Obesity and sedentary behaviour in children and their implications in adulthood

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ABSTRACT

The problem of childhood overweight and obesity are becoming more prevalent. Sedentary behaviours and the lack of physical activity are considered as independent health risk factors. The commoner chronic illnesses in adults such as obesity, high blood pressure, diabetes, and cancer are aggravated by a sedentary life. The evidence strongly suggests that sedentary behaviour is correlated to obesity in childhood and can negatively affect health in early adulthood. A literature review about the problem of childhood obesity and sedentary behaviour in children and their implications in adulthood is discussed. Efforts should be made to introduce specific interventions to increase physical activity among children and decrease sedentary behaviour such as television viewing and using electronic media. Campaigns and training programmes for parents should be implemented.

Key words

Physical activity, sedentary behaviour, children, obesity, health risk, adulthood.

INTRODUCTION

Sedentary behaviour has been defined as activities requiring low levels of energy expenditure that include sitting or lying down (Atkin et al., 2012). But sedentary behaviour is not simply that time spent just doing nothing but it is the product of time spent in specific sedentary behaviours (Jago et al., 2010). There is increasing interest in sedentary behaviours as an independent health risk factor. Physical activity or the lack of it may affect mental and physical development (Durnin, 1989).

The problem of childhood overweight and obesity is very common in many western European countries (Wang and Lobstein, 2006). According to a study by Grech et al. (2006) obesity among children in the Maltese Islands is the greatest current national health crisis and this problem must be addressed with urgency. In a study conducted by Decelis et al. (2012) it was found that nearly half of all Maltese children aged between 11 and 12 years were overweight or obese. Also in another study on a sample of Maltese children aged between 10 and 11 years, Decelis et al. (2014) found that during weekdays 44% of Maltese boys and 28% of the girls spent more than one hour on computer or electronic games, whereas during the weekend 51% of the boys and 35% of the girls spent more than one hour on computer and electronic games. In this later study they also found that 20% of both boys and girls were overweight and 14% were obese.

Durnin (1989) has shown that physical activity or the lack of it, affects the mental and physical development almost from the age at which the infant begins to crawl. A study in 34 European countries by Jannsen et al. (2004) confirmed that Maltese children ranked high in the list of obese children. Sedentary behaviours which included watching T.V. and using electronic media and computers were strongly correlated with being overweight, and this finding was consistent throughout the 34 countries. This was a significant observation considering the different backgrounds and different population groups of these countries. Only 25.6% of the Maltese children surveyed were physically active. This was one of the lowest figures among the surveyed countries. On the other hand, 42.7% of them reported watching T.V. for three or more hours during the weekday.

OBESITY AND LACK OF PHYSICAL ACTIVITY

The causes of overweight and obesity in children are complex. Decrease in physical activity and increased time spent in sedentary pursuits such as television viewing and other electronic media use are considered major contributors (Granich et al., 2008). During the increasing levels of sedentary behaviour there is reduced energy expenditure while energy intake remains unaltered. This will lead to a rising prevalence of overweight and obesity in children. Watching T.V. for more than 2 hours per day during childhood and adolescence has been shown to attribute to 17% of adult overweight (Hancox et al., 2004). T.V. viewing may contribute to overweight and obesity due to increased eating of snacks while watching T.V. (Van den Bulck and Van Mierlo, 2004) and also an increased demand for energy-dense foods advertised on T.V. (Halford et al., 2004). Another study by Salmon et al. (2006) showed that children who watch more than 2 hours of T.V. per day consume less fruit and vegetables and more high energy drinks. Also, it has also been shown by Veitch et al., (2006) that the time spent using electronic media may displace other activities that require more energy such as children's active free play.

CHILDHOOD OBESITY AS A HEALTH RISK

Obesity is now considered to be the most common nutrition-related disease of children in the developed world (Etelson et al., 2012). Childhood obesity can also be a paediatric cardiovascular risk factor. Pardee et al. (2007) found that obese children and adolescents had an increased risk of hypertension related to higher levels of T.V. viewing. Overweight and obesity in children have been shown by Power et al. (1997) to be significantly associated with long-term morbidity and mortality. The most important long-term consequence of childhood obesity is persistence into adulthood. Furthermore, according to Freedman et al. (2001) there is also a relationship between childhood overweight and coronary heart disease risk factors in adulthood. Obese children typically continue to have a weight problem through adulthood (Laessle et al., 2001), when they risk the well-known comorbidities of adult obesity (Must, et al., 1999). A study by Lobstein et al. (2004) showed that childhood obesity will lead to early heart and circulatory diseases.

One particular study did not confirm this correlation of childhood obesity with adult health risk. According to Wright et al. (2001) only children who were obese at 13 showed an increased risk of obesity as adults. They also found that no excess adult health risk from childhood or teenage overweight was found and being thin in childhood offered no protection against adult obesity. Therefore, the long term importance of obesity in childhood is not entirely clear.

According to Etelson et al. (2012) parents of overweight children systematically underestimate their children's weight, and even parents who realize that they have an obese child and recognize this condition as a health risk may not know that obese children are more likely to become obese adults. Parents need to be involved in obesity prevention programmes and for such programmes to be successful, however, pediatricians and other health care professionals must facilitate parental awareness of obesity.

SEDENTARY BEHAVIOURS AND HEALTH EFFECTS

There is evidence that indicates that various markers of sedentary behaviour, including T.V. viewing and sitting down, are deleteriously related with chronic disease morbidity and mortality (Atkin et al., 2012). If the causality is established, the risk associated with negative effects on the health of the population of sedentary behaviours is potentially big as these behaviours are widespread among children. Excessive T.V. viewing and other sedentary behaviours have been linked to other negative outcomes among children such as poor cognitive performance, anti-social behaviour and reduced sleep time (Dworak et al., 2007). A study by Hamer et al. (2009) showed that more time spent in front of television and screen entertainment time combined with low physical activity levels interact to increase psychological distress in young children aged 4 to 12 years.

Findings from a systemic review by Thorp et al. (2011) of studies done between 1996 and 2011 indicate a consistent relationship of self-reported sedentary behavior with mortality and with weight gain from childhood to the adult years. However, findings were mixed for associations with disease incidence, weight gain during adulthood, and cardiometabolic risk. This systemic review showed also that there is a growing body of evidence that sedentary behavior may be a distinct risk factor, independent of physical activity, for multiple adverse health outcomes in adults. This study concluded that other prospective studies using device-based measures are required to provide a clearer understanding of the impact of sedentary time on health outcomes.

SEDENTARY BEHAVIOUR AND GENDER

According to Biddle (2007), boys in Australia watch more T.V. than girls but show less obesity and greater physical activity. A study in active Brazilian adolescents showed that physical activity level was associated with body composition (body weight, fat mass and fat-free mass) after adjustment for age and maturation, with differences between genders (Nogueira et al. 2009).

In a cross-sectional study by te Velde et al. (2007) on the patterns in sedentary behaviours and associations with overweight in 9 - 14 year-old boys and girls in nine countries, it was shown that boys spent more time on sedentary behaviours but also more on physical exercise than girls. High T.V. viewing and low exercise behaviour independently increased the risk of being overweight. This study also showed that among boys, there was a clear association between being overweight and the most unhealthy behaviour pattern having the highest risks of being overweight. It was also shown that girls who viewed T.V. and used the computer for long hours had an increased risk of being overweight. In girls, sedentary behaviours seemed more important than physical exercise with regard to overweight status. Also, according to this study, the differences between boys and girls regarding the behaviours and risks for overweight were noteworthy. A local study among year 5 pupils (aged 9 to 10 years) showed that boys were much more physically active than girls (Micallef, 2006).

In a cohort study among Gozitan Primary School students attending Year 5 (aged 9 to 10 years) it was found that there was a significant difference between the body mass index (BMI) of girls and boys ($p=0.003$); the BMI of girls was slightly lower than that of boys (Saliba, 2011). Twenty two per cent of the boys and 15.9% of the girls were overweight, while 29% of the boys and 11.7% of the girls were obese. In a study among Maltese students aged 11 and 12 years, Decelis et al. (2014) found that girls were less active than the boys meaning that the boys ran about or did some form of physical activity more than the girls. In their study they also found that 16% of the girls were overweight and 15% were obese, whereas of the boys 24% were overweight and 13% were obese.

FAMILY AND HOME ENVIRONMENT AND SEDENTARY BEHAVIOUR

Having a media-rich physical home environment is commonplace nowadays. There are also many households who keep such equipment in children's rooms and bedrooms thus increasing the possibility of T.V. viewing and game playing. All these provide an enticing setting for electronic media use among children. Children who have older siblings who spend considerable amounts of time playing electronic or computer games were more likely to do the same (Taylor et al., 1994).

The broader family environment has also been shown to be influential with factors such as family T.V. viewing habits (Saelens et al., 2002), T.V. viewing rules, eating meals while watching T.V. and family structure and family dynamics (Granich et al., 2008) related to T.V. and other electronic media use. In a local study among Form 3 male students, a correlation was found between computer and videogame occurrence in the bedroom and hours of individual media use, as opposed to no correlation for T.V. (Mercieca, 2010). This may be due to the decrease in the use of T.V and the increase in the use of computer, tablets, smart phones and electronic media. These gadgets can be easily taken into the bedroom and parents are having less control over the use of these electronic tools.

OTHER FACTORS AFFECTING PHYSICAL ACTIVITY

Computers, social media and electronic games are playing a very important role in the daily lives of our children. Compared to other children, Maltese children are spending more than 3 hours watching T.V. or using electronic media per day during the weekends (Saliba, 2011). This is higher than the average 2 hours which are recommended by Australian guidelines (Biddle, 2007) and American Academy of Paediatrics guidelines (2001). A type of sedentary behaviour which was only measured in the Gozo study (Saliba, 2011) was the amount of time spent by children attending church and lessons by the Society of Christian Doctrine (M.U.S.E.U.M.). This was 33 minutes per day during the week. This amount of time could affect negatively the amount of time spent in physical activity. Another sedentary activity measured in Gozitan students which could affect the time of physical activity was the amount of time spent attending private lessons outside school hours. Thirty-three per cent of students in government schools and 12% of students attending church schools spend one hour per week attending private lessons.

According to Saliba (2011), 15% of the Gozitan students did not read for leisure during the weekend, and only 21.9% of the students read for 2 hours or more during the weekend. This was surprising considering that during the weekend they were supposed to have more free time at their disposal. Reading did not seem to be a popular hobby amongst this age-group. If one

were to add the average time spent in reading to the amount spent on homework, including homework using the computer, this will add up to a total of 2 and a half hours (150 minutes) which is quite a considerable time. Adding 6 hours of school time to this, one would obtain a total of about 8 hours 50 minutes of school and school-related work.

SPECIFIC INTERVENTIONS TO REDUCE SEDENTARY BEHAVIOUR

The American Academy of Paediatrics (2001) recommends a number of guidelines for parents regarding television use by children. These include limitation of children's total media time to no more than 1 or 2 hours of quality programming per day, removal of electronic media gadgets from children's bedrooms, discourage television viewing for children younger than 2 years, monitoring of things children are doing with electronic gadgets, viewing of programmes along with children and discussing the contents, and encouraging alternative entertainment for children, including reading, athletics, hobbies and creative play.

The Walking Bus Project (Decelis et al., 2009) can be an excellent idea to increase physical activity among school children and at the same time leading to a cleaner environment. Children meet every morning at the bus terminus or bus stops and walk to school as a group accompanied by a parent. One of the parents collects the school bags and carries them in a car. On arrival at school, children collect their respective bags and walk in. Children who participate in the project are allowed free use of a sports complex which apart from being a sort of a reward encourages more physical activity.

Finally Carter (2006) claimed that interventions aimed at reducing childhood obesity by tackling television viewing and playing computer games were unlikely to have much effect at all, and therefore parents and not T.V. or electronic screens should be targeted. More control by parents is needed so that children will make better use of these useful modern tools.

CONCLUSIONS

Lack of physical activity or sedentary behaviour can lead to a number of negative effects on the well-being of children and this may later on affect their health in early adulthood. There is a correlation between the lack of physical activity or sedentary behaviour and childhood obesity.

Gender differences need to be considered when developing tailored intervention strategies for prevention of overweight. On the other hand, public health awareness directed to enhance physical activity and decrease sedentary lifestyle among youngsters should focus equally to urban and rural children.

Parents and the school need to be involved in obesity prevention programmes. The health authorities need to make public campaigns of awareness of obesity amongst children and the importance of healthy nutrition and physical activity. Healthcare workers including family doctors and paediatricians need to facilitate parental awareness of obesity.

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References

American Academy of Paediatrics, 2001. Children, adolescents, and television. *Paediatrics*, 107 (2), pp. 423-426.

Atkin, A.J., Gorely, T., Clemes, S.A., Yates, T., Edwardson, C., Brage, S., Salmon, J., Marshall, S.J., Biddle, S.J.H., 2012. Methods of Measurement in epidemiology: Sedentary Behaviour. *International Journal of Epidemiology,* 41, pp.1460-1471.

Biddle, S.J.H., 2007. Sedentary Behaviour. *American Journal of Preventive Medicine,* 33 (6), pp. 502-4.

Carter, O., 2006. Parents, not TV screens, should be targeted: A response to Dehghan, Akhtar-Danesh and Merchant. Nutrition Journal. Review available online at: http://www.nutritionj.com/content/4/1/24/comments. [Accessed 20 January 2015].

Decelis, A., Jago, R., and Fox, K.R., 2012. Objectively assessed physical activity and weight status in Maltese 11-12 year-olds. *European Journal of Sport Science* , pp. 1-10.

Decelis, A., Jago, R., Fox, K., 2014. Physical activity, Screen Time and Obesity Status in a Nationally Representative Sample of Maltese Youth with International Comparisons. *BioMed Central.*

Decelis, A., Micallef Stafrace, K., Micallef Stafrace, N., 2009. The Feasibility of a Walking Bus in a Local Village Setting. 5th Biennial Primary Health Department Conference: *Broadening the Horizon for Community and Primary Health: A Change to Believe in.* Available online at: https://ehealth.gov.mt/download.aspx?id=1348. [Accessed 20 October 2014].

Durnin, J. V., 1989. *Methods to assess physical activity and energy expended on it by infants and children.* Available from: http://www.unu.edu/unupress/food2/UID09E/uid09e07.htm [Accessed December 18 2014].

Dworak, M., Schierl, T., Bruns T. et al., 2007. Impact of singular excessive computer game and television exposure on sleep patterns and memory performance of school-aged children. *Paediatrics,* Vol. 120 No. 5, pp. 978-985.

Etelson, D, Brand, D.A., Patrick P.A., Shirali A, 2012. Childhood Obesity: Do Parents Recognise This Health Risk? Available on the internet from: http://onlinelibrary.wiley.com/doi/10.1038/oby.2003.184/full [Accessed April 12 2014].

Freedman, D.S., Khan, L.K., Dietz, W.H., Srinivasan, S.R., Berenson, G.S., 2001. Relationship of childhood overweight to coronary heart disease risk factors in adulthood: The Bogalusa Heart Study. *Paediatrics*, 108, pp. 712-718.

Granich, J., et al., 2008. Understanding children's sedentary behaviour: a qualitative study of family home environment. *Health Education Research Advance Access.*

Grech, V., Ellul., M, Torpiano, J., Soler, D., Caruana, M., Attard Montaldo, S., 2006. Childhood Obesity: A Critical Maltese Health Issue. *Malta Medical Journal*, Vol.18 Suppl.

Halford, J.C.G., Gillespie, J., Brown, V. et al., 2004. Effect of television advertisements for foods on food consumption in children. *Appetite*, 42(2), pp. 221-5.

Hamer, M., Stamatakis, E., Mishra, G., 2009. Psychological distress, television viewing, and physical activity in children aged 4 to 12 years. *Paediatrics,* 123(5), pp.1263-8.

Hancox, R.J., Milne, B.J., Poulton, R., 2004. Association between child and adolescent television viewing and adult health: a longitudinal birth cohort study. *Lancet:* 364 (9430).

Jago, R., Fox, K.R., Page, A.S., Brockman, R. and Thompson, J.L., 2010. Physical activity and sedentary behaviour typologies of 10 – 11 year olds. *International Journal of Behavioural Nutrition and Physical Activity,* pp.7: 59.

Jannsen, I., Kazmarzyl, P.T., Boyce, W.F., King, M.A., Pickett, W., 2004. Overweight and obesity in adolescents from 34 countries and their associations with dietary habits and physical activity patterns. *The Journal of Adolescent Health*, 35 (5), pp. 360-7.

Laessle, R.G., Uhl, H., Lindel, B., Muller, A., 2001. Parental influences on laboratory eating behavior in obese and non-obese children. *International Journal of Obesity Related Metabolic Disorders*, 25: S60–S62.

Lobstein, T., Baur, L., Uauy, R., IASO International Obesity TaskForce, 2004. Obesity in childhood and young people: a crisis in public health. *Obesity Review* 5 (Suppl 1), pp. 4 – 104.

Mercieca, S., 2010. *Computers and Technology vs. Physical Activity: Who is winning the Battle?* B. Ed (Hons) dissertation, University of Malta.

Micallef, L., (2006). *Gender Equality Perceptions in Physical Education across Maltese Primary Schools*. B.Ed (Hons) Dissertation, University of Malta.

Must, A., Spadano, J., Coakley, E.H., Field, A.E., Colditz, G., Dietz, W.H., 1999. The disease burden associated with overweight and obesity. *JAMA,* 282, pp. 1523–1529.

Nogueira, J.A., Macedo da Costa, T.H., 2009. Gender differences in physical activity, sedentary behaviour, and their relation to body composition in active Brazilian adolescents. *Journal of Physical Activity and Health*, 6 (1), pp. 93-8.

Pardee, P.E., Norman, G.J., Lustig, R.H., Preudhomme, D., Schwimmer, J.B., 2007. Television viewing and hypertension in obese children. *American Journal of Preventive Medicine* 33, pp. 439-443.

Power, C., Lake, J. K., and Cole, T.J., 1997. Measurement and long-term health risks of child and adolescent fatness. *International Journal of Obesity*, 21, pp 507-526.

Saelens, B.E., Sallis, J.F., Nader, P.R. et al., 2002. Home environmental influences on children's television watching from early to middle childhood. *Journal of Development and Behavioural Paediatrics,* 23 (3), pp. 127-32.

Saliba, E., 2011. *Sedentary Behaviour of Pupils aged 9-10 years attending Year 5 in Gozo Primary School*. Diploma in Sports and Leisure Studies Dissertation, University of Malta.

Salmon, J., Campbell, K.J. and Crawford, D.A., 2006. Television viewing habits associated with obesity risk factors: a survey of Melbourne schoolchildren. *Med J Aust.,* 184(2), pp. 64-7.

Taylor, W.C., Baranowski, T., Sallis, J.F., 1994. Family determinants of childhood physical activity: a social-cognitive model. In:Dishman RK. (ed). *Advances in Exercise Adherence. Champaign: Human Kinetics,* pp. 319-42.

te Velde, S., De Bourdeaudhuij, I., Thorsdottir, I., Rasmussen, M., Hagstromer, M., Klepp, K.I., Brug, J., 2007. Patterns in sedentary and exercise behaviours and associations with overweight in 9-14-year-old boys and girls – cross-sectional study. *BMC Public Health*, pp. 7:16.

Thorp, A.A., Owen, N., Neuhaus, M., Dunstan, D.W., 2011. Sedentary Behaviours and Subsequent Health Outcomes in Adults: A Systemic Review of Longitudinal Studies, 1996-2011. *American Journal of Preventive Medicine,* Vol 41, Issue 2, pp. 189-196.

Van den Bulck, J., Van Mierlo, J., 2004. Energy intake associated with television viewing in adolescents, a cross sectional study. *Appetite,* 43 (2), pp. 181-4.

Veitch, J., Bagley, S., Ball, K. et al., 2006. Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health Place*, 12(4), pp. 383-93.

Wang, Y., Lobstein, T., 2006. Worldwide trends in childhood overweight and obesity. *International Journal of Paediatric Obesity*, 1(11), pp. 11-25.

Wright, C.M., Parker, L., Lamont, D., and Craft, A.W., 2001. Implications of childhood obesity for adult health: findings from thousand families cohort study. *BMJ,* 323, pp. 1280-4.