than five portions of fruit and vegetables a day, there was a range of 0 to 4.4% in men and 0 to 6.6% of women across the residential settings of people consuming the recommended amount of fruit and vegetables. Draheim et al. (2007) also found that their diets were excessively high in fat content. They reported a range

of 71.6 to 85.6% of men and 70.1 to 79.2% of women across the residential settings, were exceeding the recommended percentage of fat in their diets each day. These findings suggest that it may not be the level of staff support that determines health outcomes in community-based settings.

Further evidence that staff knowledge and engagement is an important factor can be found in a study by Marshall et al. (2002). They used the BMI to assess the rates of obesity in 407 people diagnosed with an intellectual disability who either attended a day service or lived in a community-based residential facility in Northern Ireland. They found that 64% of the adults in the sample were overweight or obese. After three months the researchers completed follow up interviews with the 122 people who were identified as obese and found that interventions had been implemented for less than 34% of these people. That study again indicates that the rates of obesity for adults who have an intellectual disability who live in the community are high, irrespective of the level of support, and that the people living in these services are not eating balanced diets. The hypothesis that staff knowledge and training is an important variable in the higher rates of obesity in adults who have an intellectual disability is further supported by this research and is highlighted by the lack of interventions reported during follow up interviews (Marshall et al., 2002) but it does not prove it. It would have been strengthened if there were higher rates of obesity in the group homes with the highest levels of support (24 hour) as this would be comparable to the staffing ratio in an institution and any differences could have been related to factors such as lower levels of staff training. This research combined with the research on institutions does provide support for the hypothesis that autonomy is an important variable in the increased rates of obesity reported in adults who have an intellectual disability.

Considering the assertion of the American Dietetic Association (Riper & Wallace, 2010) that there is no difference between adults in the general population and adults who have an intellectual disability in the techniques required to manage weight, an impaired ability to access to health care and health promotion material may also be a contributing factor worthy of investigation. In a study of 945 adults who had an intellectual disability living in Glasgow (Scotland), Melville et al. (2008) suggested that there are significant barriers for people who have an intellectual disability when accessing "health and social services". This could be due to a number of factors, for example an inability to communicate with health professionals, difficulties in accurately reporting symptoms and/or previous negative experiences with health professionals. It could be argued that these barriers are reduced by the presence of support staff. However, this would depend on how well the support staff knew the individual and their ability to understand and objectively convey the relevant information. This was a consideration raised by Evenhuis, Henderson, Beange, Lennox, and Chicoine (2001) who also suggested that even in an ideal situation, with educated and knowledgeable staff, an assessment would be a time consuming process and that this is conflict with "healthcare productivity". Often there is also a financial cost that may deter people who have an intellectual disability, who generally have a limited income, from seeking medical help. Deficits in adaptive behaviour can could also limit an individual's ability to access health professionals and utilise health promotion material. In relation to this last variable a lack of resources aimed at educating people who have an intellectual disability on health issues has been identified. Marshall et al. (2002) suggest that although there are health promotion schemes, these are more suited to the general population rather than individuals with an intellectual disability.

Strengths of the study

4.2.1 Appropriateness of the measures

The appropriateness of the measure chosen to assess obesity (BMI) in this study was supported in the research. While there are some reservations about its use when assessing obesity on an individual level, the BMI has been found to be a valid tool when assessing obesity in large populations. Its use allowed direct comparison with the prevalence data for the general population of New Zealand. Furthermore it allows this study to be readily compared to previous and future research on adults who have an intellectual disability.

4.2.2 Reliability of the measure

The BMI is a simple and easy to use tool compared to other anthropometric measures. The measurements required for the BMI, height and weight, do not require specialist training and are easy to take. Many of the measurements held in the database were taken by the staff who were responsible for completing assessments using the *Ok* Health Check (Mathews, 2003). The same measuring tape and set of scales (Weight Watchers, WW34) were used by the staff when taking height and weight measurements during the health checks.

4.2.3 Representativeness of the sample

The sample in this study could be considered to be representative of adults who have an intellectual disability living in the Otago and Southland regions. The service provider is one of three organisations that support adults who have an intellectual disability in the Otago region and one of two in the Southland region. The service provider supports adults who have an intellectual disability in a variety of

ways, from people who have contact with support staff once a fortnight, to people who live in homes with intensive 24 hour staff support.

Limitations of the study

4.3.1 Representativeness of the sample

As outlined above, one of the strengths of the study is that the service provider covers two regions and provides a variety of services. Despite this a limitation of this study is that the sample was drawn from one service provider. This means that it may not be appropriate to make generalizations to the wider population of adults who have ID in New Zealand. As 73.5% of the sample received less than five hours support a week, this is a population that lives reasonably independently as opposed to group home settings.

4.3.2 Assessment of intellectual disability

The assessment of intellectual disability was based on the referral process. That is, to access the support services individuals needed to have previously been assessed as having an intellectual disability. For the purposes of this study the accuracy of these assessments was not checked, nor were re-assessments carried out. This was not seen as necessary as all of the data used in the study belonged to individuals who were currently receiving government funded services and as such it is assumed that they met the diagnostic criteria for intellectual disability. It is also important to recognise that, for funding purposes, each individuals needs are also re-assessed on an annual basis, during which questions relating to accuracy of assessment would be raised.

4.3.3 Hours of support – an imprecise variable

It is important to recognise that the "hours of support" is not presented as a precise measure. It is a crude measure that was based on the hours of staff support that people normally received. The number of hours of staff support does not indicate the goals of the programme or the focus of the staff support, for example budgeting, cooking, community involvement, and this information could not be drawn from the database. It is also possible that in any given week an individuals circumstances could change and the amount of support they receive would vary for that period. The data for people held on the database were divided into one of two categories, based on whether they received less than five hours of support a week or more than five hours of support a week. In relation to the people who received more than five hours a week this also indicates that they either had staff on site or had staff nearby. People in this group generally had higher levels of support available for meal planning and support available during meal preparation and it was expected that they would have lower levels of obesity when compared to people with less than 5 hours of staff support each week.

Suggestions for future research

The principal finding of this study is consistent with the results of international research: there are significantly higher rates of obesity among adults with ID than in the general population. This is concerning, given the current literature highlights that a number of serious physical and mental health conditions are highly correlated with obesity (Ebbeling et al., 2002; New Zealand Ministry of Health, 2008b; Puhl et al., 2008; Stevens et al.,1998; World Health Organization ,n.d. a). The findings of this study and the available research provide some directions for future research.

Currently, obesity is an area that is attracting a lot of attention globally; however, the population that this study focuses on is often marginalised and it would not be surprising if the issue of obesity in this population will be ignored or assumed to have been addressed using the same interventions developed for the general population. This could prove to be ineffective, if the variables behind the current rates of obesity were exactly the same for this population as in the general population, then the rates of obesity would not be significantly different. Therefore research should seek to isolate those factors such as autonomy, deficits in adaptive behaviour and staff knowledge, that make obesity more likely in this population. The American Dietetic Association (Riper & Wallace, 2010) suggested that the content of obesity-/health-related resources is no different for both the general population and adults who have an intellectual disability. From this position it is important to consider that adults who have an intellectual disability may not understand how to manage their weight or the health risks associated with obesity (Hamilton et al., 2007). On this basis future research should investigate how relevant health information can be conveyed in a way that is more accessible to adults with an intellectual disability.

When considering the composition of the diagnosis of intellectual disability, it appears that deficits in adaptive behaviour could be a key factor. The function of staff support is to reduce the impact of these deficits, future research could investigate the nature of support services and whether or not there is an emphasis placed on a healthy lifestyle. This could be achieved by on a number of levels, by reviewing contracts with the New Zealand Ministry of Health, policies and procedures of service providers to the training offered to staff engaged in supporting adults who have an intellectual disability, assessing the current levels of staff knowledge and the nature and quality of staff training. If this was found to be a relevant factor this could be

followed by research into the resources required for educating not only the support staff, but also the adults who have an intellectual disability on obesity.

One of the weaknesses of the study is that the sample is drawn from one service provider. Future studies should attempt to address this by utilizing samples that could be considered more representative of the target population. It would preferable if population data collected by the New Zealand Ministry of Health identified people who had an intellectual disability. Alternatively, future studies could contact a number of other service providers nationally and offer them the opportunity to participate. Broadening the sample would not only provide a more representative sample but may also serve to raise awareness of this issue across adults who have an intellectual disability, their families and the service providers. This may make it easier to explore the relevant variables and develop interventions that are specific to this population.

Conclusion

Despite the reservations of some researchers, using the BMI was found to be a simple inexpensive measure of obesity among New Zealanders with an intellectual disability in the present study. It was non invasive and caused no embarrassment or discomfort to participants. Importantly, its use allowed comparison with the relevant prevalence statistics for the general population of New Zealand and makes it possible for this research to be readily compared with past and future studies both nationally and internationally.

It is clear from the published research (Draheim et al., 2007; Emerson, 2005; Marshall et al., 2002; McGuire et al., 2007; Moore et al., 2004; Melville et al., 2007; Merriman et al., 2005; Rimmer, 1995; Rimmer & Yamaki 2006; Robertson et al.,

2000; Takeuchi, 1994; Yamaki, 2005), and from the present study that there are higher proportions of adults who have an intellectual disability, and who are also obese, when compared to the general population. Women who have an intellectual disability had the highest rates of obesity compared to men who have an intellectual disability and women in the general population.

To date, the reasons for the higher rates in this population have not been the subject of extensive research and as such, the relevant factors have not been clearly identified. It is also apparent that, as with the general population, there is no single answer, it is likely to be multi-factorial and the issue of obesity may need to be addressed on an individualized basis. It could be that some of the core aspects in the diagnosis of intellectual disability augment the multi-factorial model of obesity. Specifically, deficits in adaptive behaviour could serve to precipitate and perpetuate obesity. For each individual these could range from being isolated in the community, to not understanding how to plan and prepare healthy meals or regulate snacking. Research comparing the restrictiveness of environments, autonomy and choice appear to be relevant. Due to the high levels of autonomy found outside of institutions, obesity could a result of a person with an intellectual disability consistently making unhealthy lifestyle choices. With the strong emphasis service providers place on choice, obesity could be difficult to address in community-based settings. However, autonomy isn't simply being allowed to choose and the research cited earlier indicates that autonomy potentially increases an individuals health risks if they are not able to make informed decisions. Therefore service providers should be equally focused on ensuring they have provided adequate information and that it has been provided in a format that the individual can understand. Based on the present findings, it is also

important that there are adequate levels of staff knowledge, training and engagement (Hamilton et al. 2007).

It is hoped that the findings of this study will highlight the issue of obesity for service providers and or policy makers and that this could lead to staff being in a better position to support adults with an intellectual disability in a way that addresses any deficits in adaptive behaviour and potentially ameliorates the higher rates of obesity discovered in the present study.

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