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Sixth Form Students’
Attitudes toward
Obesity
in
Malta

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Supervisor’s Declaration

In my opinion, this dissertation is good enough to be awarded at least a PASS by the MSc Public Health Examining Board.

__________________________   _______________________
Date                     Dr. Julian Mamo
Declaration of Authenticity

I, the undersigned, declare that this dissertation, entitled 'Sixth Form Students' Attitudes toward Obesity in Malta', is my own original work and was carried out under the supervision of Dr. Julian Mamo, Head of Public Health Department, Faculty of Medicine and Surgery (Medical School), University of Malta.

__________________________________________  ____________________________
Date                                                  Dr. Daniel Cauchi
Abstract

The aim of this study is to assess Maltese adolescent sixth form students’ current attitudes towards overweight and obesity, and analyse the effect of actual weight status on perceived weight bias. This data will be compared to attitudes elicited twenty years ago in a cross sectional study of a similar student population, and discuss reasons for any observed change.

Data collection for this cross-sectional survey was conducted between January and April 2010 in a government, church, and independent sixth form institution. A validated tool – the Attitudes Toward Obese Persons questionnaire - was used to obtain a score measuring such attitudes. Body mass index values were also derived from self-reported height and weight. A number of statistical analyses were carried out to elicit differences in self-reported BMI and attitudes towards obesity between schools, by geographical region and socioeconomic status. Results were compared to unpublished survey data collected circa 1989 by Cacciotolo, Mamo and Stivala from Polytechnic (now Junior College) students.

Results showed that ATOP score is not related to BMI in Maltese adolescents. Nor is there a significant difference in either BMI or ATOP score between schools. However, maternal education and geographical region independently influence adolescents’ attitudes towards obese persons. A higher socioeconomic status as suggested by a higher level of maternal education is associated with more discriminatory attitudes
toward obesity, whereas living in the Southern Harbour area is associated with increased
tolerance compared to students originating from the Norther Harbour area.

Additionally, there has also been a change in attitudes over the past two decades:
a gradual mellowing of perceptions appears to have taken place. Notably, attitudes
toward career success and marriage seem to be less influenced than previously by
perceived self-weight status and that of long term partners respectively.

The study concludes that increasing overweight and obesity in adolescents over
the past two decades, together with their tendency towards normative behaviour, has
resulted in increased tolerance and acceptance of obesity. This effect is seen across all
strata of society, although maternal education appears to play a role in modulating these
attitudes. Recommendations are given together with suggestions for further research.
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Definitions

Districts

Southern Harbour – Żabbar, Xghajra, Valletta, Tarxien, Santa Lucija, Paola, Marsa, Luqa, Kalkara, Senglea, Floriana, Fgura, Cosipicua, Vittoriosa

Northern Harbour – Ta’ Xbiex, Swieqi, Sliema, Santa Venera, San Ġwann, San Ġiljan, Qormi, Pieta’, Pembroke, Msida, Ħamrun, Gżira, Birkirkara

South Eastern – Żurrieq, Žejtun, Safi, Qrendi, Mqabba, Marsaxlokk, Marsaskala, Kirkop, Gudja, Ghaxaq, Birzebbugia

Western – Żebbuġ, Siggiewi, Rabat, Mtarfa, Mdina, Lija, Iklīn, Dingli, Balzan, Attard

Northern – St. Paul’s Bay, Naxxar, Mosta, Mġarr, Mellieha, Gharghur
Chapter 1: Introduction

1.1 Background

Obesity is a complex, multifactorial chronic disease that develops from a combination of genetic and environmental components, involving the aggregation of social, behavioural, cultural, physiological, metabolic and genetic factors (Kopelman, Jebb et al. 2007; Selassie and Sinha). The rising trend in overweight and obesity is one of the great public health challenges of this century, being associated with increased morbidity and mortality amongst the general population, as well as increased health care costs (Gortmaker, Must et al. 1993; Calleja 2009).

The development of effective techniques to alter health behaviour in such a way as to prevent and manage this mostly preventable, global epidemic - particularly amongst vulnerable groups such as children and adolescents - has proven to be exceedingly difficult (Flynn, McNeil et al. 2006). Thus, in spite of consistent efforts by national governmental and international non-governmental institutions, over the last few decades it has become an increasingly prevalent problem in both developing and developed countries, particularly in urban settings (WHO 2000; Kelly, Yang et al. 2008; WHO 2010). Malta is no exception.

Defined as abnormal or excessive fat accumulation that may impair health (WHO definition), both prevalence and severity of overweight and obesity in children and adolescents have increased at a dramatic rate in many countries (Lobstein and Frelut
2003; Norton, Dollman et al. 2006; Ogden, Carroll et al. 2006). This is of particular concern because of possible long-term associations with adult weight status and associated morbidity. A 2008 review of the existing evidence by Singh et al. reported a consistent increased risk of ‘tracking’ – that is, overweight and obese youth becoming overweight adults, suggesting a moderate probability of persistence of overweight and associated problems (Deshmukh-Taskar, Nicklas et al. 2006; Singh, Mulder et al. 2008; Herman, Craig et al. 2009). In one 2005 study as many as 70% of obese adolescents grew up to become obese adults (Dehghan, Akhtar-Danesh et al. 2005).

The factors underlying excessive weight are dauntingly numerous. A shift in diet toward the consumption of high fat/high sugar foods rich in energy, with a concomitant trend toward a sedentary lifestyle involving decreased physical activity, has resulted in an energy imbalance between calories consumed and those expended. Genetics, prenatal influences and cultural contexts also play a role (Deckelbaum and Williams 2001). Additionally, obesogenic medication and maladaptive coping mechanisms to deal with daily stresses may contribute synergistically to weight gain (Selassie and Sinha 2011).

Physiologically, obesity is a consequence of an imbalance between energy intake and expenditure. In Western countries in particular - although the phenomenon is now also seen in developing countries - the abundance of cheap, highly palatable, energy-dense foods coincides with increasing automation and fewer opportunities for physical activity.
This imbalance is further compounded by evolutionary adaptations to conserve energy (Siervo, Wells et al. 2009) at the same time as technological advances require less physical activity to perform functions of daily living. Modern societies and lifestyles are seen as “obesogenic” environments: meaning that they lead to over-consumption of food and to widespread sedentary lifestyles, which increase the risk of obesity (Rubinstein and Caballero 2000; Tao and Glazer 2005). However, this historical change has not been accompanied by a general acceptance of obesity as an inevitable consequence of progress – the price to pay for our comforts. In the not too distant past, extra weight was a sign of wealth and thus desirable (Brewis 2011).

The World Health Organisation (WHO) regularly publishes research on the topic, and the most recent statistics speak for themselves. Worldwide obesity has more than doubled since 1980, with 1.5 billion adults over 20 being overweight in 2008. Of these, more than 200 million men and nearly 300 million women were obese. Within the WHO-European region, as well as other regions, more than 50% of women are overweight. As of 2010, about 43 million children under the age of five were overweight (WHO 2010).

The health and socio-economic implications are staggering. Overweight and obesity lead to serious health consequences, with risk increasing progressively as Body Mass Index (BMI – calculated as weight in kilograms divided by height in metres squared) increases. The WHO defines excess weight using values with corresponding national cut-off rates. A BMI equal to or greater than 25 generally signifies an overweight status, whereas a BMI equal to or greater than 30 signifies obesity. In the case of children and adolescents, the WHO Reference Child Growth Standards and Growth Charts are
used to take into account the changes that occur during normal physiological development. Children and adolescents with a BMI between the 85th and 94th percentiles of sex and age-specific national reference data are generally considered overweight, while those with a BMI at or above the 95th percentile of population are typically considered obese (WHO 1995).

Raised body mass index is a major risk factor for chronic diseases such as: cardiovascular disease, stroke, diabetes, musculoskeletal disorders such as osteoarthritis, and increased risk of certain cancers, including endometrial, breast, and colon cancer (Kenchaiah, Evans et al. 2002; WHO 2010). Other effects include orthopaedic problems, sleep apnea – which may lead to reduced attention and function in school – hypoventilation syndrome and menstrual irregularity (Deckelbaum and Williams 2001). Harmful metabolic and cardiovascular risk profiles tend to track from childhood into adult life, resulting in an elevated risk of ill health and premature mortality, which greatly increase the burden on existing health services (Krassas and Tzotzas 2004). In fact, children are now more frequently subject to many obesity-related health conditions that were once confined to adults (Lobstein, Baur et al. 2004; Deshmukh-Taskar, Nicklas et al. 2006; Johannsson, Arngrimsson et al. 2006).

The socio-economic aspects of morbidity and mortality associated with obesity are also of concern. Around 2.8 million people die annually as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the morbidity related to ischaemic heart disease, and between 7% - 41% of cancer morbidity is directly related to overweight and obesity, which are already responsible for 2-8% of health costs
and 10-13% of deaths in several countries. Approximately 2.5 millions deaths a year are attributable to excess body weight worldwide (WHO 2010). Last but not least, the psychological impact of excess weight should not be underestimated, with affected children and adolescents exhibiting mental disorders, underachievement in school and lower self esteem (Perrin, Boone-Heinonen et al.).

The economic burden of obesity on Maltese society is mostly due to increased healthcare costs to treat associated diseases (i.e. direct costs) and costs associated with lost productivity due to absenteeism from work and premature death (i.e. indirect costs). A 2008 exercise undertaken by the Department of Health Information and Research estimated the excess direct cost on the Maltese health service associated with overweight and obese individuals when compared normal weight individuals. Even when excluding expenses related to medication, surgery such as bariatric surgery, ancillary services and loss of income, this amounted to around 20 million euros per year, accounting for 5.7% of total health expenditure. This estimate increases to over 25 million euros when private healthcare costs are included (Calleja 2009).

Comparisons with other countries in the WHO Europe region show that Malta had one of the highest rates of obesity in Europe (Finucane, Stevens et al. 2011). However, the sample size in each country was rather small. No cohort studies on older Maltese adolescents exist. Instead, an inkling of current and future morbidity can presumably be gained from several studies on young children. Anthropometric data collected from the entire national cohort of 6 year old children gathered by Grech and Farrugia Sant Angelo in 2007 showed that 25.8% of boys and 27.8% of girls were overweight or obese,
according to International Obesity Task Force (IOTF) criteria. Using the same criteria, the cohort was followed up and measured again in 2008 and 2010, when aged 9 to 10 years. Unpublished results show that the total of overweight and obese children has increased to 44.4% in boys and 39.6% in girls (Grech 2010)

Another source of local data is the Health Behaviour in School Children (HBSC) study, which is a WHO initiative that regularly assesses the health and lifestyle of children aged 11, 13 and 15. The 2006 HBSC study was conducted in local schools taking a representative sample of eligible children. Based on self-reported height and weight, results showed high proportion of Maltese children to be overweight. Approximately 15% of 13-year olds are above the 95th weight percentile. The rates are generally higher than the previous findings in the same study carried out in 2002 (WHO 2008). The HBSC study was repeated in 2010, with no published results as yet. Of the 41 participating countries, Malta had the second highest proportion of obese or overweight children amongst 11 and 13 year olds, and the overall highest proportion of obese and overweight 15 year olds. In all three age groups, more than one quarter (28-31%) of children have a self-reported BMI that is greater than 25. IOTF data also shows that over 35% of children in the 7-11 year age group in Malta are overweight or obese. Another 2008 study on 6 -7 year olds found 26.1% of boys and 29.58% of girls to be overweight or obese according to the 2007 WHO Child Growth Standards (European Child Growth Surveillance Initiative (ECOSI) Malta 2008).

This worrying trend spills over into adulthood. Results for the Maltese adult population are available from the European Health Interview Surveys – Malta, conducted
Chapter 1: Introduction

by the Department of Health Information and Research (Asciak 2003; HIS 2008). The results of the 2002 survey were troubling: in the 16-19 year age group, 13.5% of males and 5.9% of females had a BMI ≥ 30kg/m². In the same age group, 35.7% of males and 17% of females had a BMI of ≥ 25kg/m² but ≤ 30kg/m² with the prevalence of obesity increasing with age (Asciak 2003). The 2008 study collected self-reported data from a sample of 5500 subjects stratified by age, gender and locality, taken from all the Maltese resident population aged 16 and over, with appropriate weighting. Around 22% of the population was found to be obese while a further 36% is overweight, bringing the total percentage of affected adults to approximately 58%.

When compared to EU-27 member states, Malta claims the dubious honour of the highest rate of obesity amongst males and the third highest rate amongst females. HIS results also demonstrated a higher male prevalence of obesity and overweight rate, with a substantially high proportion of 55 to 64 year olds being affected. In females the highest proportion of overweight is in the 45 to 54 age group, whereas the highest rate of obesity occurs in the 65 to 74 age group. An interesting and expected conclusion was that BMI decreases as educational level increases, although it is still in the overweight range in those with tertiary education: at 25.9 kg/m². This effect remains visible after adjusting for the possible confounders such as age and gender. In keeping with international trends, the discrepancy between genders has increased from 2002, as did the prevalence of obesity in the groups with the lowest educational level (HIS 2008).

To date, no attempts to identify any long term change in attitudes toward obesity within the Maltese context have been carried out. Whilst the implications and prevalence
of obesity in young, primary-school aged children on the Maltese islands have been rather extensively researched (Grech 2006; Grech and Farrugia Sant'Angelo 2009), little is known about the subject in post-secondary institutions. Currently, negative attitudes and beliefs about obesity seem to be pervasive, possibly as a result of media trends and peer pressure. The former’s emphasis on thinness and the ‘ideal’ body figure is ubiquitous and blatant in most contemporary marketing frameworks.

Studies have documented the presence of bias and discriminatory behaviour against obese persons in several areas, including employment, health care, and education (Puhl and Brownell 2001). In contrast to members of other, oft-stigmatized groups such as minority and ethnic groups who show a tendency toward solidarity with other group members, obese individuals themselves often display a weight-related bias (Wang, Brownell et al. 2004). This is possibly a result of involuntary internalisation of society's negative views of obesity. Also, adults who were obese adolescents are more likely to have lower incomes and experience higher degrees of social exclusion (Muennig, Lubetkin et al. 2006).

Adolescence is a critical period for engaging the population in health issues. New health behaviours, influenced by peer and media pressure among other factors, develop and track into adulthood, with long lasting effects on health and lifespan. A prospective cohort study (Patton, Coffey et al. 2011) following 14 year-old Australian adolescents over 10 years showed a 13% increase in overweight individuals, while obesity increased from 3.6% to 6.7%. Around half of obese young adults had never been classified as obese as adolescents, whilst all individuals with persistent obesity in adolescence had a BMI of
more than 25 after 10 years. Although few persistently overweight adolescents managed to achieve a normal weight in young adulthood, resolution of weight problems was more common in those who were less persistently overweight as teenagers, indicating that lifestyle interventions targeting adolescents might be key to future obesity prevention efforts.

Such worrying trends may be due to unfavourable shifts in activity patterns that occurs during adolescence (Nelson, Neumark-Stzainer et al. 2006), as increased television viewing and time spent in front of the computer increases. Although controversial in its clinical relevance, a statistically significant relationship exists between TV viewing and body fatness among children and youth which compounds the problem (Marshall, Biddle et al. 2004). Whilst current health policy makers might assume that adolescents rarely become ill and hence are of limited interest, efficient health measures should take into account adolescent’s attitudes toward health and aim to prevent a ‘lifetime of bad habits’ (Viner and Barker 2005).

Indeed, as evidence accumulates and the burden of disease and health costs associated with obesity are increasingly recognised, the problem no longer remains purely health-related, but transforms into a politically-sensitive topic subject to fierce intersectoral debate and discussion (Kopelman, Jebb et al. 2007). In addition to traditional principles of disease management such as education, lifestyle change, self monitoring and possibly medication, population-based interventions in the built environment, the agricultural industry, transportation, advertising, social and economic inequalities as well
as access to healthcare are also required to overcome existing barriers to health behavioural change (WHO 2000).

An evaluation of attitudes toward obesity in those most susceptible to media and peer influences would be useful to health policy makers in order to glimpse any particular trends in attitudes which would in turn influence preventive strategies (Puhl and Heuer 2011). This study aims to compare with and expand on unpublished data regarding such attitudes gathered 20 years ago within a population of 17-18 year old sixth form students. Such a comparison will allow a glimpse of changing trends over two decades, and possibly help to target future health promotional campaigns in this age group. It would be revealing if the more prevalent obesity in the current generation of adolescents were to result in more accepting attitudes toward obesity at this age group. This could be easily understood given their tendency toward normative behaviour.
1.2 Aim and objectives

The aim of the study is to identify any changes in Maltese adolescents’ attitudes toward obesity and overweight over the last two decades, and suggest reasons for such change. This was carried out by comparing unpublished survey data collected circa 1989 from ‘Polytechnic’ (now Junior College) students with current survey data collected in the first quarter of 2011 from a mix of sixth form settings.

The objectives of this research are to:

1. Assess adolescent students’ current attitudes toward obesity using the ATOP scoring system.
2. Compare current attitudes with those elicited twenty years ago in an unpublished study (Cacciotolo; Mamo & Stivala).
3. Calculate current self-reported prevalence of obesity through BMI measurement for students participating in the study.
4. Analyse the effect of actual BMI on perceived weight bias and attitudes toward obese persons.
5. Relate BMI to socio-economic category via the level of parental education and place of residence.
6. Elicit differences in self-reported BMI with attitudes toward obesity among all students and between government, church and state institutions.
Chapter 2: Literature Review

2.1 Sources

A thorough literature review was carried out, mainly using Pubmed and MeSH databases, together with the EBSCOhost collection of databases and Google Scholar search engine. Articles in the former were searched using a combination of MeSH terms, namely ‘obesity’, ‘attitudes’ and ‘adolescents’. Other key words of importance included ‘overweight’, ‘fat’, ‘perceptions’, ‘bias’ and ‘stigma’. Articles mainly published between 1985 and 2011 were sought, although older research was also utilised where relevant.

A focused search for relevant articles was also carried out in high-impact journals which were found to publish most of the studies on the subject. These journals include Obesity Reviews, Journal of Adolescent Health, International Journal of Obesity and Social Science and Medicine. In addition, local studies of relevance were sought in the Library catalogue of the University of Malta. However, whilst anthropometric studies and self-reported measurements on children and youth exist, no studies dealing with attitudes toward obesity in adolescents per se were found.

2.2 Salience

Adolescence can be a challenging time, and even more so for overweight or obese individuals. Mental health is an increasingly relevant functional aspect of today’s society, so a healthy, emotionally stable adolescence is important for future potentially obese adults (Ali, Fang et al. 2011). Unfortunately, this is not the case for the majority of those with a high BMI. Although most research dealt with adult subjects, those studies having
adolescent subjects indicate a pervasive social stigma attached to excess weight. Whilst prevention of adolescent obesity requires willingness by the main actors to adopt healthy behaviours, in practice this can be difficult to achieve. In fact, behaviours contributing to a reduction in the burden of obesity, such as physical activity or adopting healthy food habits actually decline during adolescence (Guenther, Dodd et al. 2006). Instead, ‘obesogenic’ sedentary behaviours such as watching television or playing computer games for prolonged periods may increase. It is not surprising that a direct relationship has been shown between adolescent TV watching and weight status (Dennison, Erb et al. 2002).

In spite of the sheer volume of research conducted over the years, it remains largely unclear as to what extent stigmatizing attitudes translate into outright discrimination of obese individuals in important lifestyle facets such as education, employment and health (Puhl and Brownell 2001; Carr and Friedman 2005). As the obesity epidemic intensifies, appropriate and timely public health decisions need to be taken to curb its spread. Research into the attitudes governing obesity is necessary in order to guide policy makers’ future health promotional policies and activities.

2.2.1 Theoretical framework

Whilst to date, no theory has fully explained the reasons for weight bias, understanding why it exists is crucial since it affects so many people with a potentially severe impact on their well-being and mental health. Identifying the origins of prevalent negative stereotypes would be beneficial to reduce the problem and perhaps reverse it. Do
overweight and obese adolescents have negative perceptions of themselves? Are adolescents of a higher socioeconomic status (using parental education and occupation as indicators) thinner than those of a lower social class? Is this an income or an educational cause? Do they express more negative attitudes toward their obese peers? Is there a gender difference in such attitudes, and have these changed over the years?

Social psychology research has developed theories which address specific areas of weight bias, suggesting that stigmatizing attitudes toward obese individuals emerge from beliefs about controllability and responsibility for excess body weight. For example, the "Attribution Theory" (Weiner, Perry et al. 1988) suggests that people tend to ascribe reasons for obesity because this enables them to quickly categorize information on, and form expectations about, the people within various social groups. In typical individualistic western mind sets where values of self-determination predominate, people are held responsible for their life situation.

Indeed, causality plays a pivotal role in determining reactions to such stigmatized persons, where the greater the level of personal controllability the object of stigma is perceived to have, the greater the negative reactions to it. In several studies, subjects who felt less pity (Weiner, Perry et al. 1988; Crandall 1994) also showed decreased willingness to help obese persons reduce weight, and were less inclined to support obesity prevention efforts. Despite exhaustive research demonstrating that body weight is determined by a complex interaction of genetic, biological, environmental and social factors, a negative outcome such as obesity is frequently attributed to personal failure by
the individual to control his or her weight. Discriminatory behaviour may well be the end result of such a combination of factors (Puhl and Heuer 2011).

Other determinants of the obesity stigma exist. One study found that negative perceptions of severity of health problems (including obesity) increased social rejection (Crandall and Moriarty 1995). However, such attitudes can be manipulated by challenging existing views of obesity, such as increasing awareness about the high prevalence of obesity, labelling obesity as a chronic illness with few existing treatment options and reducing the emphasis on personal controllability results in less stigmatizing attitudes (Puhl, Schwartz et al. 2005). Demographic factors also play a role; for example, men show more negative attitudes toward excess weight than women (Wang, Brownell et al. 2004) In addition, there is controversial evidence that stigmatizing attitudes toward obesity decrease with increasing age, and are not related to the subject’s body weight (Rand and Wright 2000; Schwartz, Chambliss et al. 2003; Schwartz, Vartanian et al. 2006).

A study using the Fat Phobia Scale suggests that people with a higher level of education who are non-medical professionals are more likely to have negative attitudes, although it also showed that measures designed to reduce respondents’ feelings of responsibility for fatness lowered their anti-fat phobia (Robinson, Bacon et al. 1993).
2.3 Impact of obesity on lifestyle

Overweight adolescents are frequently subjected to multiple forms of weight bias: physical bullying, verbal teasing (e.g. offensive nicknames; derogatory remarks), and exclusion from activities, or simply being ignored. The school setting in particular is often a site for daily stigmatizing attitudes – mainly from peers, but also from teachers and possibly parents. Research suggests that this may even contribute to early school leaving among adolescents (Barone and O'Higgins 2009). Unfortunately, the media - through television, films and magazines – tends to reinforce negative attitudes about body weight and perpetuate weight bias. Negative attitudes have also spilled over into commerce. For example, several U.S. airlines (e.g. United Airlines; Continental Airlines) have a specific policy asking for a double seat to be booked in the case of obese individuals who do not fit into one seat. Although probably motivated by financial reasons, such policies may be seen as discriminatory in nature.

2.3.1 Emotional and Health Consequences

Perhaps the most subtle yet disturbing consequences of adolescent obesity are psychosocial in nature (Zeller, Saelens et al. 2004; Hayden-Wade, Stein et al. 2005). In addition to health issues, excess weight in the teenage years has negative, stigmatizing connotations leading to decreased self-reported social functioning (Swallen, Reither et al. 2005). Several studies have demonstrated obese adolescents as being targets of discrimination from an early age, both within and outside school settings, being ranked lower in the desirability of having them as friends by peers. Negative attitudes toward
obesity are also reported among their adult educators (Puhl and Brownell 2001; Puhl and Latner 2007).

Inevitably, such attitudes over the long term may cause development of eating disorders, depression, low self esteem, confidence issues and a negative self-image, which appears to persist into adulthood (Zeller, Saelens et al. 2004; Carr and Friedman 2005; Huang, Norman et al. 2007). Obese adolescents showing dissatisfaction with self and life may demonstrate significantly higher rates of sadness, loneliness and nervousness, rendering the likelihood of engaging in high-risk behaviours such as smoking or consuming alcohol much higher than non-overweight youth. They are more likely to believe that others made negative comments about them, exacerbating difficulties in forming friendships (Strauss 2000; Fonseca, Matos et al. 2009). They may exhibit greater fear and anxiety related to social stigma, or engage in inappropriate efforts to lose weight (Hague and White 2005). In a worst case scenario, obese youth who are repeatedly victimized by peers because of their weight are at risk of suicidal thoughts and behaviours (Eaton, Lowry et al. 2005).

From a very young age, overweight and obese individuals are often unfairly characterised as lazy, untidy and lacking intelligence. Such labelling encourages efforts at dieting which may cause ill-health as described above. Some surveys report that adolescents' exposure to and internalisation of ubiquitous media messages promoting thinness and weight loss is related to the development of harmful eating patterns such as binge eating behaviour and unhealthy weight control (Puhl, Moss-Racusin et al. 2007) although the validity of this association has been debated in other cross sectional studies.
(van den Berg, Neumark-Sztainer et al. 2007). This is particularly the case where overweight youth are teased by friends and peers because of their weight.

Paradoxically, prospective research shows that victims of weight-bias are more likely to engage in binge eating at 5 years follow up and less inclined to diet or participate in physical activity in response to bias, thus compounding their weight problem. These results persisted even after controlling for age, ethnicity and socioeconomic status (Eisenberg, Neumark-Sztainer et al. 2003; Puhl and Brownell 2006). Gender differences also emerged in this study, where weight teasing was predictive of maladaptive weight control behaviours among men and frequent dieting among women. Some obese individuals respond to increased stress following discrimination or teasing by overeating (Puhl and Brownell 2006) Over the last decade, a clear link between depression and excess weight during adolescence persisting into adulthood (Pine, Goldstein et al. 2001; Goodman and Whitaker 2002) has been described. However, while a positive association between adolescent depression and risk for adult obesity was elucidated, it is unclear whether being obese is causally related to depression.

Finally, weight bias indirectly affects health since it influences attitudes toward the health care system. Unfortunately, health care professionals such as doctors, nurses, psychologists, and dieticians may show intentional or unintentional bias against obese patients. Research has shown that heavier patients are more likely to avoid or cancel important appointments or disregard health promotional/preventive messages because they expect disrespectful treatment and negative attitudes from health care providers, dislike being weighed, and have experienced embarrassing incidents where medical
equipment was too small for accurate testing. In some studies, this subgroup reported that barriers increased in direct proportion to their body mass index after adjustment for age and socioeconomic status (Matthews, Salomon et al. 2005; Puhl and Brownell 2006)

2.3.2 Education

Overweight and obese students deal with stigma and discrimination throughout their education, and have been doing so for decades. In 1994, a landmark National Education Association report on size discrimination in the United States concluded that:

“For fat students, the school experience is one of ongoing prejudice, unnoticed discrimination, and almost constant harassment...fat students experience ostracism, discouragement, and sometimes violence. Often ridiculed by their peers and discouraged by even well-meaning education employees, fat students develop low self-esteem and have limited horizons.”

Such youth face countless sources of weight bias within their educational setting. Local research is limited, yet the prevalent western attitude idolising the ‘thin ideal’ is likely also present in Malta.

Research shows that bias can be exhibited not only in the form of regular harassment and teasing by fellow students, but also in the general attitudes and actions of teachers and other school employees (NEA 1994; Neumark-Sztainer, Story et al. 1999). For example, physical education teachers might have lower expectations for overweight
students than for "normal weight" students; not only with regards to physical activity, but also in non-weight related areas such as cooperation with peers, intelligence and social ability. One study among physical education students unsurprisingly identified a need to reduce negative fat stereotyping in education environments and to foster a healthy positive link between health and an active lifestyle in curricula (Greenleaf, Martin et al. 2008). Anti-fat bias may be so intense that in one study, adolescent college students rated fat people last as marriage partners after embezzlers, cocaine users, shoplifters, and blind people (Tiggemann and Rothblum 1988) The 1988 study also indicated a maladaptive concern with weight maintenance among normal-weight female adolescents in particular.

Obesity might also have an impact on educational attainment and the academic aspect of adolescents' life. A 2010 study retrospectively assessed the academic achievements of two cohorts of adolescents who were aged 14-18 in 1979 and 1997 respectively. After adjustment for socio-demographic variables, obese adolescents in the contemporary (1997) cohort were less likely to have attained a college degree compared to normal weight peers (Fowler-Brown, Ngo et al.) This was not observed in the older cohort, possibly indicating an increase in anti-fat prejudice and stigma in recent years. It also confirms previous research (Crandall 1994) showing that overweight students, despite showing similar academic ability and motivation, were less likely to attend college than those within a normal weight range.

2.3.3 Employment

Although not directly relevant to adolescents in the current study that are still receiving education rather than actively seeking work, the impact of obesity on their
future job prospects cannot be ignored. It is a known fact that overweight and obese people encounter bias in their working environment, from job interviews to performance evaluations. Studies have found that the overweight applicant is viewed negatively and is less likely to be hired than the normal weight applicant, in spite of identical qualifications (Puhl and Brownell 2001). Other research has shown that overweight workers may be paid less for identical jobs, are more likely to have lower paying jobs, and are less likely to get promoted than thin people with the same qualifications. Up to 43% of participants in the same study reported stigmatization and teasing by co-workers, supervisors or employers because of their weight (Puhl and Brownell 2006). Abroad, particularly in the USA, legal cases documenting weight-based discrimination in employment settings continue to surface.

As far back as 1979, observational studies established that overweight and obese people were viewed consistently more negatively than others on variables considered essential for employment and work performance (Larkin and Pines 1979). Participants in this study also rated obese men and women as significantly less competent, less productive, disorganized, indecisive, inactive, less successful, less pro-active or perseverant, less ambitious, mentally lazy and less self-disciplined than were underweight or average-weight persons. Obese individuals are at a higher risk of being stereotyped about their employment qualities, and of unequal treatment in the work place (Giel, Thiel et al. 2010).
2.3.4 Legal aspect

Maltese law does not specifically prohibit discrimination against obese individuals, or contain specific legislation dealing with the matter. Article 2 of the 'Employment and Industrial Relations Act' - Chapter 452 - describes discriminatory treatment as ‘...any distinction, exclusion or restriction which is not justifiable in a democratic society...’ and continues with a non-exhaustive list of potential reasons underlying discrimination, such as marital status, pregnancy and disability. The problem with obesity and overweight in the legal framework is that a fine line exists between actual discrimination and inability for work (e.g. in the case of individuals seeking employment in the Police Department or the Armed Forces, where a certain level of physical fitness is expected and desirable).

Each potential case of positive discrimination shown toward obese individuals for any reason would necessarily have to be decided on its own merits. Severe obesity may well be pleaded and included as a form of disability according to the 'Persons with Disability (Employment) Act' - Chapter 210. However, whether morbid obesity qualifies as a disability under Maltese law is a thorny yet increasingly relevant issue. Such unresolved issues, combined with public perceptions blaming obese people for their own negative experiences, may result in inconsistent court rulings and discourage others from seeking legal assistance for weight-based discrimination in any setting.
2.4 ‘Thin is in, Stout is out’

“Let me have men about me that are fat.”

Shakespeare, Julius Caesar, Act 1, Scene 2

Attitudes toward obesity have changed dramatically, particularly within the last few decades as the mass media achieved a global reach. While excess weight is often considered undesirable nowadays, this was not always the case. In fact, the female ideal as represented in the arts for many centuries was a full-bodied, curvy woman - the so-called ‘Rubenesque’ stature - which by today’s standards would probably be considered overweight. This way of thinking lasted until the beginning of the twentieth century, at a time when symptoms of tuberculosis, such as emaciation, were common. Plumpness was therefore seen as a sign of good health, and did not bear the negative connotation it does today in both males and females (Scheindlin 2008). However, slimmer body types became increasingly sought after in post-Victorian times, with women in the 1920s preferring to appear thinner and thus took to wearing long dresses that concealed curves (Dercene and Beresin 2006).

This changed once again as cinema became popular in the middle of last century, when a new feminine ideal featuring curves and ample breasts emerged. Film stars such as Marilyn Monroe among others actively sought this body type and were idolised by their fans (Scheindlin 2008). Cultural influences also contributed to the uptake of such ideals; according to Plotz (1959) immigrants to the United States from war-torn Europe who were used to starvation and thinness actively valued a plump physique, both for
aesthetic and socioeconomic reasons (Plotz 1959). Interestingly, retrospective research conducted on winners of the annual Miss America contest provides an insight into the ideal of feminine beauty during the twentieth century. In the 1920s, Miss America contestants were often svelte and slim, whereas during and immediately after World War II, most pageant winners possessed a more statuesque figure, like many trend-setting movie stars of the time. The winners of the final three decades of the century once again reflected society's worship of thinness. The researchers calculated the BMI of every Miss America from 1922 to 1999, and found that while winners had BMIs between 20 and 25 up to the mid-1960s, the majority of winners since then have had BMIs lower than 18.5 (Rubinstein and Caballero 2000). This gradual decline in BMI possibly mirrors a public acceptance of thinner ideals and increased importance of weight control in recent years.

On the other hand, a controversial 2006 survey on a non-representative sample of the U.S. population indicated that attitudes toward extra weight are shifting from outright rejection toward acceptance, while attitudes toward avoidance of snacking have also relaxed. Over a 20 year period between 1985 and 2005, the percentage of respondents who stated that they found overweight people less attractive decreased from 55% to 24% (Cawley, Joyner et al. 2006), although obese adolescents were half as likely to go on a date with the opposite sex as normal weight peers. Does this indicate that as obesity becomes more common and accepted, social norms regarding attractiveness and beauty accommodate this change?

Wright (1987) proposed that body image disturbance is common among severely overweight individuals (Wright and Whitehead 1987), but more recent research evidence
also suggests that normal weight individuals (especially women) may find it difficult to
accurately assess their body size, thus failing to recognise that their weight is of concern
and of personal relevance (Johnson, Cooke et al. 2008). It will be interesting to note
whether Maltese adolescents also have difficulty in determining their weight status, and
hence delay seeking help for weight management issues.

2.4.1 A global perspective

Weight based stigma and widespread contempt shown toward obese individuals is
rapidly becoming an accepted reality around the world, even in places where larger
bodies have traditionally been valued. Societal preferences for particular body build sizes
and attitudes about weight have a profound socio-cultural dimension in all human
societies, often helping to shape identities (Ritenbaugh 1982; Stearns 2007; Brewis
2011). A recent study on 680 adults from 10 countries tested for cultural variation on how
people view and stigmatize excess weight and obesity. Results demonstrated shared
beliefs on obesity that also include societies who traditionally have a positive outlook in
this regard such as Samoa and Mexico, suggesting a global diffusion of more ‘modern’
attitudes.

Such beliefs include awareness that obesity is a disease, assigning individual
responsibility to weight management, social preference for thinness and the idea that one
should not openly express prejudice against fat (Brewis 2011). The evidence suggests
that in many developed western countries, being thin is associated with “...health,
beauty, intelligence, youth, wealth, attractiveness, grace, self-discipline and goodness”
(Caputi 1983; Moreno and Thelen 1993), while in contrast obesity is associated with "...ugliness, lack of desirability, lack of self-control and social responsibility, social dysfunction and laziness." This is reflected in current social realities. Individuals with a BMI greater than 30 have fewer career and educational opportunities, less pay, lower quality health care service, and less likely to be romantically successful (Grogan and Richards 2002; Brownell, Schwartz et al. 2009; Brewis 2011). Such intolerance is made evident by several studies, such as one in particular where a significant percentage of respondents started that they would rather lose their sight or die at a younger age than be obese (Schwartz, Vartanian et al. 2006).

At the same time as weight loss and slim bodies became desirable worldwide, eating patterns started favouring excessive consumption of calorie-dense foods (Kelly 2005), while advances in technology rendered hard physical labour practically redundant. This apparent conflict has been further fuelled by a large weight loss industry promising weight control with minimal effort, as well as new pharmaceuticals touted as being effective aids to weight management.

However, the question remains: How did negative weight bias spread so far, and so quickly? Several ethnographic studies conducted in the latter part of the twentieth century described societies where fat bodies implied beauty, better marriage prospects, and favourable moral values promoting social belonging such as godliness, generosity, fertility, and responsibility. For example, studies in areas as diverse as the Saharan desert, Jamaica, Belize and Fiji identified societies which valued (or were at most indifferent to) large body mass in the past, but have increasingly adopted mainstream
preference for slim body types (Sobol 1994; Anderson-Fye 2004; Popenoe 2004; Brewis 2011).

In 2004, a landmark follow-up study on Fijian adolescents linked the transition from a fat-tolerant attitude to actively upholding western ideals of attractiveness to the introduction of television in a time of rapid societal change. Within a very short time frame, a new preoccupation with body shape, loss of self-esteem and disordered eating started to develop in a setting where such behaviours were previously unknown.

There is still substantial debate on whether weight bias and slim ideation are connected, particularly since comparative studies assessing the spread of both are lacking. Conflicting evidence exists. For example, by the end of last century, the traditional Samoan veneration of large bodies had been replaced, as natives embraced slim ideals, yet they still differed from western industrialised societies in that they did not show significantly negative attitudes towards weight (Brewis et al. 1998). Such debate is very relevant: as the prevalence of overweight and obesity rises in most countries and the problem is identified as a major public health issue with health and economic implications, its social aspect - namely the increase in vulnerability to weight stigmatising attitudes - is also of increasing concern.

The 2011 cross-cultural study by Brewis et al. identified shared cultural norms in many countries, including weight stigma and social discrimination; where obesity is used as a basis for judging the social and personal qualities of previously unknown individuals (Brewis 2011). However, results also suggested that the true extent of fat stigma may be
concealed, as it is not deemed 'politically correct' or socially acceptable to state forceful opinions weight in public, although a judgement may have already been made internally. Such masking of beliefs is widespread, and contributes to dissonance between underlying attitudes and social patterns that may minimise and trivialise the extent of the issue. The same study also found an association common to all countries between a higher level of education and a lower endorsement of negative attitudes in public. This might indicate that education reflects respondents' exposure to media and public health messages. Both factors might increase the likelihood of exposure to and internalization of weight bias, but lead to less outright expression of stigmatizing ideas (Brewis 2011). This may have implications for future public health interventions.

2.4.2 Media influences

Media portrayal of obesity is critical in the formation of public perceptions of the obesity epidemic. As interest in the issue increases among opinion leaders, so does media interest – the two are mutually influential, and often the media determines the agenda for consideration of obesity (Evans 2006). Studies show that media content may contribute to negative public attitudes toward obese people, social acceptability of weight prejudice and, most importantly, influence policy making decisions (Evans, Finkelstein et al. 2005). Blaming obese individuals for what is seen as a lack of personal responsibility reduces the perceived need for interventions by well-funded governmental organisations, thus adversely affecting public policy efforts to confront the challenge of increasing obesity rates (Puhl and Heuer 2009; Heuer, McClure et al. 2011; Puhl and Heuer 2011).
Throughout history, the ideal of beauty as defined by social norms has been difficult to achieve. Current mass media and imagery is subtle yet powerful, leading to increased dissatisfaction with self and body image with associated weight stigma among both men and women (Derenne and Beresin 2006; Heuer, McClure et al. 2011).

The study comparing early 1980s perceptions of obesity in Fijian adolescents to those a decade later effectively linked the introduction of television to a dramatic change in perceptions and attitudes toward obesity (Becker 2004). Adolescents in particular were shown to be vulnerable to images and values shown on media such as TV shows, magazines and more recently, the internet.

Understanding how these messages are internalised by youth is crucial in order to prevent risky behaviours such as disordered eating. Overweight and obese persons are frequently ridiculed and stereotyped in popular television shows and films (Fouts and Burggraf 2000; Fouts and Vaughan 2002; Klein and Shiffman 2005; Robinson, Callister et al. 2008), which can perpetuate weight stigmatization (Crandall 2005).

Additionally, the media often prefers to link obesity with individual responsibility, ignoring important societal and environmental factors (Bonfiglioli, Smith et al. 2007; Kim and Willis 2007). Increased news media coverage and high individual BMI are two determining factors affecting beliefs about causes of obesity and support for specific preventive strategies. Individuals with a higher BMI are more likely to blame environmental factors for their obesity and are less supportive of specific measures such as restricting availability while increasing costs of unhealthy food, preferring to advocate
for broader interventions such as education. On the other hand, normal weight individuals are more receptive to such measures, and assign less blame to society (Evans 2006).

A recent study (Heuer, McClure et al. 2011) analysed content of online (i.e. available on the internet) news stories about obesity in order to classify portrayal of obese people. 65% of individuals identified in news photographs were overweight or obese, and the majority of images were classified as being negative and stigmatizing. Compared to normal weight individuals, obese people were significantly more likely to be shown eating or drinking, partially clothed, or portrayed with just their abdomen visible, thus evoking a sense of ‘disgust’ (as opposed to simply protecting privacy of the photographed person) which reinforces stigma. Additionally, they were significantly less likely to be shown wearing professional attire or while exercising.

According to the ‘Frame Analysis Theory’ (Goffman 1974) on which the idea of stereotyping is based, such undue emphasis placed on specific body parts, together with evocative imagery of excess weight in photographs, actually turns people into symbols of the problem. Such negative or stereotypical symbolism can subtly communicate biases to viewers, even if the written content itself is not negative, thus perpetuating negative public attitudes and discrimination toward overweight and obese individuals (Heuer, McClure et al. 2011).

A randomized experimental study supporting this conclusion was conducted on adults asked to read a neutral news story about the prevalence of obesity. These stories either lacked visual imagery, or were accompanied by photographs of obese adults.
Participants who were assigned unflattering, stereotypical images expressed more negative attitudes toward obese people than those whose story was accompanied by more positive photographs (McClure, Puhl et al. 2011). Such findings emphasise the need to increase awareness of weight bias in journalistic communication. In this respect, the positive role that the news media can play in reducing stigma is already being recognised: several major journalists’ societies advocate avoidance of stereotyping – of obesity as well as other discriminatory issues - by establishing ethical guidelines - such as the Society of Professional Journalists’ Code of Ethics – which reporters can consult.

The susceptibility of children, adolescents and other vulnerable groups to obesity, its link with poverty, as well as its pervasive impact on individuals and societies alike make for sensational reading. Industry research points out that public perception is different from verifiable scientific truth, since the media often follows the voice of opinion leaders and tends to focus on simplistic solutions to rather complex problems (ECHO 2004). The report claims that the food industry is demonised by newspaper articles and television programs, which blame major companies in addition to advocating personal responsibility. Since both governments and regulators tend to seek popular support on such issues, relying on scientific fact alone is insufficient – motivated, trusted individuals with adequate skills and media presence need to be brought on board in order to pass along a convincing, appealing message to society. Relatively novel means of promoting reduced calorie intake, including corporate responsibility, legislation, food reformulation and labelling, advertising rules and taxation are being explored in many countries (Tao and Glazer 2005). Whether efforts in this direction yield the desired success remains to be seen.
2.5 The origins of obesity

As described earlier, an imbalance between energy intake and energy expenditure is thought to be the main driver of weight gain. Eating behaviours of adolescents are particularly variable and tend to be influenced by both individual and environmental factors (Grundy 1998; Selassie and Sinha 2011). Story (2002) describes four main levels of influence affecting food choices in this subgroup: individual biological or psychosocial factors; the influence of family or friends; the community’s physical environment such as ease of access to fast food outlets; and major societal influences such as mass media, advertising and social and cultural norms (Story, Neumark-Sztainer et al. 2002). However, in spite of increasing exposure to health messages, children and adolescents are often indifferent to their health (van Exel, de Graaf et al. 2006). Although data regarding Maltese adolescents’ attitudes toward their food habits is limited, several factors need to be considered prior to formulating interventions targeting this age group.

2.5.1 Historical context

Dietary habits are rooted in cultural traditions and food availability. As globalisation in food marketing and distribution becomes the norm, increased consumer purchasing power and the proliferation of fast food companies has resulted in a rapid change across cultures. Through the ages, Malta’s strategic geographical location as a convenient staging post for mercantile sea routes led to its colonisation by many of the great seafaring nations of Europe, before gaining independence in 1964.
Chapter 2: Literature Review

The necessity of adapting to the demands of colonisers, particularly the British (1800 to 1964) had profound repercussions on Maltese culture and nutritional habits, which had competing Mediterranean influence due to Malta’s proximity and exposure to Italian food practices. One would expect the traditional healthy Mediterranean diet (Kushi, Lenart et al. 1995; Kushi, Lenart et al. 1995; Bautista and Engler 2005; Esposito, Ciotola et al. 2007; Babio, Bullo et al. 2009; Kastorini and Panagiotakos 2010) — typically high in vegetable, pulses, cereal and fruit intake with moderate amounts of fish but low meat or dairy product intake - to be espoused by the majority of the Maltese. However, the islands’ historical context has unfortunately led to a shift toward a more ‘westernised’ diet, high in refined carbohydrates, meat and fats (Bellizzi 1992; Bellizzi 1993), to the extent that according to a report by Serra-Majem (1997), “Malta exhibits diet and health patterns more typical of Northern Europe than of the Mediterranean” (Serra-Majem, Ferro-Luzzi et al. 1997).

A qualitative study comparing the nutrition transitions of Malta and Sardinia concluded that in Malta, there has been a sudden shift from a relative food shortage — particularly during the Second World War where meat and foods rich in fats and sugar were practically unobtainable — to one of affluence, but in a cultural context where the Mediterranean identity has changed to an Anglo-Saxon one (Tessier and Gerber 2005). Maltese emigrants who had left the islands seeking employment in the 1950s returned decades later upholding their host societies’ lifestyle and cuisine, while mass tourism has resulted in a situation where food practices resemble Anglo-Saxon habits, being characterised by lack of diversity and elevated levels of saturated fatty acids and salt (Tessier and Gerber 2005). Adolescents in Malta tend to eat meals prepared by their
parents, so that previous generations perpetuate unhealthy food habits to their offspring—a vicious circle which is hard to break. Any public health intervention to address obesity would necessarily require parental cooperation.

2.5.2 Early Determinants

The origins of obesity may be traced back to early life. Behavioural and social determinants influence the onset of childhood overweight in pre-school years (Dubois and Girard 2006) which may continue into adolescence and adulthood (Herman, Craig et al. 2009). Diverse elements, such as genetics, the interaction between maternal and foetal factors during intrauterine growth and infancy (e.g. maternal smoking during pregnancy) (Deckelbaum and Williams 2001), single parenthood (Huffman, Kanikireddy et al. 2010) or unhealthy food environments during childhood all contribute to a situation where unless identified early on, the progression of abnormal weight gain results in obesity-related morbidity (Nader, O'Brien et al. 2006).

2.5.2.1 Parental influences

Solid evidence describing a genetic link between parent and child weight status exists, with research suggesting that the environment interacts with predisposing genes to enhance or hide their phenotypic effects (Bouchard 2009; Zhao and Grant 2011). Parents play a major role in determining the sort of food environments their children are exposed to. These subsequently shape adolescent nutritional and activity lifestyle (e.g. patterns of food intake, eating behaviour, and preferences for particular forms of activity), as well as familial patterns of overweight (Birch and Davison 2001). Excessive parental control of offspring's eating habits may have a counterproductive effect as it interacts with genetic
predispositions, increasing the risk of eating disorders and maladaptive behaviour (Birch and Davison 2001; Scaglioni, Salvioni et al. 2008).

Scaglioni et al. (2008) reported significant inter-generational similarities for food intake, eating motivations, and body dissatisfaction or satisfaction. Interestingly, although both parents and obese adolescents themselves blame the individual’s lack of willpower for inability to control weight gain, their parents are also blamed for providing an unhealthy diet, and for not being supportive in their attempts to exercise (Lindelof, Nielsen et al. 2010). This conflict argues in favour of positive attitudes in parental role modelling as opposed to excessively strict controlling methods (Scaglioni, Salvioni et al. 2008) in order to achieve tangible results.

Parental social status is also a critical factor in the origins of obesity. It is likely that parental overweight and low socioeconomic status synergise with adolescents' sedentary behaviour, and as such are strong risk factors for adolescent weight gain, whereas an active parental lifestyle is associated with a lower risk (Thibault, Conrand et al. 2010). However the literature is inconsistent in this respect. Studies in industrialised countries show that children from families with lower socioeconomic status tend to have excess weight (Will, Zeeb et al. 2005), whereas in less industrialised societies, excess weight is found predominantly among children with a higher socioeconomic status (Lobstein and Frelut 2003). As a developed country, Malta is expected to follow the former trend.
2.5.2.2 Education

As children’s food preferences are passed on across generations through a process of socialisation, it is generally accepted that appropriate nutrition education aimed at promoting and establishing positive health attitudes needs to start at an early age (WHO 2000). This is reflected in the Maltese National Minimum Curriculum (Malta Ministry of Education, 1999), where a key objective is to facilitate ‘...making wise choices in the field of health...adopting lifestyles that safeguard one's health.’, highlighting the importance of equipping students with knowledge, attitudes and skills related to healthy eating (Perez-Rodrigo and Aranceta 2001). Compulsory subjects such as Home Economics are crucial in this respect. The impact of education on obesity rates is subject to debate, but is thought to contribute to the potential for excess weight, as children of parents with low educational status tend to have a higher BMI (Classen and Hokayem 2005). Studies on socioeconomic and educational inequalities in westernised nations lend support to this correlation (Singh-Manoux, Gourmelen et al. 2009; Faeh, Braun et al. 2010; Singh, Siahpush et al. 2010).
Chapter 3: Materials and methods

3.1 Research Design

An observational cross-sectional design, similar in structure and thematic content to a similar survey conducted 20 years ago was chosen, in order to gather comparable data and discuss the changes over the past two decades on this highly current public health topic.

3.1.1 Research Method

The original self-reported questionnaire designed by Cacciottolo, Mamo and Stivala was entitled ‘Fat Finding Mission’ \( (\text{appendix}) \) and contained 9 questions concerning attitudes toward obesity. Two demographic variables were requested, namely gender and age. Each question consisted of a short statement regarding a particular aspect of obesity, and offered a choice of three possible answers, reflecting a positive, neutral or negative attitude. A total of 126 questionnaires were completed and made available for data input. It is unclear whether this is a representative sample of the student population attending the major government sixth form institution at the time (i.e. the Polytechnic Institute, subsequently known as the G.F. Abela Junior College).

3.1.1.1 Fat Finding Mission

The target population of the questionnaire entitled ‘Fat Finding Mission’ \( (\text{FFM}) \) were first year students aged 15 to 19 years who were enrolled at the Polytechnic Institute
in 1989. The exact denominator is not known, and no information regarding the type of sampling carried out is available.

3.1.1.2 Attitudes toward Obese Persons (ATOP) Questionnaire

Taking into account the significant increase in student numbers since 1989, it was considered prudent to adopt a similar data collection method and sample different classrooms from a ‘captive’ student population in the school. It was hoped that this would yield high response rates and increase the validity of the study. Although students were given the option not to answer questions, it is likely that delivering the ATOP questionnaire in a classroom setting increased the response rate. Although self-reported data is notoriously subjective and prone to bias, particularly regarding self-reported weight and height, (Stommel and Schoenborn 2009) the main aim of the study is to identify current attitudes toward obesity, with self-reported BMI being just one of several correlates reviewed.

3.1.2 Target Population and Eligibility Criteria

The population under consideration in this study was adolescents born between 1992 and 1996 completing their first year in post-secondary education institutions in Malta. Repeaters (i.e. students repeating their first year) were also included. Due to time and access constraints, those attending institutions in Gozo were excluded from the study.

The most recent enrolment data for the Maltese educational system was collected by the National Statistics Office in 2006, and published in 2010 (NSO 2010). More up-to-date records are not available, but student numbers at the post-secondary level have been
relatively stable over the past few years. There are currently 5 major post-secondary institutions delivering general education in Malta. Two are church schools, one is independently run, and the remainder are government schools. In order to obtain a truly representative sample of the eligible student population, it was deemed appropriate to select one school of each type, and obtain permission from their respective authoritative bodies authorities to conduct the questionnaire.

The eligible student population consisted of all students who were:

- enrolled in their first year of studies
- studying to obtain the post-secondary matriculation certificate (i.e. general education leading to ‘A’ or ‘Intermediate’ Level examinations)
- between 15 through 19 years of age (students over 19 years of age were excluded from the study)

In view of the need for anonymity, it was not possible to identify and exclude foreign students attending the school. These might be a source of bias due to their exposure to a different socioeconomic and educational environment in the past, which might have influenced their attitudes toward obesity. Stratified sampling by gender was not feasible in the circumstances, given that handing out the questionnaire was subject to the pressing demands on the class teacher at the time. Additionally, since demographic information on the population completing the survey 20 years ago is unavailable, comparability with similar questions in the ATOP questionnaire may be limited. However, it is likely that any change in trends was successfully detected, and the survey might be a basis for future studies on the topic.
3.1.3 Sampling rationale

The population size proved rather difficult to determine. The 2010 NSO report 'Malta in Figures' states that total 2006/2007 enrolment in post-secondary institutions (matriculation certificate) for both males and females was 5,909. This decreased slightly to 5,719 in 2007/2008. More recent data is not available. It is probable that around half of these were first year students, while the remainder were second year students. This would be consistent with the information obtained from the NSO report 'Education Statistics' for 2006, where the total number of enrolled first year, post-secondary matriculation certificate students was 3,024.

Communication with the Education Department identified a first year sixth form (matriculation certificate) population of 364 in Church schools, 66 in Independent schools, and around 2350 in Government institutions - namely Junior College and Giovanni Curmi Higher Secondary School (or GCHSS) - in 2010, for a total of 2,780 students. Conflicting information from different sources made this number difficult to confirm, so the number was rounded up to approximately 3000 students. Several attempts were made to sample the Junior College student population, since this would have been closest in composition to the original study population in 1989 and hence the most comparable. However, this proved impossible due to administrative difficulties and problems in obtaining approval for a non-convenience sampling method. GCHSS was chosen for sampling instead.
The minimum sample size required for the study was calculated to be 500 using the following criteria:

- Population size: 3,000 (NSO 2010)
- Power: 80%
- Confidence interval: 4
- Confidence level: 0.05

Ultimately, a confidence interval of 3.85 was achieved.

3.2 Research tool – questionnaire selection and development

The Attitudes toward Obese Persons Scale, which uses a 20 question, 6-point Likert scale to assess respondents’ perceptions, was the psychometric tool chosen for this purpose. The ATOP scale has a good Cronbach’s alpha reliability range of 0.80 to 0.84 (Allison 1991). Permission to use both ATOP scale was obtained from the author. This tool was selected over others because it was designed to be applicable to a wide variety of scenarios (i.e. it was not specific to a particular population sub-group), and contained most of, if not all, the themes identified in the FFM.

3.2.1 Socio-economic Status

Parental education and parental occupation were used to estimate students’ socioeconomic status (SES). Although more accurate measures of SES, such as net household income, are commonly used, these were thought to be too abstract for the majority of students. However, by late adolescence it is likely that most students are
aware of their parents’ employment and educational level – hence the inclusion of these two variables in the ATOP questionnaire. SES was not asked for in the Fat Finding Mission questionnaire; however such data are of value in order to accurately assess current trends in attitudes toward obesity.

For many decades across countless statistical reports, socio-economic position has traditionally been defined using the Registrar General’s scale of Social Class and Socio-economic groups (Leete 1977). This consists of six major classes, ranging from ‘Professionals’ in class one to ‘Unskilled’ and ‘Other’ in classes 5 and 6. Class 3 is subdivided into manual and non-manual skills. It has been argued that the level of skill at work may not be the best way of measuring social position, and this debate eventually led to the introduction of the National Statistics Socio-Economic Classification (NS-SEC), based on the concepts of employment relations and conditions rather than skill (Rose 1998). However, the latter was deemed to be slightly more complicated than the Registrar General scale, which is more easily understood by those with no formal statistical training. For this reason, parental occupation was classified using the Social Class based on Occupation method.

3.2.2 Online version

An online version of the questionnaire was distributed to the relatively small number of students attending St. Martin’s College following a perceived reluctance by teachers to distribute hard copies of the questionnaire in class. The Principal suggested this method after assurances that most questionnaires at the school were distributed in this fashion, that IT literacy was high, and that the response rate was usually satisfactory.
Chapter 3: Materials and Methods

A free survey creator website (www.surveygizmo.com) was utilised for this purpose – the content of the web survey had an identical format to the hard copy version. The link to the survey was forwarded to all eligible students, taking care to emphasise that no identifying data such as email addresses would be collected. Students simply clicked on the link, which directed them to the online version, and typed in or selected their preferred answers. Poor initial response rate was observed. However the link was resent twice over a period of three months until the majority of students had completed the questionnaire. Collected data was directly exported to Microsoft Excel for processing.

3.3 Focus group

Prior to commencing fieldwork, a focus group session was held for piloting purposes. Seven first year students from different Sixth Forms were approached (through convenience sampling) and asked to complete the edited ATOP questionnaire after briefing them on the purpose of the study. They were subsequently asked to comment on content, wording and relevance to the local context, particularly with regards to the sections which did not form part of the published ATOP scale. Upon analyzing their responses, the wording of several questions in Section B - Demographics was altered to clarify their meaning. For example, ‘Locality:’ was edited to ‘Which town do you currently reside in?’ to ensure clarity of response. Another question asking for ‘Number of years of parental schooling’ was removed completely, since changes in educational practice over the years meant that most students were unable to reply accurately to this question. One alteration was made to Section A, where an open-ended question not present in either the ATOP scale or the Fat Finding Mission (FFM) questionnaire had
been included in an effort to identify health issues related to obesity. ‘Do you have any health problems which you think are related to excess weight?’ was expanded into two questions (qs. 26 and 27 – refer to Appendix) to facilitate data analysis later on.

3.4 Procedure

Three post-secondary institutions were selected and sampled: Saint Aloysius College (SAC) as one of two church schools, St. Martin’s College (SMC) as an independent school, and Giovanni Curmi Higher Secondary (GCHSS), representative of a government institution. In SMC, the survey was conducted online as previously described, with all eligible students being targeted. In both GCHSS and SAC, the questionnaire was distributed manually in various classrooms with the aid of the teacher present at the time. Although it would have been ideal to distribute, complete and collect questionnaires straight away at the start of each lecture period, this was not possible for all classes. The teachers’ preferences were taken into consideration for all classes (e.g. some preferred to distribute the ATOP toward the end of the lecture, while others distributed and collected the questionnaire before starting their lecture).

English language/literature classes were sampled at random in GCHSS, since although students move about from class to class every hour, a majority of matriculation certificate students had English at intermediate or A’ level. In this way, the process of questionnaire distribution avoided handing out multiple questionnaires to the same student. In SAC, a class from each major A’ level (e.g. Biology and Chemistry; Maths and Physics; Languages) was selected, so that approximately equal numbers of students from each background replied to the questionnaire.
3.5 Variables obtained

3.5.1 Self-reported

Raw data obtained for each individual included self-reported weight in kilograms and height in centimetres. Other information recorded included gender, school, the age in years, town of residence, completed parental education and parental occupation. The remainder of the data consisted of the responses to ATOP and FFM questions.

3.5.2 Derived data

The body mass index (BMI) was computed from height and weight entered onto an Excel spreadsheet using the formula $\text{BMI} = \frac{\text{weight}}{\text{height}^2}$. This index is also known as the Quetelet index.

Parental education levels were ranked in ascending order, according to difficulty of the level reached. For example, completed primary education was given a rank of 1, whereas a PhD degree was given a rank of 6. A similar technique was adopted for the Registrar General’s scale of Social Class and Socioeconomic Groups. Here, professional occupations were ranked first, whilst unemployed individuals were ranked last.

A score for ATOP respondents was calculated according to author instructions (Allison 1991). The final value represents overall attitude towards obesity for the respondent. A higher score implies an overall positive, more tolerant, less discriminatory and less biased attitude toward obese persons. Students with a high score are more accepting of excess weight.
All variables were manually inputted into Excel (Microsoft Excel, 2003) and subsequently transferred to the Predictive Analysis SoftWare: PASW 18 (IBM Statistics) for statistical analysis and graphical output.

3.6 Comparing ATOP and FFM

Certain items from the FFM (namely questions 1, 6, 7, 8, 9) were appended to the ATOP questionnaire because they tackled themes which were lacking in the latter (refer to Appendix). For example, the validated ATOP survey does not contain items addressing the impact of obesity on lifespan, participation in sport, aesthetics or perceived self-weight. To enable retrospective comparison of responses, the listed items were added to the new questionnaire in their entirety.

The theme or scope of the remaining FFM questions were already present in the ATOP questionnaire. Thus, items addressing the impact of obesity on health status, career success and choice of ideal partner were identified in both questionnaires, and their responses linked or ‘bridged’ together. The three-point Likert scale used in the FFM is less accurate than the six-point scale of the ATOP questionnaire, and thus understandably less sensitive to response variability. However, bridging of responses for comparative purposes required recoding of variables. The two upper and two lower points of 6-point scale were collapsed into one category each, while the middle two items were collapsed into yet another category to create a 3-point scale similar to that in FFM.

This method assumed that respondents selecting the middle two points in the ATOP questionnaire (i.e. ‘I slightly agree’ or ‘I slightly disagree’) had a relatively neutral
stance to the theme of the question. Although imprecise, this was taken to be equivalent to an intermediate, non-extreme response in FFM. However, not all such 'midway' responses were entirely neutral, and this may have implications for interpretation of results.

The newly-created ranked ATOP points were then matched to corresponding FFM responses, requiring some reorganisation of data. Thus, mean values obtained for that section of the results may differ from mean values for the same question in previous sections.

3.7 Statistical Analysis

The statistical computations for each group of students include:

- Descriptive statistics including mean age, median, standard deviation
- Non-parametric testing such as Analysis of Variance (ANOVA) and Kruskal Wallis tests to determine the statistical significance of the difference between the means of ATOP score and BMI in the three schools, between gender, and other independent variables
- Use of Chi Square tests and Pearson's Correlation tests to assess correlations between variables
- Regression analysis
- Throughout the results, any p value less than 0.05 was considered to be statistically significant
- All results have a margin of error of +/- 5 percent (95% confidence interval)
Chapter 4: Results

This chapter will showcase descriptive and analytic summary data. Besides giving a summary representation of the main findings of this study in terms of graphs, means, ranges as well as confidence intervals, it goes on to analyse some key differences of interest – such as the difference in attitudes between the current cohort of adolescents and the previous study, including different attitudes by gender, BMI and education amongst others.

It will also explore differences between the various means of the data obtained. In keeping with international trends, it is expected that as obesity rates increase, there will be an increased negative bias toward obesity, although public expression of this stigma may not be as pronounced as in the similar study 20 years previously. Other expected findings include a link between actual BMI and attitudes towards BMI as well as with certain geographical locations. BMI, ATOP scores and socioeconomic status are likely to be related to parental education or occupational level. The chapter will explore any gender and school-based differences in attitudes towards obesity, and challenges the assumption that those students having a higher BMI are more tolerant of excess weight.

ATOP scale questionnaire statistics will be discussed first, followed by analysis of the FFM questionnaire. Finally, comparisons between similarly-themed questions present in both ATOP and FFM will be made. Due to inherent differences in gender ratio and the different distribution methods used in the schools, normal distribution of results was not assumed. Non-parametric testing was utilised for the most part.
4.1 Attitudes toward Obese Persons (ATOP) Questionnaire

The ATOP questionnaire is a psychometric scale that assigns a numerical ranking to attitudes toward obesity. The value was obtained from responses to the questionnaire using the authors’ scoring instructions, where a low score implies negative bias toward excess weight, whereas a high score suggests a more positive attitude. In general, a high ATOP score represents a more positive attitude towards obesity.

Body mass index values obtained from self-reported weight and height were placed within four major BMI categories as determined by WHO cut-off points (WHO, 1995). The following classification was used throughout the analysis:

<table>
<thead>
<tr>
<th>BMI</th>
<th>Weight Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 19.9</td>
<td>Underweight</td>
</tr>
<tr>
<td>≥ 20 to ≤ 24.9</td>
<td>Normal weight</td>
</tr>
<tr>
<td>≥ 25 to ≤ 29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>≥ 30</td>
<td>Obese</td>
</tr>
</tbody>
</table>

Each student’s locality of residence was categorised according to the Nomenclature of territorial units for statistics (NUTS), a geographical nomenclature subdividing the territories of the EU and Malta into different levels. The Local Administrative Units (LAU) 1 level was used to classify towns and villages within the 6 main districts; namely, Western, Northern, Northern Harbour, Southern Harbour, South Eastern and Gozo and Comino. The use of this nomenclature facilitated geographical analysis of variables.
4.1.1 Descriptive Statistics

The following sections describe differences between independent, government and church schools. Gender, age, region and other variables are also taken into account. Table 1 below shows the distribution of the eligible population in the three schools sampled, with response rates for each. An overall response rate of 62% was achieved, with a slightly higher percentage of females answering the questionnaire than males. However, the sex ratio of respondents in each school differed from that of eligible students. In SAC in particular, a much higher percentage of respondents was male compared to the other two schools. Students were between 15 and 19 years of age.

<table>
<thead>
<tr>
<th></th>
<th>Independent</th>
<th>Church</th>
<th>Government</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible students</td>
<td>50</td>
<td>225</td>
<td>580</td>
<td>855</td>
</tr>
<tr>
<td>Respondents</td>
<td>41</td>
<td>140</td>
<td>352</td>
<td>533</td>
</tr>
<tr>
<td>Response rate (%)</td>
<td>82%</td>
<td>62.3%</td>
<td>60.7%</td>
<td>62%</td>
</tr>
<tr>
<td>% of Total Respondents</td>
<td>7.7%</td>
<td>26.3%</td>
<td>66%</td>
<td>100%</td>
</tr>
<tr>
<td>Respondent Males</td>
<td>15</td>
<td>82</td>
<td>157</td>
<td>254</td>
</tr>
<tr>
<td>Respondent Females</td>
<td>26</td>
<td>58</td>
<td>195</td>
<td>279</td>
</tr>
<tr>
<td>% Males</td>
<td>36.6%</td>
<td>58.6%</td>
<td>44.6%</td>
<td>47.5%</td>
</tr>
<tr>
<td>% Females</td>
<td>63.4%</td>
<td>41.4%</td>
<td>55.4%</td>
<td>52.5%</td>
</tr>
<tr>
<td>Sex ratio of eligible students (M:F) *</td>
<td>0.79</td>
<td>1.06</td>
<td>0.69</td>
<td>0.76</td>
</tr>
<tr>
<td>Sex ratio of respondents (M:F)</td>
<td>0.57</td>
<td>1.41</td>
<td>0.8</td>
<td>0.91</td>
</tr>
</tbody>
</table>

*Sex ratio of eligible students was calculated using data received from school authorities.

Table 1. Response rate and gender distribution across schools
Chapter 4: Results

<table>
<thead>
<tr>
<th>Valid Weight and Height responses (by school)</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Giovanni Curmi Higher Secondary School (N = 352)</td>
<td>309</td>
</tr>
<tr>
<td>St. Aloysius College (N = 140)</td>
<td>132</td>
</tr>
<tr>
<td>St. Martin's College (N = 41)</td>
<td>33</td>
</tr>
</tbody>
</table>

Table 2. Valid weight and height responses per school (Valid N = cases with calculable BMI)

Respondents who failed to report their weight and height were excluded from analysis involving BMI. All students reported their gender and age. Mean age for all respondents was 16.4 years ($N = 533$; $range = 15 - 19$; $SD. = 0.765$), with the majority of students being 16 or 17 years of age.

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>25</td>
<td>4.7</td>
</tr>
<tr>
<td>16</td>
<td>304</td>
<td>57.0</td>
</tr>
<tr>
<td>17</td>
<td>161</td>
<td>30.2</td>
</tr>
<tr>
<td>18</td>
<td>32</td>
<td>6.0</td>
</tr>
<tr>
<td>19</td>
<td>11</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>533</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 3. Students' age distribution (in years)

The table below shows students' area of residence according to NUTS region. The majority of students hailed from the western and northern/northern harbour areas of Malta. It is not known whether this distribution reflects the locality of origin of all
eligible sixth form students in Malta. Eight students did not disclose their current town of residence.

<table>
<thead>
<tr>
<th>Region</th>
<th>Respondents</th>
<th>Percent</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Eastern</td>
<td>64</td>
<td>12.0</td>
<td>12.2</td>
</tr>
<tr>
<td>Western</td>
<td>109</td>
<td>20.5</td>
<td>20.8</td>
</tr>
<tr>
<td>Northern</td>
<td>125</td>
<td>23.5</td>
<td>23.8</td>
</tr>
<tr>
<td>Northern Harbour</td>
<td>161</td>
<td>30.2</td>
<td>30.7</td>
</tr>
<tr>
<td>Southern Harbour</td>
<td>66</td>
<td>12.4</td>
<td>12.6</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>98.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing No response</td>
<td>8</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>533</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Number of respondents by NUTS region.

Parental education and occupation were requested in the demographic section of the ATOP questionnaire. Maternal education was found to be an independent factor influencing ATOP score. Frequency data for this variable is shown in the table below.

<table>
<thead>
<tr>
<th>Maternal Education</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary level or less</td>
<td>19</td>
<td>3.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Secondary level</td>
<td>230</td>
<td>43.2</td>
<td>44.7</td>
</tr>
<tr>
<td>Post-secondary</td>
<td>132</td>
<td>24.8</td>
<td>25.7</td>
</tr>
<tr>
<td>University</td>
<td>59</td>
<td>11.1</td>
<td>11.5</td>
</tr>
<tr>
<td>Post Graduate degree</td>
<td>45</td>
<td>8.4</td>
<td>8.8</td>
</tr>
<tr>
<td>PhD</td>
<td>29</td>
<td>5.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Total</td>
<td>514</td>
<td>96.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing No response</td>
<td>19</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>533</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Maternal education (distribution)
Mean BMI values were calculated for those respondents who included weight and height data. BMI was normally distributed across the student population, with a minimum value below the underweight range, and a maximum value in the severely obese range. Mean BMI was 22.2 (n = 474, C.I. = 21.9; 22.6), which is within normal limits according to WHO cut-off points.

<table>
<thead>
<tr>
<th>Body Mass Index: Statistics</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Error</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Mass Index</td>
<td>474</td>
<td>14.7</td>
<td>45.2</td>
<td>22.227</td>
<td>.1776</td>
<td>3.8664</td>
</tr>
</tbody>
</table>

Table 6. Body Mass Index of all sampled students

<table>
<thead>
<tr>
<th>ATOP score: Statistics</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Error</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATOP score</td>
<td>533</td>
<td>21</td>
<td>96</td>
<td>58.39</td>
<td>.566</td>
<td>13.062</td>
</tr>
</tbody>
</table>

Table 7. ATOP score of all sampled students

<table>
<thead>
<tr>
<th>ATOP score</th>
<th>N</th>
<th>Mean</th>
<th>Lower CI</th>
<th>Upper CI</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>135</td>
<td>59.23</td>
<td>56.9</td>
<td>61.6</td>
<td>13.959</td>
</tr>
<tr>
<td>Normal weight</td>
<td>240</td>
<td>57.80</td>
<td>56.2</td>
<td>59.4</td>
<td>12.774</td>
</tr>
<tr>
<td>Overweight</td>
<td>84</td>
<td>57.80</td>
<td>55.0</td>
<td>60.6</td>
<td>12.934</td>
</tr>
<tr>
<td>Obese</td>
<td>15</td>
<td>60.53</td>
<td>53.5</td>
<td>67.5</td>
<td>12.660</td>
</tr>
<tr>
<td>Total</td>
<td>474</td>
<td>58.30</td>
<td>57.3</td>
<td>59.5</td>
<td>13.128</td>
</tr>
</tbody>
</table>

Table 8. Mean ATOP score by BMI category

Mean ATOP score for all students in the sample was 58.39 (n = 533, C.I. = 57.3; 59.5). While higher values imply a more positive attitude toward obesity, there is no
‘threshold’ value that can be used to classify attitudes as being overall ‘positive’ or ‘negative’. Instead, each score can only be judged against a range of ATOP scores obtained from the rest of the subject population under study, or against scores obtained from a different population.

4.1.1.1 Parental characteristics

A Kruskal Wallis (KW) test was run to identify any inter-school differences in parental characteristics. Whilst maternal occupation scores were similar across schools ($p = 0.135$), paternal education ($H(2) = 36.10$, $p = <0.001$) and maternal education ($H(2) = 21.29$, $p = <0.001$) were substantially different for SMC compared to the other two schools. There was also a statistically significant difference between schools with regard to paternal occupation ($H(2) = 23.39$, $p = <0.001$), with a mean rank of 180.84 for SMC and 277 for GCHSS. In this case a lower score implies a more highly skilled job, and hence a higher socioeconomic status with greater purchasing power.

Although differences between schools were detected, Chi Square Independence testing did not show any significant differences in parental characteristics between NUTS regions.
4.1.2 BMI

Students’ BMI and their weight categories were tested against other variables using non-parametric tests. Mean BMI referred to in charts and tables is measured in kg/m$^2$.

4.1.2.1 Gender Comparisons

Unsurprisingly, and consistent with results found elsewhere a significant gender difference in mean BMI was found ($p = 0.004$), with males having a higher mean body mass index of 22.74 kg/m$^2$ (C.I. = 22.19; 23.28) versus 21.72 kg/m$^2$ in females (C.I. = 21.29; 22.15).

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error of Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>240</td>
<td>21.725</td>
<td>3.4003</td>
<td>.2195</td>
</tr>
<tr>
<td>Male</td>
<td>234</td>
<td>22.741</td>
<td>4.2382</td>
<td>.2771</td>
</tr>
</tbody>
</table>

Table 9. Mean BMI by gender

4.1.2.2 Age

No significant age differences in mean BMI or BMI category (i.e. whether students were underweight, normal weight, overweight or obese) were found ($p = 0.743$).

4.1.2.3 NUTS region

No significant difference in either mean BMI, or BMI category between the five NUTS regions of Malta was found ($p = 0.697$).
4.1.2.4 School

No significant difference in mean BMI (or BMI/weight status category) was found between schools \((p = 0.663)\).

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giovanni Curmi Higher</td>
<td>306</td>
<td>22.144</td>
<td>3.8454</td>
<td>.2188</td>
<td>21.714 - 22.575</td>
<td>14.7</td>
<td>45.2</td>
</tr>
<tr>
<td>Secondary School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Aloysius College</td>
<td>132</td>
<td>22.479</td>
<td>3.8161</td>
<td>.3321</td>
<td>21.822 - 23.136</td>
<td>15.6</td>
<td>34.0</td>
</tr>
<tr>
<td>St. Martin's College</td>
<td>33</td>
<td>21.991</td>
<td>4.3174</td>
<td>.7516</td>
<td>20.460 - 23.522</td>
<td>15.2</td>
<td>38.9</td>
</tr>
<tr>
<td>Total</td>
<td>474</td>
<td>22.227</td>
<td>3.8664</td>
<td>.1776</td>
<td>21.578 - 22.576</td>
<td>14.7</td>
<td>45.2</td>
</tr>
</tbody>
</table>

Table 10. Independent groups ANOVA test for mean BMI of students in the three schools

4.1.2.5 Parental Characteristics

Mean BMI was not significantly related to paternal occupation \((p = 0.723)\), maternal occupation \((p = 0.570)\), paternal education \((p = 0.141)\) or maternal education \((p = 0.577)\).

4.1.2.6 Weight status and ATOP score

A Pearson product-moment correlation was run to determine whether a relationship exists between an individual's self-reported BMI category, and their ATOP score, the expectation being that students having a greater weight would be more tolerant of obese people and have less discriminatory (hence more 'positive') attitudes towards obesity. There was a very weak, negative correlation between the two, which was not statistically significant \((r = -0.021, n = 474, P = .666)\). This result will be explored later on in this chapter.
4.1.3 ATOP score

A value was obtained for each item in the ATOP questionnaire using scoring method outlined by the author. Summation of values gave a score representing attitudes toward obese persons in a psychometric linear scale which was found to be of high internal consistency (Allison, 1991). Students' ATOP scores were tested against other variables using parametric and non parametric tests.

4.1.3.1 Gender

Unlike BMI values, comparison of ATOP scores by gender did not result in any significant differences ($p = 0.770$). Mean ATOP score for males was 56.35 (C.I. = 56.83; 59.87), while that for females was 58.43 (C.I. = 56.79; 60.08).

4.1.3.2 Age

No significant differences in mean ATOP scores between ages 15-20 were detected ($p = 0.460$).

4.1.3.3 NUTS region

There was a statistically significant difference in ATOP score between regions as determined by one-way ANOVA ($F_{(4,520)} = 2.993$, $p = .018$). A Tukey post-hoc test revealed that ATOP scores of Northern Harbour and Southern Harbour were significantly different at 56.36 (C.I. = 54.34; 58.38) and 62.44 (C.I. = 59.15; 65.73) respectively,
although other regions did not significantly differ between themselves. The single student from Gozo was excluded from this analysis to allow post-hoc testing between groups.

![Mean ATOP score by Region](chart.png)

**Figure 1.** Bar chart showing mean ATOP score by region

4.1.3.4 School

Although mean ATOP score was highest in SAC (mean rank = 60.6) and lowest in SMC (mean rank = 56.4), the difference in mean ATOP score between schools was just above significance level ($p = 0.055$). Mean ATOP score for GCHSS was 57.79 (C.I. = 56.39; 59.20), that for SAC was 60.72 (C.I. = 58.60; 62.85), whereas SMC
students had a mean score of 55.89 (C.I. = 51.87; 59.92). The minimum ATOP score for all three schools ranged between 21 and 25. However, the maximum ATOP scores for GCHSS and SAC were 96 and 92 respectively, whereas that for SMC was only 76.

![Bar chart showing mean ATOP score by school](image)

**Figure 2.** Bar chart showing mean ATOP score of each school

### 4.1.3.5 ATOP score by Parental education

Although ATOP scores were not found to be related to parental occupation or paternal education, maternal education seemingly had an effect on ATOP scores. Students whose mothers had a post-graduate degree expressed the most negative,
discriminatory attitudes towards obesity, obtaining a lower mean ATOP score \((p = 0.012)\). Interestingly, students whose parents were University graduates scored the highest mean ATOP score. Such results should be interpreted with caution as students may not have reported parental education accurately.

<table>
<thead>
<tr>
<th>Maternal Education</th>
<th>Mean ATOP Score</th>
<th>Lower Confidence Interval</th>
<th>Upper Confidence Interval</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary level or less</td>
<td>59.16</td>
<td>54.05</td>
<td>64.26</td>
<td>2.431</td>
</tr>
<tr>
<td>Secondary level</td>
<td>58.29</td>
<td>56.62</td>
<td>59.96</td>
<td>0.847</td>
</tr>
<tr>
<td>Post-secondary</td>
<td>58.74</td>
<td>56.49</td>
<td>60.99</td>
<td>1.138</td>
</tr>
<tr>
<td>University</td>
<td>63.22</td>
<td>59.6</td>
<td>66.84</td>
<td>1.81</td>
</tr>
<tr>
<td>Post-graduate</td>
<td>54.33</td>
<td>50.26</td>
<td>58.41</td>
<td>2.021</td>
</tr>
<tr>
<td>PhD</td>
<td>54.72</td>
<td>49.7</td>
<td>59.75</td>
<td>2.454</td>
</tr>
</tbody>
</table>

**Table 11.** Mean ATOP score by level of Maternal Education

There was a statistically significant difference in student ATOP score according to maternal education as determined by one-way ANOVA \((F(5) = 2.979, p = .012)\). A Tukey post-hoc test revealed that ATOP scores of students with mothers having University degrees were significantly different from those with Post-graduate or PhD degrees, although there was no significant difference between mothers having post-graduate degrees and PhDs.
4.1.3.6 BMI category

ANOVA and Tukey’s post-hoc testing resulted in non-significant ATOP score differences between BMI categories. ATOP score did not significantly vary as weight status increased ($p = 0.66$). However, the graphs below show that attitudes tend to become slightly more negative as weight increases, with overweight individuals showing the most biased attitudes. Obese individuals (BMI > 29.9), on the other hand, tended to have higher ATOP scores than overweight individuals, perhaps showing an acceptance of their weight status as opposed to overweight students who have internalised society’s
weight stigma, even against themselves. Scatter plots failed to reveal valid correlation between the two variables.

![ATOP score by weight status](image)

**Figure 4.** Bar chart showing mean ATOP score according to self-reported weight status.

### 4.1.4 Discrepancy between computed BMI and perceived weight

A dissonance between computed body mass index using self-reported measurements, and whether students classify themselves as overweight, average or thin was observed, possibly indicating a lack of awareness of ideal body size. This gap between the two was particularly pronounced in males. Almost 15% of males perceived
themselves to be average in size when in fact their self-reported BMI exceeded 24.9 kg/m², compared to 11.7% of females describing themselves as average. In contrast, 14.2% of females describing themselves as average were in fact below normal BMI range, compared to 8.5% of males.

<table>
<thead>
<tr>
<th>Females (N = 240)</th>
<th>Perception of self-weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>Thin</td>
</tr>
<tr>
<td>Underweight</td>
<td>17.5%</td>
</tr>
<tr>
<td>Normal weight</td>
<td>5.8%</td>
</tr>
<tr>
<td>Overweight</td>
<td>.4%</td>
</tr>
<tr>
<td>Obese</td>
<td>.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Males (N = 234)</th>
<th>Perception of self-weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>Thin</td>
</tr>
<tr>
<td>Underweight</td>
<td>16.2%</td>
</tr>
<tr>
<td>Normal weight</td>
<td>20.9%</td>
</tr>
<tr>
<td>Overweight</td>
<td>.4%</td>
</tr>
<tr>
<td>Obese</td>
<td>.0%</td>
</tr>
</tbody>
</table>

Table 12. Frequency tables for perceived versus actual weight by gender

Frequency tables by school demonstrated similar distribution across schools. However, the lack of available BMI data in SMC due to non-response would bias a more detailed comparison.

4.1.5 Regression analysis and correlations

In this section, a regression model of continuous variables is described. Subsequently, any significant correlations between BMI, ATOP score and questionnaire responses are detailed. A number of significant yet weak relationships were identified.
Initially, BMI and ATOP scores will be correlated to specific questionnaire items, followed by a summary of inter-item relationships.

4.1.5.1 Univariate Regression analysis

Prior to regression analysis, data was tested for normality as a prerequisite for parametric testing. As seen in the Q-Q plots below, data points for ATOP score were distributed normally in a linear fashion. However the same could not be said of students’ BMI data, which were positively skewed due to a large number of outliers at both ends of the spectrum.

![Normal Q-Q Plot of ATOP score](image)

**Figure 5.** Q-Q Plot for ATOP score showing normality of data
A Pearson product-moment correlation was run to determine the relationship between students’ ATOP score and their BMI according to WHO cut-off points. The data was not normally distributed, showing heteroscedasticity. There was a very weak, negative correlation between BMI and ATOP score, which was not statistically significant \( r = -0.021, n = 474, p = 0.666 \).
Pearson Correlation

<table>
<thead>
<tr>
<th></th>
<th>ATOP score</th>
<th>BMI Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATOP score</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>533</td>
</tr>
<tr>
<td>BMI Category</td>
<td>Pearson Correlation</td>
<td>-.021</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>474</td>
</tr>
</tbody>
</table>

Table 13. Pearson’s correlation testing (BMI category vs ATOP score)

ANOVA Table

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATOP score * BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category (Combined)</td>
<td>271.680</td>
<td>3</td>
<td>90.560</td>
<td>.524</td>
<td>.666</td>
</tr>
<tr>
<td>Within Groups</td>
<td>81242.970</td>
<td>470</td>
<td>172.857</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>81514.650</td>
<td>473</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 14. Independent groups ANOVA: ATOP score by weight category showing non-significance.

A simple scatter dot graph with BMI as an independent variable (predictor) of ATOP score revealed a slight linear relationship between the two variables. The visual output showed heteroscedasticity with a large number of outliers that could not be corrected for without compromising the quality of data. The $R^2$ value of 0.001 in the table below indicates that only 0.1% of the ATOP score can be explained by students’ BMI. In fact, despite attempts to remove outliers, the univariate regression model could not significantly predict the outcome variable ($p = 0.552$).
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### ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>61.092</td>
<td>1</td>
<td>61.092</td>
<td>.354</td>
<td>.552a</td>
</tr>
<tr>
<td>Residual</td>
<td>81453.558</td>
<td>472</td>
<td>172.571</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>81514.650</td>
<td>473</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Body Mass Index
b. Dependent Variable: ATOP score

**Table 15.** Summary of regression model

![Graph showing scatter plot with dotted line](image)

**Figure 7.** Scatter-plot graph showing abnormal distribution of data
4.1.5.2 Univariate Analysis of Variance

General linear modelling was carried out using Univariate Analysis of Variance with ATOP score as the dependent factor, and the two significant associated variables (i.e. maternal education and region) as fixed factors. The resulting model showed that both variables were independently and strongly associated with ATOP score, with a significance level of 0.005 for maternal education, and 0.006 for NUTS region.

4.1.5.3 BMI and specific questions in the ATOP tool

Multiple Pearson’s Chi Square tests using the World Health Organisation’s Body Mass Index classification (WHO, 1995) were run to identify correlations between BMI according to weight category and other ATOP questionnaire items. Frequent but weak, non-significant correlations with ATOP questions were observed, however there was no correlation with parental characteristics or other demographic variables.

In summary, students reporting a higher BMI were more likely to think that they can be as successful as other workers; to give less importance to participation in sport, and to downplay the effects of obesity on lifespan. They were also more likely to think that aesthetically, being obese is no different from normal weight individuals. They do not lack self-worth, with overweight students agreeing with the statements that obese people are just as self-confident as other people, and are not ashamed of their weight. There is even a feeling that obese people are as healthy as non-obese people, although the association is very weak. On the other hand, they were slightly more likely to state that they had health problems related to excess weight.
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There was no significant relationship between weight category and expected happiness of obese individuals compared to non-obese people: apparently excess body weight was not seen to significantly impact mood.

KW testing showed statistically significant differences between BMI categories with regard to self-worth \( (H(3) = 13.208, p = 0.004) \), with mean rank of 205 for underweight, 249 for normal weight, and 296 for obese student. Thus, obese students as a group apparently have a lower sense of self-worth than non-obese students. There seems to be an inverse relationship between self-reported weight and self-worth, even though this was just above significance level \( (\text{Chi-square}_{15}) = 24.664, p = 0.055 \). Weight was also not significantly related to self-consciousness \( (\text{Chi-square}_{15}) = 9.042, p = 0.875 \).

Responses to the question regarding dissatisfaction with self were also normally distributed, with no significant correlation with BMI found \( (\text{Chi-square}_{15}) = 12.559, p = 0.636 \).
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Perceived self worth among obese by BMI category

Most obese people feel they are not as good as other people (qs. 2)

Figure 8. Perceived self worth among obese people

On the other hand, there was significant association between BMI category and responses to the statement that obese individuals are as self confident as non-obese people (Chi-square_{15} = 25.074, p = 0.49). 77.1% of students classified as overweight or obese moderately or strongly agreed with this statement, whereas only 42.6% of those classified as underweight or normal weight showed similar levels of agreement.

Notably, there was no correlation with responses to expectations of a successful career (Chi-square_{15} = 16.578, p = 0.345). However, the clustered bar chart below indicates that the majority (51.9%) of students think that weight does not play a role in future employment.
Figure 9. Perceived future career success among obese people

Surprisingly, the association of BMI category with selection of an obese individual as a marriage partner was also non-significant \((\text{Chi-square}(15) = 11.508, p = 0.716)\), with graphical output showing that responses to this question were normally distributed. Typical characterisations of obese people – i.e. that they are less tidy, less aggressive, more sociable and emotional than, yet resentful of non-obese people – were also non-significant.
That obesity is seen to be strongly and significantly associated with feelings of shame is not surprising \((\text{Chi-square}_{(15)} = 33.965, p = 0.003)\). 50.7% of all respondents moderately or strongly disagreed with the statement that few obese people are ashamed of their weight. Only 19% of students moderately or strongly agreed with the statement, and more than three quarters of this subgroup fell into the overweight or obese category.
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Shame felt by obese persons by BMI category

Figure 11. Sense of shame felt by obese persons

BMI category was not significantly related to how ‘normal’ obese individuals’ life was perceived to be ($\chi^2_{15} = 22.933, p = 0.086$), nor to their health when compared to non-obese people ($\chi^2_{15} = 16.74, p = 0.335$). There was also no association with sexual attractiveness ($\chi^2_{15} = 11.395, p = 0.724$). Additionally, BMI category was not related to the idea that the worst thing that could happen to a person would be for him to become obese ($\chi^2_{15} = 18.145, p = 0.237$).
Association with the stereotype that obese people tend to have family problems was also non-significant \((\text{Chi-square}_{15} = 11.521, p = 0.715)\).

![Sexual attractiveness of obese people by BMI category](image)

**Figure 12.** Sexual attractiveness of obese people
4.1.5.4 BMI related to non-ATOP questions

Kruskall Wallis testing of ordinal data in the second part (questions 21 - 26) of the distributed ATOP questionnaire resulted in statistically significant differences between responses to items in the different weight categories. As BMI increased, differences were seen in students’:

- Subjective attitudes (i.e. aesthetic perception of obesity) toward being fat ($H_{(3)} = 9.89, p = 0.019$) with mean rank increasing stepwise from 211.79 in underweight students to 234 in normal weight and 298.67 in obese students, showing increasing tolerance as weight increases

- Their perceived weight status ($H_{(3)} = 130.465, p < 0.001$) – demonstrating accurate awareness of their weight status

- Perceived effect of obesity on lifespan ($H_{(3)} = 17.45, p = 0.001$), with mean rank of 175.60 for obese students and 247 for underweight and normal weight students, suggesting that obese students were more likely to think that their weight would not affect lifespan

- Likelihood of having health problems allegedly related to obesity ($H_{(3)} = 13.178, p = 0.004$), with students falling into the obese category more likely to experience such health issues
No significant differences were seen with regards to participation in sport as a remedial measure to combat obesity ($H_{(3)} = 6.716, p = 0.082$), implying that students were all mostly aware of the importance of exercise as an important component of weight loss. Additionally, obesity was not a factor influencing choice of friends, as no significant differences between BMI categories was found ($H_{(3)} = 0.663, p = 0.882$).

Correlations between BMI category and the above items were also investigated using Chi-square tests. There was no significant correlation between students' self-reported BMI category and aesthetic perception of excess weight ($Chi-square_{(6)} = 11.814$,}
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$p = 0.066$; participation in sport ($\text{Chi-square}(6) = 8.996, p = 0.174$); or choice of friends ($\text{Chi-square}(6) = 3.756, p = 0.71$). Students’ weight was however significantly negatively correlated with perceived effect on lifespan ($\text{Chi-square}(3) = 17.493, p = 0.001$), and positively correlated with the likelihood of students stating that they have a health issue related to excess weight ($\text{Chi-square}(3) = 13.206, p = 0.004$).

![Perceived lifespan of obese persons](image)

**Figure 14.** Perceived lifespan of obese people
4.1.5.5 Gender differences

Kruskal Wallis testing was also utilised to identify differences in questionnaire responses by gender, in the belief that this may offer insight into their different motivations, beliefs and cultural norms. For the majority of questionnaire items, response trends were similar in both males and females. However, a few striking exceptions stand out.

There was a significant gender difference regarding whether students thought obese people were more self-conscious than non-obese people \((H_{(l)} = 10.178, p < 0.001)\) with mean rank of 286.75 for females and 245.31 for males. Female students were more likely to think that excess weight leads to greater self-consciousness. This was reflected in the significant gender difference found with regards to self-worth \((H_{(l)} = 4.832, p = 0.028)\), where females were more likely to attribute lower self-worth to overweight and obese persons. Confidence was also implicated \((H_{(l)} = 6.125, p = 0.013)\), with females less likely to think that obese individuals are as self-confident as other people.

On the other hand, males seem to give much more importance to aesthetics than do females when it comes to marriage \((H_{(l)} = 13.523, p < 0.001)\), with a mean rank of 243.16 in females and 291.29 in males. This may be related to the differences in response to the question on sexual attractiveness \((H_{(l)} = 8.3, p = 0.0041)\), with males significantly less likely to agree with the idea that obese people are as attractive as non-obese individuals. A spearman's correlation between the two items uncovered a weak yet significant negative relationship between perceived sexual attractiveness of obese people
and marriageability ($r_s = -0.275$, $p < 0.001$). Thus, students who are not influenced by obesity with regards to marriage seem to be less influenced by popular perceptions of sexual attractiveness. There was also a weak negative correlation of marriageability with students’ aesthetic perception of obesity ($r_s = -0.149$, $p = 0.001$). Students who thought that obesity was ‘ugly’ were less likely to want to marry obese people.

Figure 15. Gender-based response to marriageability of obese persons

Responses to the question on long-term lifestyle prospects also differed ($H(5) = 5.398$, $p = 0.020$) with females having a lower mean rank – suggesting that males link
obesity with a greater effect on life in general. Additionally, the issue of health is not as
relevant to males as it is to females ($H_{(1)} = 8.3, p = 0.004$).

### 4.1.5.6 Age

No significant differences were found in the response to individual questions by age.

### 4.1.4.7 School

Student attitudes towards obesity also seemed to be dependent on the school they attend.
In particular, perception of career success was markedly different ($H_{(2)} = 16.526, p = < 0.001$) between schools. SAC had a mean rank of 229.16, GCHSS had a rank of 275.06, whereas SMC ranked highest at 327. Thus, SMC had the most negative attitude towards obesity in terms of career success, whilst surprisingly SAC had the most positive attitudes in this regard. Similar mean rank differences were observed in the item suggesting that obese people tend to have family problems ($H_{(2)} = 20.626, p = < 0.001$), with SAC students having the most positive attitudes (i.e. expressing most disagreement with this statement).

One questionnaire item showed an unexpected result. 53% of SMC students stated that being obese was ‘Nice’ ($H_{(2)} = 42.535, p = < 0.001$) with a mean rank of 402.29 for SMC, 256.39 for GCHSS and 240.00 for SAC. No obvious reason for this jarring contrast to previous negative responses by students attending this school was identified.
4.1.5.8 Parental characteristics

Responses to questionnaire items were not found to be significantly related to parental characteristics. Indeed, the lack of association with either parental education or occupation may in itself be more significant than any correlation identified.

4.1.5.9 Health issues

Only 6 students allegedly had health problems related to excess weight, and these may not necessarily be truly caused by their obesity (only perceived to be thus associated). However this constitutes some 1.12% of the sampled student population, and may be just the tip of the iceberg. Problems mentioned included:

- “Excessive bullying” (impaired mental health)
- Fat liver
- Asthma
- Low blood pressure
- Heart problems
- Shortness of breath
- Diabetes
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4.2 Fat Finding Mission (FFM) Questionnaire

The Fat Finding Mission was distributed amongst Polytechnic Institute (now known as the Junior College) first year students in 1989. Since the eligible student population at the time is unknown, calculation of response rate is not possible, and normal distribution cannot be assumed.

4.2.1 Descriptive Statistics

Some recoding of data was necessary during the analysis stage. Certain questions leading to coding of ordinal data did not present their responses in a sequential manner. For example, the sequence of responses in question 3 (referring to health status of the fatter person) was altered prior to analysing results, in order to allow clearer ranked numerical representation of responses. Generally, a higher value was assigned to responses indicating a greater impact of obesity on lifestyle or health status.

Values for height and weight were not collected, so BMI could not be calculated. Additionally, the questionnaire format did not allow scoring of responses into a psychometrically valid scale similar to the ATOP score, hence attitudes toward obesity could not be accurately assessed and compared in this population. Instead, comparisons by gender will be made, and any correlations between items explored.
4.2.1.1 Gender

An analysis of gender differences in the responses to the nine items in the FFM was conducted using the Kruskal Wallis test for non-parametric, ordinal data. To facilitate analysis, the main theme or scope of each was distilled into a short phrase as seen below.

<table>
<thead>
<tr>
<th>FFM questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
</tr>
<tr>
<td>Respondent Males</td>
</tr>
<tr>
<td>Respondent Females</td>
</tr>
<tr>
<td>% Males</td>
</tr>
<tr>
<td>% Females</td>
</tr>
<tr>
<td>Sex ratio of respondents (M:F)</td>
</tr>
<tr>
<td>Mean age</td>
</tr>
<tr>
<td>Age range</td>
</tr>
</tbody>
</table>

Table 16. Descriptive statistics (FFM)

General aesthetic value attributed to excess weight differed significantly between males and females, with females being much more likely to express a negative aesthetic opinion (i.e. mark ‘Ugly’) when asked about their perception of being fat ($\chi^2 = 7.478, p = 0.006$), with a mean rank of 57.13 for females and 72.00 for males. No other significant differences were detected.

4.2.1.2 Age

The minimum and maximum age of respondents to the FFM was 15 and 19 respectively. No significant difference between variables was found by age.
4.2.2 Correlations

A Spearman's Rank Order correlation was run to determine any relationships between ordinal variables in the FFM. This excluded question 2, which encoded nominal data – a Cramer's V and Phi correlation was subsequently run independently for this question. All questionnaires were fully completed (N = 126). Most observed significant correlations are rather weak, yet suggestive of social trends current at the time of surveying.

4.2.2.1 Aesthetics

It was hypothesised that a negative aesthetic or health value attributed to fatness would influence response to other questions, suggesting a more negative overall attitude toward obesity. In fact, replies to this question were significantly but weakly correlated with perceived health status of overweight individuals \( (r_s = 0.187, p = 0.036) \), but not with an impact on lifespan. Aesthetics was also weakly, inversely correlated with perceived impact on career prospects \( (r_s = -0.191, p = 0.032) \) and participation in sport \( (r_s = -0.274, p = 0.002) \). This suggests that viewing fatness as something negative is associated with attribution of a lower health status to obese people, a greater (presumably negative) effect on career, and further emphasis on participation in sport by students, presumably in an effort to improve health. There was no relationship between aesthetic value and choice of ideal partner, suggesting that the formation of long-term relationships at the time was not dependent on current ideals of beauty or attractiveness.
4.2.2.2 Health status of the ‘fatter person’

How healthy are obese individuals? Analysis revealed a moderate and significant positive correlation between knowledge of a poorer health status in obese individuals and knowledge of the relationship between fatness and health, which will be explored later. Additionally, a significant weak-moderate negative correlation with effect on lifespan ($r_s = -0.388, p < 0.001$) was found, indicating an awareness of the link between the poor health of obese individuals and early mortality. There was also a weak association with a perceived increased need for participation in sport ($r_s = -0.180, p = 0.043$), so that the less healthy fat people were perceived to be, the higher the likelihood of students stating that fat people should participate even more in sport. Such associations are telling. At the time of surveying there were fewer sources of knowledge on health effects of obesity (outside of school) that students could consult. Yet it appears that Polytechnic students were aware of the negative health effects of obesity, and of the beneficial effect of sports to combat excess weight.

4.2.2.3 Choice of ideal partner

There was no significant correlation between choice of ideal partner and any other item. In spite of the weak association between perceived beauty and good health, the formation of long-term relationships was apparently not dependent on either factor.

4.2.2.4 Choice of friends

The lack of a correlation between obesity as a factor influencing choice of friends and any other variable in the FFM questionnaire may be of relevance. It does not exclude
the existence of weight bias in peer networking completely, although weight status as measured by question 1 (i.e. perception of oneself as being fat, average or thin) also had no obvious effect on students’ friend network.

### 4.2.2.5 Perception of self weight status

There was no significant correlation between classification of self-perceived weight and any other questionnaire item.

### 4.2.2.6 Knowledge of the relationship between fatness and health

The Chi Square Independence test was used to assess any statistically significant correlations between knowledge of the relationship between fatness and health and other variables. As expected, there was a positive correlation between student’s knowledge of the negative health status of fat individuals and awareness of a relationship between obesity and health \((Chi-square_{(4)} = 35.93, p = < 0.001)\) with a contingency coefficient of 0.471. There was also a significant correlation awareness of the above relationship and attribution of a shorter lifespan to fat individuals \((Chi-square_{(4)} = 10.57, p = 0.032, contingency coefficient t= 0.278)\), reflecting students’ knowledge that obesity impacts morbidity and mortality. Other variables did not have any significant associations.
4.3 ATOP vs FFM – an analysis

The following section will explore differences and similarities between responses to matched questions present in both the ATOP and FFM questionnaires.

4.3.1 Differences

The dataset containing bridged responses was first run through a Kruskal Wallis test in its entirety, using the year of distribution of questionnaire (i.e. in 1989 or in 2011) as a grouping variable. This allowed detection of overall differences in between students replying to the questionnaires, and hinted at changes in attitudes towards obesity over two decades. Subsequently, a second KW test was initiated with gender as the main grouping variable, thus enabling increasingly detailed comparison of the two populations.

A statistically significant difference \( H(1) = 29.87, p < 0.01 \) was detected with regards to the effect of obesity on career success, with students nowadays convinced that obesity has a lower negative impact (mean rank = 311.89) on their employment prospects than students 20 years ago (mean rank = 406.61).
The FFM question on whether obesity affects choice of an ideal partner was matched to two related ATOP questions: one dealing with marriage, and another on sexual attractiveness. Students' criteria for an ideal long term partner might have changed over the years, particularly with modern society's emphasis on aesthetic beauty. There was a statistically significant difference \( (H(1) = 55.76, p < 0.01) \) where 'ideal partner' was taken to imply marriage, with modern-day students less likely to feel influenced by excess weight in their choice (mean rank = 303.81) compared to previous students (mean rank = 435.17). However, this difference was not significant when the same question was related to sexual attractiveness \( (p = 0.484) \).
This contrasts with the significant difference observed with regards to the aesthetic value they place on obesity ($H_{(i)} = 6.427$, $p = 0.011$). Students 20 years ago were more likely to state outright their negative bias toward obesity (mean = 291.41) compared to the subjects utilised in this study (mean = 332.49). Whether this is due to true cultural change or simply reflective of increased political correctness is debatable.

No statistically significant differences between the two studies were found in students’ perception of their own weight ($p = 0.51$) - an interesting result considering the dramatic increase in adolescent obesity rates in the past twenty years. Nor were there any significant differences detected in their response to the items on participation in sport ($p = 0.112$), choice of friends ($p = 0.123$) and health status of the fatter person ($p = 0.348$). However, study participants nowadays were significantly more likely to be aware of the decreased lifespan associated with obesity ($H_{(i)} = 14.78$, $p = <0.001$), replying more negatively to this question (mean rank = 341.31 as opposed to 282.16 rank of the 1989 population).

### 4.3.2 Gender differences

Changes in gender perception of obesity – a reflection of how their specific socio-cultural context influenced their attitudes toward obesity – is particularly relevant when designing public health interventions aimed at changing such attitudes.

Kruskal Wallis testing of 1989 and 2011 student data at the gender level showed similar degrees of change in the two sexes over the years. For example, male students today give less importance to the potential impact of obesity on their career ($H_{(i)} = 13.93$, $p = <0.001$) with a mean rank of 192.08 for students twenty years ago and 146.51 for
Chapter 4: Results

modern-day students. For females, a similar result was observed \( (H_{(1)} = 15.52, \ p = <0.001) \), with a mean rank of 214.74 and 166.0 for 1989 and modern student populations respectively. Observed changes in ‘perceived effect on lifespan’ between the two studies were also similar for males \( (H_{(1)} = 9.245, \ p = 0.002) \) and females \( (H_{(1)} = 5.902, \ p = 0.015) \).

Over time, the two sexes truly differed in two items of importance. Whilst male students in both studies did not express a significantly altered attitude towards the aesthetics of obesity \( (p = 0.573) \), current female students showed markedly less outright bias and disgust toward obesity \( (H_{(1)} = 15.259, \ p =< 0.001) \). Indeed, the significant difference in this socio-cultural factor seen previously (i.e. between the two student populations in their entirety) was solely due to female students’ substantial change in their concept of the ideal body size.

This mellowing of attitudes is dramatically reflected in current females’ response when asked whether obesity influences their choice of an ideal partner. There was a highly significant difference between the two female populations of the two studies \( (H_{(1)} = 57.280, \ p = < 0.001) \) with a mean rank of 251.49 (implying a large influence on their choice) and 156.62 (a much smaller influence) - for female students surveyed in 1989 and 2011 respectively.
Chapter 5: Discussion

In discussing results of the study in this chapter, a necessary comparison is made with findings from similar studies elsewhere. Particular care was taken to explore any changes in attitudes over the past twenty years and potential explanations for these changes are proposed. Limitations of the study are also discussed.

5.1 Limitations

During the course of the study, a number of limitations and difficulties that could have affected validity were encountered. These are discussed below:

- The main limitation of the study was the self-reporting method chosen for height and weight, which is notoriously prone to errors. Although open-ended questions were kept to a minimum, self-reporting of anthropometric measurements frequently result in overestimation and underestimation respectively (Stommel and Schoenborn 2009; Krul, Daanen et al. 2010). Self-reporting of parental characteristics might also not reflect reality, since a few students will inevitably not be cognisant of their parents’ occupation or educational level.

- Confounding factors may not have been equally distributed between groups leading to bias and subsequent misinterpretation.
• Selection Bias - only those students who attended their school on the day of surveying were sampled. Additionally, it is possible that a large proportion of those who did not report their weight and height were themselves overweight or obese – hence the relatively low number of overweight individuals in the survey. Such sampling errors might have been amplified since student populations in the different schools varied widely.

• The ATOP questionnaire was distributed to SMC students via online means. This might have led to differing levels of information bias, with systematic errors in measurement and response rates.

• Due to time and access constraints, Gozitan institutions were excluded from the survey. The student population is thus not entirely representative of the entire Maltese population.

• The FFM was distributed in the sixth form institution nowadays known as the Junior College (JC). Ideally, the ATOP questionnaire should also have been distributed within the same school, in order to compare similar student populations. However, JC authorities did not permit systematic, random questionnaire distribution and data collection, adamantly insisting on convenience sampling outside the classroom instead. This resulted in a low response rate with uncertain representation. GCHSS (a relatively representative government school
where authorities allowed sampling in the classroom) was selected instead of JC
for this reason.

- While the ATOP questionnaire is a validated, internally consistent tool that has
  been used in multiple studies, the FFM questionnaire (1989) was designed in-
  house by Maltese researchers, and did not undergo validation testing.
  Additionally, the use of certain linguistic terminology (e.g. fatness) might not be
  politically correct nowadays, with most literature making use of the term ‘obesity’
  instead.

- Questions in the FFM were not transposed in their entirety to the questionnaire
  distributed in 2011, so that comparability of certain FFM questions to ATOP
  required ‘collapsing’ of Likert scale responses to enable bridging. This process
  decreased the sensitivity of the ATOP questionnaire and the comparison itself,
  with subsequent loss of nuanced responses that forced either agreement or
  disagreement with the statements (i.e. made neutral responses impossible)

- In spite of precautions, random errors might still have occurred during data input.

- Response rate for GCHSS and SAC was around 60%. This may bias the accuracy
  of results in that non-responders may have been overweight or obese students who
  were put off by the theme of the questionnaire, or were simply unwilling to fill it
  in.
• The author collected all questionnaire data – hence the study was not blind, and it is difficult to exclude potential bias during data collection.

5.2 Socioeconomic status

Obesity is partly a social construct. Socioeconomic status (SES) plays a major role in the development of obesity, and attitudes towards this public health issue (Sobal and Stunkard 1989). Sobal’s exhaustive review of the literature (Sobal and Stunkard 1989) indicated that SES is inversely related to obesity in developed countries, especially in women. The authors suggested that dietary restraint, physical activity, social mobility and inheritance could be determinants of this inverse relationship, which differs dramatically from the positive relationship seen in developing countries (Subramanian, Perkins et al. 2010). Later systematic reviews confirmed these findings (Shrewsbury and Wardle 2008), emphasising the importance of parental education.

To a certain extent, the determinants mentioned above are all related to level of education, which in turn influences familial food habits, knowledge about obesity, health behaviours, and financial ability to improve lifestyle so as to prevent the development of obesity (and that of their children). Hence, parental education as a measure of SES was of greater importance than occupational class during this project, a finding substantiated by obesity studies elsewhere (Novak, Ahlgren et al. 2006).
One would expect an independent, profit-oriented school to be attended by relatively well-off students whose highly educated parents can afford substantial annual fees, whereas state-funded government and church schools tend to be less costly, and hence less exclusive. In effect, obvious differences in paternal occupation and level of parental education between schools resulted in their offspring's differing attitudes towards obesity. Maternal education in particular exerted a significant independent effect on ATOP score. Possibly, mothers in general spend more of their time with their children, who thus internalise their attitudes to a greater extent (Miranda 2011). Taking maternal education as a proxy of SES, the higher the socioeconomic standing of an individual, the more negative the attitudes toward obesity. Whether this is due to increased knowledge of negative health effects of obesity or to a greater emphasis/appreciation of slimness as a beauty ideal, or to perceived lack of self control of obese individuals is a subject for further research.

Regional differences in ATOP score are harder to explain, especially when taking into account Malta's small size. No regional difference in student BMI was observed, indicating that the true reason lies elsewhere. Initially it was thought that regional differences were due to current SES habitation trends, with people from the Northern part of Malta generally having a higher educational level and overall SES (HIS 2008). However, univariate analysis of variance showed that region had an apparently independent, significant effect on ATOP score. The catchment area for all three schools extends across Malta. However, this does not mean that students from different regions have similar access to each school; socioeconomic status invariably has an effect on
school access (Sultana 1994). Thus, peer networks and friendships formed between students coming from particular regions and schools. This may play a pivotal role in development of attitudes.

Although an expected weight difference by gender was observed, BMI itself was not associated with measured determinants of SES. While this may be due to lack of a sufficient sample size, a more worrying possibility is that excess weight in Maltese adolescent students has now become the norm, across all strata of society. Further qualitative research and publication of existing studies such as the results of the HBSC 2009/2010 survey, will be useful in this respect.

5.3 ATOP score and BMI

Neither BMI nor ATOP score differed by school, although the latter difference almost reached significance, with SMC having the lowest mean ATOP score. More surprisingly, however, ATOP score did not vary significantly by BMI category. Previous research indicated that as BMI increased, ATOP score would decrease, implying an internalisation of weight bias by overweight individuals who subsequently express their frustration and dissatisfaction at their own excess weight (Puhl and Brownell 2006; Puhl, Moss-Racusin et al. 2007). However, this was not found in the present study. While overweight students showed a slight decrease in the ATOP score compared to normal weight students, the score for obese students was slightly higher than either category, although results were not statistically significant. Was this related to acceptance of their weight? Did those students who were merely overweight resent their extra kilos, perhaps
feeling pressured to return to normal weight? Did those who went beyond overweight into the obese range give up trying to lose weight, deciding to make the best of their situation and accept themselves as they are? Is this necessarily something to be discouraged? It must be kept in mind throughout that these results are self-reported, and that reality may be very different.

5.4 Change in perceptions and attitudes toward obesity

On comparison of attitudes toward obesity between young Maltese adolescents twenty years ago and today, two aspects stand out in particular. Firstly, the apparent decrease in expressed weight bias over time is at odds with modern trends idealising thinness. Secondly, the intricate relationship between self-reported excess weight and perceived negative effects on students’ future is less pronounced today than it was twenty years ago. Notably, attitudes toward both career success and marriage seem to be less influenced by individual weight status than previously.

The concept of sexual attractiveness has not changed dramatically over time: slim, slender people appear to be as desirable today as they were 20 years ago, across all self-reported weight categories. However, partner’s weight status is no longer as significant as it used to be in determining long-term relationships. This is particularly true for female adolescents nowadays. Male adolescents, on the other hand, seem to have retained a preference for slim, attractive long term partners. What brought about this apparent cultural shift? Did it occur because the overwhelming increase in average body size made the likelihood of finding an ‘ideal’, slim partner unrealistic, at least for females? Or is it simply a case of students acknowledging that slim, attractive individuals do not
necessarily make good long term partners? Such questions will require further qualitative research in order to identify the reasons behind these changes.

Perceived impact of obesity on future employment has also changed over time. Whilst students twenty years ago believed that weight status has an effect on career success, current study participants (particularly those who were reportedly overweight or obese) generally disagreed, suggesting that they are not cognizant of existing obesity bias in the workplace setting (Puhl and Heuer 2009; Giel, Thiel et al. 2010). Hence, this study showed how current students of both sexes having a greater BMI were more likely to think that they can be as successful as other workers. It is possible that as obesity rates in general (together with the proportion of students who fall into the overweight or obese BMI category) increased over the years, there was a corresponding shift in career perception.

In line with contemporary research, one would expect students from a lower socioeconomic background to have the least discriminatory attitudes towards obesity. In fact, SMC students attributed obesity with the greatest impact on career success. This is in line with findings that SMC students had parents with the highest level of education and paternal occupation compared to the other two schools. High levels of maternal education were directly linked to a lower ATOP score, and hence an increased probability of thinking that weight status has a role in the world of work.
Chapter 5: Discussion

The stereotypical jolly, sociable but untidy obese individual with emotional and family problems seems to have disappeared over time. Overweight people are no longer the exception. Increasingly, they are becoming the norm across developed societies, and it is difficult to portray stereotypes when many students' peers are themselves overweight.

5.5 To weigh or not to weigh...

Whilst the idealization of thinness has increased over past decades, Maltese adolescents have become progressively heavier (Cacciotolo 1992; Grech 2006). However, this has not been accompanied to a significant extent by increased awareness of general weight gain. Although actual weight comparisons cannot be made due to lack of BMI data in the 1989 survey, current study participants did not perceive themselves to be significantly more overweight than 1989 students.

In this study, a significant percentage of both male and female students were unaware of their overweight status, perceiving themselves to be average in size. On the other hand, a small proportion of female students of normal weight according to self-reported BMI category perceived themselves to be overweight – probably as a result of their exposure to current social pressures and norms. This dissonance between actual weight and perceived weight needs to be addressed for successful health interventions to address obesity. A possible reason for this mismatch may be the way adolescents evaluate and compare themselves to their peers, rather than to models provided by society. As their main reference point (i.e. peers) became heavier over time, adolescents were probably less likely to perceive themselves to be overweight. Additionally, when non-
peers (adults) are themselves overweight, the distinction between what is ‘normal’ and what is abnormal blurs. This may be of significance later on, when the chronic health effects of obesity start to appear at increasingly younger ages.

Female adolescents tend to be more concerned about their weight than males – perhaps being conscious of the greater attractiveness of slimmer girls to males as found in this study - and perceived overweight in spite of normal actual weight is more common among girls (Felts, Tavasso et al. 1992; Kaltiala-Heino, Kautiainen et al. 2003). This finding was supported in this study, with female adolescent students nowadays attributing greater self consciousness, lower self worth and less self confidence to obese people than did male students. Among the latter, being heavier is likely to have a different meaning: a greater size is associated with strength and masculinity, both of which are ‘positive’ attributes (Adams, Sargent et al. 2000; McCreary and Sasse 2000).

It seems that adolescents are not particularly concerned about being overweight, although the proportion of those who are actually overweight has probably increased. While male students seem to have kept the same aesthetic criteria for judgment of ideal body size, female students show markedly improved attitudes towards obesity now than they did two decades ago. This is reflected in their less discriminatory responses when asked whether obesity influences their choice of an ideal partner. Perhaps their exposure to increasingly large body sizes is leading to a ‘blurring’ of contrasting body types, so that students can no longer easily differentiate between normal weight and overweight. Alternatively, society may be witnessing a gradual acceptance of excess weight as
something ‘normal’. The latter scenario is of particular importance for future health promotion efforts. It seems that a paradigm shift in perception of excess weight has occurred, with body sizes that were previously normal being regarded as thin nowadays, whereas what was overweight several years ago is now considered to be average.

Future time-trend studies should assess both actual and perceived weight, in order to identify discrepancies between the two. International research has shown that educated young women tend to systematically overestimate their weight at the lower range of BMI, whereas males tend to underestimate their weight at higher BMI deciles (Wardle, Haase et al. 2006). This effect was also observed in this study.

5.6 Obesity and self-worth

In accordance with expectations gained from international research (Puhl and Heuer 2009; Puhl and Heuer 2011), heavier students seem to have internalised societal obesity bias (Wang, Brownell et al. 2004; Schwartz, Vartanian et al. 2006). Consequently, their self-esteem and sense of worth suffers. Strangely, however, this was not accompanied by increased dissatisfaction with self, nor with increased self-consciousness or unhappiness. Self worth was not significantly correlated to perceived self-weight, indicating that at least some overweight students have become accustomed to their weight, preventing it from determining their sense of worth. Additionally, a large proportion of overweight students stated that they are as self-confident as non-obese people. Perhaps overweight and obese students are rejecting obesity bias, refusing to let society dictate how they should feel about themselves. The relatively large proportion of overweight students denying that they felt ashamed about their weight supports this idea,
at the same time as the majority of non-obese students attributed feelings of shame to persons with weight problems. This study also detected increased aesthetic tolerance of obesity - which is directly linked to self-worth (Sobal, Nicolopoulos et al. 1995) - as actual BMI increased, which may be a psychological reaction to the bias that overweight students encounter daily. Once again, it must be emphasised that a qualitative study might give a very different picture of the situation.

5.7 Health

Although other studies (Okosun, Choi et al. 2001) have found significant linear associations between obesity and self-rated health, with fewer people reporting good health as their weight increases, this effect was not reproduced in this survey. Indeed, although only reportedly overweight individuals claimed to have obesity-associated health problems, there was general acceptance amongst obese students that obese people are as healthy as non-obese people.

Outside of educational institutional in 1989, there were fewer sources of knowledge detailing the health effects of obesity (such as the internet) that could be readily consulted by students. Yet students were already making the link between the two, and this has remained valid even now. All responses relating excess weight to poor health were similarly negative in both the 1989 and the current survey, implying that this association is being made irrespective of the level of maternal education.

The lack of a significant difference in students’ perceived weight from 1989 to 2011 is interesting. It is highly unlikely that Polytechnic students were all overweight.
However, the dramatic increase in actual weight from 1989 to 2011 apparently did not translate into a significant difference in perceived self weight. It may be argued that current students, although heavier than past students, are unaware of their extra weight. By contrast, students nowadays are more aware of the decreased lifespan associated with obesity than students twenty years ago. However, overweight and obese students were more likely to think that their weight would not influence lifespan, although they acknowledge a relationship between obesity and health. This gap suggests an element of denial that complicates the overall situation.

One health-related factor has remained constant over the years: across all weight categories, sport was seen as an essential component of weight loss efforts. This is one area where students’ perceptions are at par with public health knowledge.

5.8 Friend networks and obesity

In this study, obesity did not seem to significantly influence choice of friends for students in any BMI category. Obesity has become so commonplace that it does not significantly contribute to formation of relationships with peers. This was consistent with findings from the 1989 subject population, although students may also have been reluctant to express an outright weight-related opinion about their own peer networks. There is a lack of local qualitative data in this regard that may help to identify the true socialization effects of obesity.
5.9 ATOP scores abroad

The mean ATOP score for students across all sampled schools in Malta was 58.3. Unfortunately, no studies using the ATOP questionnaire on adolescent students were identified in the literature, so direct comparisons with a similar population could not be made. However, studies on adult subjects exist.

A sample of overweight adults sampled from a U.S. weight loss program (Friedman, Reichmann et al. 2005) had a mean ATOP score of 54.5. This population accepted overweight less than Maltese students, which is consistent with evidence suggesting that overweight individuals are more critical of their own weight problems (Crandall 1994). However, Maltese students scored substantially less than non-obese U.S. psychology undergraduates (mean = 63.9) or members of the National Association to Advance Fat Acceptance (mean = 67.6) (Allison 1991). While it was in the interest of the latter group to have relatively positive attitudes toward obesity, the non-obese U.S. undergraduate students are unlikely to have had any such motivation. The 1991 study suggested that lean persons may have more positive attitudes than heavier individuals. If this is also the case in Malta, perhaps Maltese students are becoming increasingly biased as their average weight increases.
Chapter 6: Conclusion and Recommendations

6.1 Conclusion

In conclusion, this study finds that Maltese adolescents seem to be rather indifferent to their ever more prevalent overweight and obesity, although a range of attitudes related to social gradient was also evident.

There appeared to be an on-going conflict between messages idealising thinness transmitted to them by the media, and beliefs formed through observation of their physical surroundings, where overweight and obesity are rampant. Adolescents nowadays are exposed to a bewildering array of conflicting messages regarding appropriate weight. From stick-thin models and film stars on the big screen, to popular local or foreign soap operas (e.g. “Mike and Molly”; “King of Queens”; ‘Simpatici’) portraying overweight role models; from emphatic health promotion messages focusing on the negative health effects of obesity, to unhealthy food environments at home - it is not surprising that some adolescents adopt harmful food habits whilst at the same time internalising society’s aesthetic values. Such conflicts do not make the typically confusing teenage years any easier to get through, and may have long lasting consequences for mental health. Although outwardly knowledgeable about obesity’s risk to their health, adolescents in this study seemed to distance themselves from such beliefs.

Presently, Maltese adolescents seem to have more discriminatory attitudes toward obesity than do certain other populations in the U.S. Compared to U.S. non-obese undergraduate students and obese individuals with a strong commitment to improve attitudes towards overweight, subjects in the study had less favourable scores. However,
they had slightly better ATOP scores than obese individuals who were seeking help for their weight problem. One should keep in mind that these populations are not very similar, and hence any comparisons should be interpreted with caution. If one assumes for a moment that Allison’s conclusions in his 1991 study were correct (i.e. that obese persons have more negative attitudes toward their weight than do relatively lean people), then perhaps Maltese adolescents are on a transitory path towards increasingly negative attitudes as their average weight increases.

Additionally, perceptions of obesity appear to have changed over the last two decades. As adolescents’ average Body Mass Index increased, there seems to have been a concomitant increase in acceptance of overweight and obesity (although reservations exist regarding the comparability of the two study populations). Presently, however, there seems to be a gap between existing knowledge about excess weight, and its implications for the students’ future.

Awareness of obesity’s public health relevance has undoubtedly increased since the late eighties, thanks to greater evidence-based knowledge of the long-term consequences of obesity and urgent public health efforts to push obesity into the forefront of the political agenda. Over the years, adolescents seem to have listened to and understood health promotional and media messages stating that obesity is harmful to health. Current students know that obesity influences morbidity and mortality, and are aware that measures can be taken to control their weight. Interestingly, however, this study also indicates that they fail to truly relate personally to these messages. Whilst they have internalised societal bias towards heavy body size, and female students in particular
seem to suffer emotionally as a consequence, they do not imagine that their present weight might affect future employment or relationship prospects. Is this failure to holistically grasp the true implications of the problem a conscious effort, a wilful attempt to refute the imposition of society’s negative attitudes? Whatever the case, education regarding all aspects of the obesity problem from an early age is key: the home environment (as suggested by using maternal education as an indirect measure of SES) seems to be a determinant factor in the moulding of such attitudes and perceptions from an early age.

Additionally, the study results showed that students do not compare themselves (or their weight) to abstract scientific values. Instead, they utilise their immediate social environment - their role models, their peers, and their family - to create their own standards and norms against which to measure themselves.

6.2 Recommendations

Any public health interventions aimed at reducing the burden of obesity would need to take into account the specific characteristics of the Maltese population, particularly adolescents. This age group should be a major target for prevention and treatment interventions, since adolescents are liable to suffer from similar co-morbidities as obese adults, and for a longer time span. This is directly related to an increased risk of mortality (Abdullah, Wolfe et al. 2011) as well as having a detrimental impact on their quality of life (Deckelbaum and Williams 2001; Dehghan, Akhtar-Danesh et al. 2005). As future parents, they also have the potential to transmit their health perceptions and
behaviours to their offspring, shaping and moulding the sociocultural environment of subsequent generations.

All adolescents, regardless of weight status, should be targeted. Given adolescents' normative tendencies, it is important to encourage healthy behaviours amongst both overweight individuals and their non-obese peers, making such behaviours 'mainstream' and ordinary. In this way, the shift in normative attitudes towards acceptance of obesity may be reversed.

The results of this study on adolescent and young adult students suggest that obesity in Malta has become increasingly accepted, and being overweight is not as unusual or disturbing as previously. These normative changes in perceptions and attitudes toward obesity, together with their implications on physical and mental health, deserve further study.

Researchers have proposed that dissatisfaction with body size may itself result in corrective weight control behaviours (Heinberg 2001), arguing that adolescents experiencing weight stigma may be motivated to lose weight. At the same time, this study and other contemporary research (Latner and Stunkard 2003) suggest that adolescents are not following this pattern, as evidenced by the recent significant increase in obesity rates in Maltese adolescents (Grech 2010). Others still have proposed that weight stigma is counterproductive, increasing the likelihood for unhealthy eating, sedentary behaviour, maladaptive weight loss efforts and decreased access to preventive health (Carr and
Friedman 2005; Puhl and Brownell 2006; Carels and Musher-Eizenman 2010; Puhl and Heuer 2011).

6.2.1 Obesity Strategy

This study shows that existing health promotion efforts in Malta should increasingly take into account adolescent’s changing attitudes towards obesity in an increasingly ‘heavier’ society. Policymakers - who are responsible for setting out the framework within which the obesity problem is addressed - should be made aware of existing psychosocial barriers to health promotion efforts, and encourage a reversal of the trend. A national Obesity Strategy is currently undergoing the final stages of consultation with key stakeholders, and is expected to be published in the coming months. A multidisciplinary, inter-departmental approach should be taken in order to ensure that all aspects of our obesogenic environment are addressed and modified.

6.2.2 Parental engagement

Results from this project highlight the importance of parental education - particularly maternal education - in the moulding of adolescent attitudes towards obesity, which in turn directly influence health behaviours. Any interventions aimed at adolescents and children should also engage their parents, who are crucial in the fostering of healthy food habits and a family environment conducive to a normal, healthy weight. Parents should ideally receive information about the long term effects of obesity on their children, starting from a tender age (e.g. nutrition and health classes for the entire family in a community setting). Actions that can be taken in the family setting, such as limiting
6.2.3 Content of health messages

To a certain extent, it seems that current health promotional messages are being received and internalised. However, this increased knowledge is not translating into healthier behaviour or improved attitudes towards excess weight. Adolescents perceive themselves as healthy despite their increased weight, and the majority do not complain of weight-related health problems. Placing more emphasis on general wellbeing as opposed to good health, and teaching adolescents about the potential implications of obesity on their immediate future, might be more relevant to adolescents. Health issues and obesity seem to be distantly connected in their minds; but the prospect of work, and formation of relationships, might be of more immediate interest. Effective health messages should also be gender-specific, tackling topics of relevance to adolescents and taking into account the substantial psychological differences between males and females.

6.2.4 Psychological health

Obesity affects the psychological health of Maltese adolescent students, particularly girls who are more prone to feelings of worthlessness and shame than their male counterparts. Although the effects of obesity on students' psychological well being were not actively researched in this study, the creation of supportive environments for
such individuals, whether at school or in the community, might go a long way towards encouraging them to face related problems and successfully achieve weight control.

6.2.5 Peer-based approach

A focused approach towards altering attitudes towards obesity that targets overweight adolescents and their peers might be more effective than generalised campaigns in the long run. Participatory health education sessions delivered by students within the school setting might be one such approach. Adolescents spend a significant amount of time each day with their peers, who have a disproportionate influence on each other's attitudes toward and perceptions of obesity. Collective participation in health promotional interventions might help to establish new social norms that encourage and facilitate weight control.

6.2.6 Further research

Further qualitative and quantitative research is required to explore adolescents' weight behaviour and attitudes towards their weight. Prospective studies that measure changes in students' perceptions during and after specific interventions would greatly enhance current knowledge and guide policymakers in their efforts to reduce the overall burden of obesity. Additionally, the conflict between society's transmitted expectations regarding weight and those generated by adolescents themselves is a topic deserving of further study.
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University of Malta
MEDICAL SCHOOL
Mater Dei Hospital, Tal-Qroqq MSD 2090

20th September 2010

Mr J Sciriha
Principal
Junior College

Dear Mr Sciriha,

Re: Sixth Form Students’ Attitudes towards Obesity in Malta – Study by Dr Daniel Cauchi MD

Dr Cauchi submitted a research ethics application with the Faculty of Medicine and Surgery Research Ethics Committee.

The Research Ethics Committee finds no objection to Dr Cauchi conducting above study on condition he is granted ethical approval by the University Research Ethics Committee.

Yours sincerely,

Dr M Vassallo
Chairman
Research Ethics Committee

FAT FINDING MISSION

Please put only one mark (x) per question.

Sex: male __ female __

Age last birthday: ___/

1. Do you consider yourself:
   - fat ............................................ ( ) 1
   - average ............................................ ( ) 2
   - thin ............................................. ( ) 3

2. Do you think there is a relationship between fatness and health?
   - Yes................................................. ( ) 4
   - No.................................................. ( ) 5
   - Don't know......................................... ( ) 6

3. Do you think that the latter person is:
   - More healthy..................................... ( ) 7
   - Less healthy ..................................... ( ) 8
   - No different....................................... ( ) 9

4. How might fatness affect success in your career?
   - No effect.......................................... ( ) 10
   - Little effect...................................... ( ) 11
   - Great effect...................................... ( ) 12

5. To what extent does fatness affect your choice of an ideal partner?
   - Very much....................................... ( ) 13
   - No effect.......................................... ( ) 14
   - Very little....................................... ( ) 15

6. To what extent does fatness affect your choice of friends?
   - Very much....................................... ( ) 16
   - No effect.......................................... ( ) 17
   - Very little....................................... ( ) 18

7. Being fat is:
   - Ugly................................................. ( ) 19
   - No different....................................... ( ) 20
   - Nice................................................ ( ) 21

8. Fat people should:
   - Not participate in sport...................... ( ) 22
   - Participate in sport............................ ( ) 23
   - Participate even more in sport.............. ( ) 24

9. Fat people:
   - Usually live longer............................. ( ) 25
   - Have an average life span.................... ( ) 26
   - Usually die younger........................... ( ) 27

Thank you for your help
Appendix C: ATOP Questionnaire

Attitudes toward Obese Persons Scale

The following short questionnaire will attempt to assess your attitude towards obese persons, and will take around 5 minutes of your time. Your participation is entirely voluntary, and you may stop answering questions at any point. Please refrain from writing anything by which you may be identified in order to preserve anonymity.

Section A – Attitudes Towards Obese Persons Scale

Kindly read the following instructions before answering this section.

Instructions

Please mark each statement below on the right margin, according to how much you agree or disagree with it. Kindly fill in all statements. Use the numbers on the following scale to indicate your response. Remember to place a minus or plus sign (- or +) beside the number that you choose, to show whether you agree or disagree.

-3  -2  -1   +1   +2   +3
I strongly disagree  I moderately disagree  I slightly disagree  I slightly disagree  I moderately agree  I strongly agree

1. Obese people are as happy as non-obese people. _____
2. Most obese people feel that they are not as good as other people. _____
3. Most obese people are more self-conscious than other people. _____
4. Obese workers cannot be as successful as other workers. _____
5. Most non-obese people would not want to marry anyone who is obese. _____
6. Severely obese people are usually untidy. _____
7. Obese people are usually sociable. _____
8. Most obese people are not dissatisfied with themselves. _____
9. Obese people are just as self-confident as other people. _____
10. Most people feel uncomfortable when they associate with obese people. ______
11. Obese people are often less aggressive than non-obese people. ______
12. Most obese people have different personalities than non-obese people. ______
13. Very few obese people are ashamed of their weight. ______
14. Most obese people resent normal weight people. ______
15. Obese people are more emotional than non-obese people. ______
16. Obese people should not expect to lead normal lives. ______
17. Obese people are just as healthy as non-obese people. ______
18. Obese people are just as sexually attractive as non-obese people. ______
19. Obese people tend to have family problems. ______
20. One of the worst things that could happen to a person would be for him to become obese. ______

Please mark one answer with an 'X' in the appropriate box
21. Being obese/fat is:
   Ugly □  No different □  Nice □
22. Do you consider yourself to be:
   Overweight □  Average □  Thin □
23. Fat people should:
   Not participate in sport □
   Participate in sport □
   Participate even more in sport □
24. Fat people usually:
   Live longer □
   Have an average life span □
   Die younger □
25. To what extent does fatness affect your choice of friends?
Very much ☐  No effect ☐  Little effect ☐

26. Do you have any health problems which you think are related to excess weight?

Yes ☐  No ☐

27. If yes, what health problem/s do you have? (please leave blank if your answer was ‘No’)

Section B - Demographics

This section contains general questions for demographic purposes.

1. Gender: Male ☐  Female ☐

2. Age at last birthday (in years): _______

3. Which town do you currently reside in? _____________

4. Weight (kg): _____________

5. Height (cm): _____________

6. Completed parental education:
   a) Primary level or less
   b) Secondary level
   c) Post-secondary
   d) University
   e) Post Graduate Degree
   f) PhD

   Father  Mother

   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐

7. Parental occupation
   a) Professional (e.g. lawyer, doctor, accountant)
   b) Intermediate (e.g. teacher, nurse, manager)
   c) Skilled non-manual (e.g. typist, clerk)
   d) Skilled manual (e.g. carpenter, bus driver, cook)
   e) Unskilled manual (e.g. cleaner, labourer)
   f) Armed Forces/Police/CPD
   g) Home carer
   h) Unemployed

   Father  Mother

   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐
   ☐  ☐
Appendix D: Permission to use ATOP questionnaire (Author’s correspondence)

On November 21, 2010 at 5:04 PM, Richard Sarver <RSarver@ms.soph.uab.edu> wrote:

Good morning Dr Cauchi,

Thank you for your message to Dr. David Allison. I am responding on his behalf while he is out of the office. Dr. Allison is delighted to hear of your interest in his research and is happy to grant your request.

Should you need anything else, please let me know how I may be of assistance.

With thanks,

Richard F. Sarver
Program Manager II
Section on Statistical Genetics, RPHB 414
205.975.9169 T; 205.975.2541 F
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http://www.ssg.uab.edu

From: Dan Cauchi [mailto:dcauchi@gmail.com]
Sent: November 19, 2010 3:06 PM
To: dallison@uab.edu
Subject: Permission to use ATOP

Dear Dr. Allison,

I am Daniel Cauchi, a public health physician reading for a MSc in Public Health at the University of Malta. I am currently in the process of creating a proposal for my dissertation, which basically involves comparing contemporary sixth form (16 yr) students’ attitudes towards obesity with unpublished data collected 20 years ago and attempt to identify any changes in such attitudes. The closest and most comprehensive validated questionnaire I could find was your Attitudes Toward Obese Persons Scale, which included all of the themes explored in the questionnaire given to students two decades ago, and more besides.

I was wondering whether you and your co-authors would be so kind as to give me permission to use the ATOP scale for academic purposes? Should you wish, I can send you a draft version of my thesis proposal for your perusal.

Best regards,
Daniel Cauchi M.D.
Malta