Adolescents' perceptions of physical activity for the enhancement of health: a Systematic review

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(B.Sc., Honns.)

Thesis submitted for the degree Magister Scientiae in Human Movement Science at the North-West University

Study Leader: Prof. C.J. Wilders

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DECLARATION

The co-author of the articles which form part of this thesis hereby give permission that the candidate may include the articles as part of a thesis. The contribution (advisory and supportive) of this co-author was kept within reasonable limits, thereby enabling the candidate to submit this thesis for examination purposes. This thesis, therefore, serves as partial fulfillment of the requirements for the M.Sc. degree in Human Movement Science within the School of Biokinetics, Recreation and Sport Science in the Faculty of Health Sciences at the North-West University.

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FOREWORD

In completion of this study, it would not have been possible without the help and support of several individuals. I would like to thank them sincerely:

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The author
2012

We can not allow our fears to withhold us from our dreams

-Author unknown

Abstract

Adolescents' perceptions of physical activity for the enhancement of health: a Systematic review

Adolescents are usually considered to be in good health, but their wellbeing tend to decrease from primary school to high school. When youth participate in at least 60 min of physical activity every day several health benefits accrue: healthy bones and muscles, improved muscular strength and endurance, reduced risk of developing chronic disease risk factors, improved self-esteem, as well as reduced stress and anxiety. Most youth, however, are not engaging in the recommended level of physical activity. Several studies report that adolescents' general perception of health includes immediate issues like body awareness and not other health risks like osteoporosis, cholesterol and high blood pressure. The aim of this study was to firstly establish from the literature the main perceptions of physical activity for adolescents, and secondly to establish from the literature the main perceptions of physical activity in health enhancement for adolescents.

The systematic review was, where possible, undertaken in line with the recommendations of the guidelines of the Cochrane Handbook for Systematic Reviews of Interventions. The researchers independently reviewed the title and abstract of each reference to assess its eligibility. The full article was obtained for all potentially eligible references. After a review of the full article, 29 fulfilled the inclusion criteria for article 1 (chapter 2) and 17 articles for article 2 (chapter 3). From the results of the study it seemed that the main perceptions of physical activity for adolescents are influenced by cultural and social factors as well as parents' beliefs. Perceptions youth have about physical activity will influence their participation in physical activity. Lastly, the results of this study demonstrate that there is a low level of knowledge and awareness regarding physical activity and health. The need to increase physical activity is a public health priority and therefore it is necessary to understand the factors that may influence their participation in order to promote physical activity among youth more effectively.

Key words: **Physical activity, health, exercise, adolescent, physical activity perceptions**

Opsomming

Adolessente se persepsie van fisieke aktiwiteit in gesondheidsbevordering: 'n sistematiese oorsig

Adolessente word gewoonlik gesien as gesond, maar hul welstand neig om af te neem van laerskool na hoërskool. Wanneer jeugdiges daagliks vir ten minste 60 minute fisiek aktief is, is daar baie gesondheidsvoordele: gesonde bene en spiere, verhoogde spierkrag en uithouvermoë, verlaagde risiko om simptome van kroniese siektes te ontwikkel en verbeterde selfbeeld, sowel as 'n verlaging in stres en angstigheid. Die meeste jeugdiges voldoen egter nie aan hierdie voorgestelde vlak van fisieke aktiwiteit nie. Verskeie studies toon dat adolessente se algemene persepsie oor gesondheid onmiddellike probleme soos liggaamsbewustheid insluit en nie ander gesondheidsrisiko's soos osteoporose, cholesterol en hoë bloeddruk nie. Die doel van hierdie studie is eerstens om uit die literatuur te bepaal wat die hoofpersepsies van fisieke aktiwiteit onder adolessente is en tweedens om vas te stel wat die hoofpersepsies is wat adolessente het oor fisieke aktiwiteit in gesondheidsbevordering.

Hierdie sistematiese oorsig is, waar moontlik, gedoen in lyn met die aanbevelings in die "Cochrane Handbook for Systematic Reviews of Interventions". Die navorsers het elke titel en abstrak van elke verwysing afsonderlik nagegaan om hul geskiktheid vir insluiting in hierdie studie te bepaal. Die volledige artikel is bekom indien as geskik geag. Na 'n oorsig van die volledige artikel is 29 artikels ingesluit vir oorsig by artikel 1 (hoofstuk 2) en 17 artikels vir artikel 2 (hoofstuk 3). Uit die resultate van die studie blyk dit dat adolessente se hoofpersepsies van fisieke aktiwiteit beïnvloed word deur kulturele en sosiale faktore, asook ouers se waardes en oortuigings. Die persepsies wat jeugdiges het oor fisieke aktiwiteit sal hul deelname aan fisieke aktiwiteit beïnvloed. Laastens toon die resultate van hierdie studie dat daar 'n lae vlak van kennis en bewustheid is rakende fisieke aktiwiteit en gesondheid. Die behoefte om deelname aan fisieke aktiwiteit te verhoog, is 'n openbare-gesondheids-prioriteit en dus is dit belangrik om die faktore te bepaal wat deelname aan fisieke aktiwiteit kan beïnvloed. Sodoende kan fisieke aktiwiteit onder adolessente meer effektief bevorder word.

Sleutelwoorde: **Fisieke aktiwiteit, gesondheid, oefening, adolessente, persepsies**

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Chapter 1

Problem statement and aim of study

1.1 INTRODUCTION

Sedentary behaviour has been recognised as one of the leading preventable causes of death, and shows an inverse linear relationship between hipokinetic diseases, ill health and all-cause mortality and morbidity (Chastin & Granat, 2010:82; Koezuka *et al.*, 2006:515; LaMonte & Blair, 2006:540). Although research indicates the advantages of physical activity, the majority of people still have a pathogenic approach towards physical activity and health. Physical activity (PA) is essential in the prevention of the increasing burden of chronic diseases (Müller-Riemenschneider *et al.*, 2008:355; Lucas *et al.*, 2008:431). It seems therefore, that a lack of physical activity as a health modality (prevention, maintenance and rehabilitation) remains an imminent public health issue (Lopez-Quintero *et al.*, 2009:1769; Magnusson, 2009:271; Kallings, 2008:67; Haskell *et al.*, 2007:1082; Marcus *et al.*, 2006:2739).

Being physically active is defined as the accumulation of 30 minutes of moderately intense activity such as brisk walking, on at least 5 days of the week (Blair & Morris, 2009:255; Harrison *et al.*, 2006:207). A lifestyle that includes regular physical activity has been associated with numerous health benefits including reduced risk of coronary heart disease, type 2 diabetes, obesity and associated health risks (Ianotti *et al.*, 2009:493; Maas & Verheij, 2007:227; De Jong *et al.*, 2006:132). In addition to the physical health benefits of PA, it is associated with positive physical and social health indicators such as perceived health status, self-image, quality of life and quality of peer relationships (Asztalos *et al.*, 2009:468; Ianotti *et al.*, 2009:493).

1.2 PROBLEM STATEMENT

Research has shown that children/adolescents are not participating in sufficient PA to obtain health benefits and this is of concern as physical activity habits that develop in childhood may persist into adult life (Burgess *et al.*, 2006:57; Koezuka *et al.*, 2006:515). Although improving health behaviour at a younger age results in lifetime health benefits, it is never too late to start healthy habits and gain benefits (Mokdad *et al.*, 2004:356). Moreover, adequate participation in physical activity during childhood may play a significant role in the prevention of chronic disease later in life (Fees *et al.*, 2009:268). Family health care providers see physical activity as part of the education of a child and it is important for the development of both small and big motor control, no matter a person's socio-economic status (Fees *et al.*, 2009:269).

Physical activity in adolescence is an important public health issue, and regular participation in physical activity by adolescents can enhance their physical, psychological and social well-being (Young-Ho, 2004:523).

Young people's perceptions of their physical competence (the belief in one's skills and abilities in particular domains) have been shown to be an important and consistent indicator of their participation effort and long term interest in sport and physical activity (Burgess *et al*., 2006:58).

The Health Belief Model (HBM) (fig 1.1) states that health behaviour practice is predicted upon an individual's perception of a personal health threat and the perception that a specific health practice will be effective in reducing a health threat (Anderson *et al*., 2005:310). The Stages of Change Model (SCM) (fig 1.2) describes intentional health-behaviour adoption and maintenance as a process that occurs over time as a function of behavioral history and motivation. The SCM accounts for the dynamic nature of health behaviour and perception change and recognizes that individuals often must make several attempts at behaviour change before they are successful (Young-Ho, 2004:524).

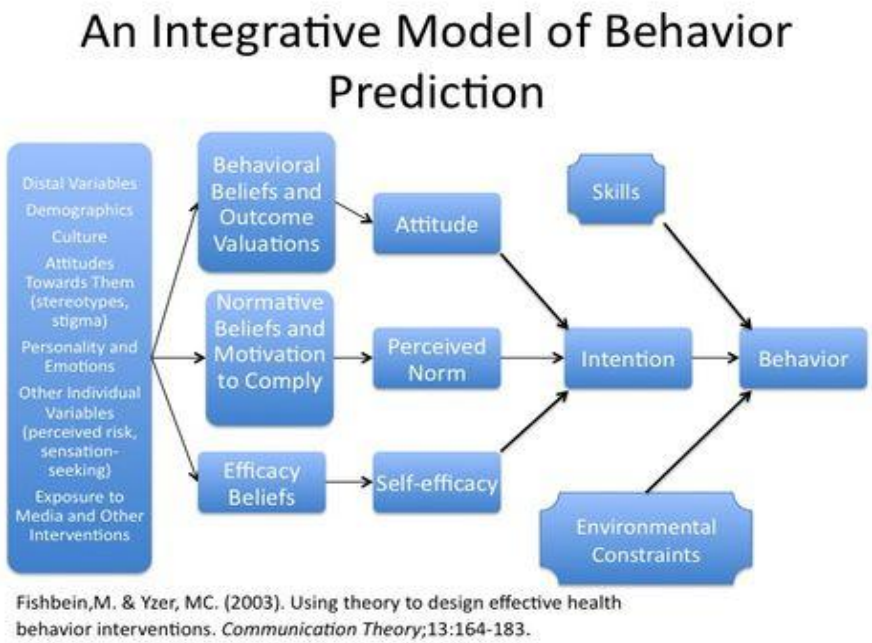

Figure 1.1: Health Belief Model

More specifically, Harter's (1982) Competence Motivation Theory (CMT) suggests that individuals who feel competent in the physical domain will be more likely to participate in physical activity (Knowles *et al.*, 2009:557). On the other hand it seems that patients' beliefs about the number of symptoms associated with an illness are consistently related to the limitation of daily activity (Frostholm *et al.*, 2007:130).

A study by Botha-Scheepers *et al.* (2009:49) on illness perceptions support the findings that illness perceptions predict health outcomes. Positive perceptions about body and mind may improve the intention to fulfill treatment, as well as the willingness to seek treatment in the future (Botha-Scheepers *et al.*, 2009:53; Duistermaat *et al.*, 2009:2). For youths in particular, in the absence of an immediate threat to their health, it may be difficult to relate their present lifestyle practices to their future adult health status (Anderson *et al.*, 2005:310).

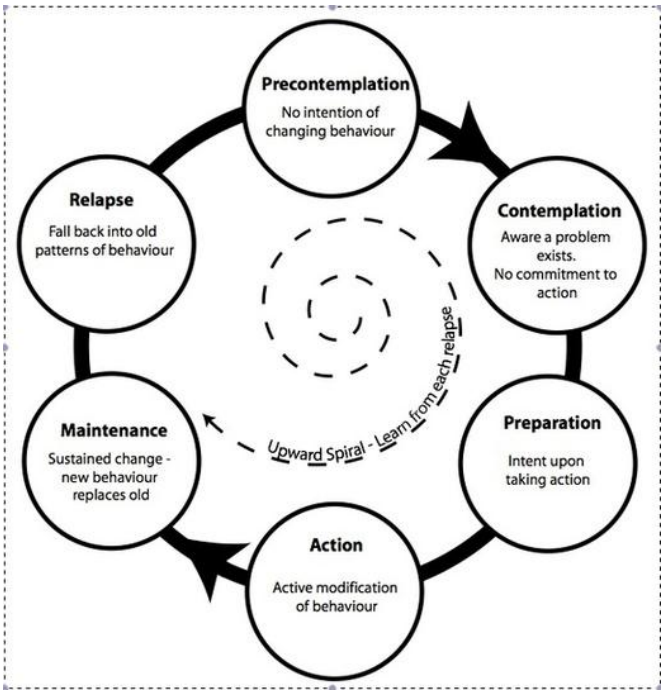

Figure 1.2: Stages of Change Model

In a study by Anderson *et al.* (2005:310) female adolescents believed physical inactivity, smoking and inadequate calcium levels were health-risking behaviour and realised there was a clear relationship between physical activity and the perception of one's own health with respect to specific chronic health problems, mental health, mobility and pain (Harrison *et al.*, 2006:209).

In contrast to this, Carver *et al.* (2008:218) found that some teenagers, particularly girls, consider formal physical activity options as placing too much emphasis on competition and ability. Numerous studies have shown that among adolescent females, physical inactivity, poor nutrition and cigarette smoking are on the rise (Anderson *et al.*, 2005:305).

Parents play a significant role in adolescents' perceptions of physical activity (Bios *et al.*, 2005:382). Studies that have tested this hypothesis in the PA domain have shown mixed results (Duncan *et al.*, 2007:81). Some investigations have found a moderate to strong relationship between the PA involvement of parents and their children (Adkins *et al.*, 2004:43), whereas other studies have found a weak or no relationship between the activity levels of parents and children (Bios *et al.*, 2005:382). With reference to their own childhood, parents believed that children now face more risk, mainly from traffic and strangers (Carver *et al.*, 2008:219). However, independent of the direct influence of family on physical activity, the potential relationship of adolescent physical activity to the quality of family relationships has not been well investigated (Ianotti *et al*., 2009:493).

Perceived barriers to exercise and physical activity are mostly associated with a lack of time due to work, school, other demands and cultural constraints (Wolin *et al.*, 2008:567). However, very little is known about people's actual time use for physical activity (Mullahy & Robert, 2008:1). Kagawa-Singer *et al.* (2010:60) stated that culture is fundamental to human life and cultural mores also specify the strategies that promote or maintain health and prevent disease or illness. Research also indicates that cultural influences play an important role (Kwok *et al.*, 2006:269). Adolescent females in Westernised societies such as the US and the UK are subjected to powerful culturally determined pressure to be very thin (Smolak, 2004:16). As a result, dissatisfaction with body image is particularly high in this population group. Evidence shows that dissatisfaction with appearance in general is associated with low self-esteem in adolescent females (Burgess *et al.*, 2006:57; Tiggemann, 2004:30). In a study by Knowles *et al.* (2009:556) adolescent girls' perspective of physical activity is that one has to be thin and comfortable with oneself to do physical activity. On the other hand, Burgess *et al.* (2006:58) found that adolescent girls believed that one needs to be physically active to lose weight in order to feel good about oneself.

Culture has the potential to significantly affect perceptions of health and health related behaviour (Sobralske, 2006:81), and biomedicine may in some cases abjectly fail where it inadequately takes into account cultural and social issues (Capstick *et al.*, 2009:1342). The elevated prevalence of obesity and chronic disease among ethnic minorities, as well as their concomitant excessive mortality, can be accounted for by behavioral and genetic vulnerabilities at the personal level and by distal social and cultural influences (Lopez-Quintero *et al.*, 2009:1769). In this regard culture is an important determinant of quality of life, because it defines the purpose of and prescriptions for living a meaningful life in sickness and in health (Uskul *et al.*, 2009:535) and therefore there is a need to study and quantify sedentary behaviour (Chastin & Granat, 2010:82).

On the other hand individuals' perception that exercise would create a better and healthier feeling were positively related to a greater readiness for exercise. Conversely, individuals' beliefs that they would feel sore and have little time for exercise were negatively associated with a readiness for exercise (Young-Ho, 2004:528). Perceptions of physical activity and health form part of social and cultural structures. The need for a clear understanding of the perceptions of physical activity and health in a multicultural environment like South Africa is imperative. Therefore the question arises as to what literature says with regard to the perceptions of physical activity in the health enhancement of adolescents.

The significance of this study is to help healthcare professionals understand the perceptions adolescents have of physical activity in the literature as well as the different factors that influence adolescents' physical activity. Knowledge of these findings will help healthcare professionals to implement successful interventions in order to improve adolescent health through physical activity.

1.3 OBJECTIVES

- To establish from the literature the main perceptions of physical activity for adolescents;
- To establish from the literature the main perceptions of physical activity in health enhancement for adolescents.

1.4 HYPOTHESIS

- The literature will show that the main perceptions of physical activity among adolescents are influenced by cultural and social factors as well as parents' beliefs.
- The literature will show opposing perceptions of physical activity in health enhancement for adolescents.

1.5 STRUCTURE OF THE DISSERTATION

Chapter 1: Introduction: Background, methods and procedures

Chapter 2: Article 1: Adolescents' perceptions of physical activity: a systematic review of randomised control trials

Chapter 3: Article 2: Adolescents' perceptions of physical activity in relation to health enhancement

Chapter 4: Summary, conclusions and recommendations for further research references

Both articles will be sent for publishing to the *Journal of Health Psychology*.

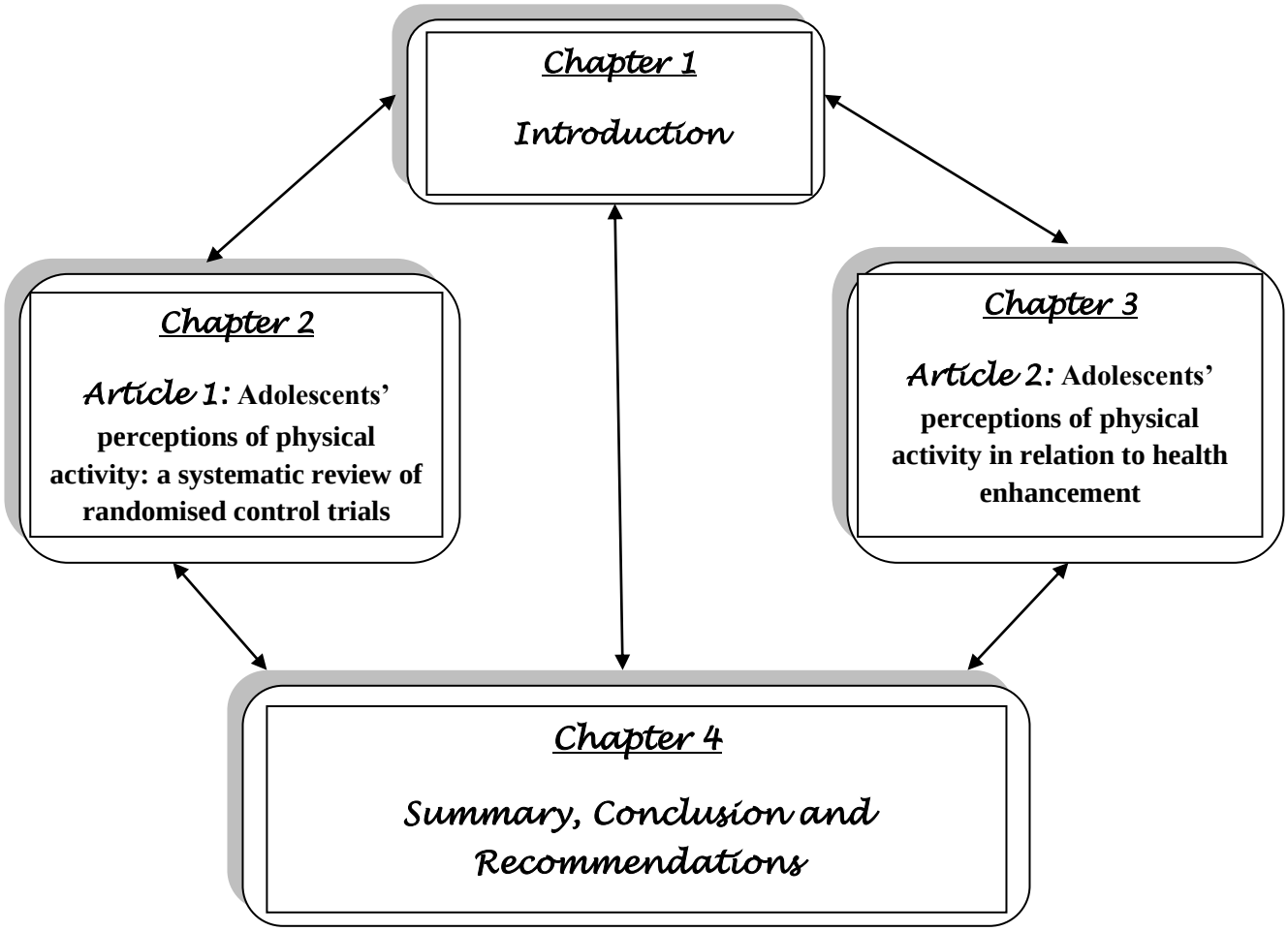

Fig 1.3 A schematic presentation of the structure of this dissertation

1.6 SUMMARY, CONCLUSION AND RECOMMENDATIONS

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CHAPTER 2

Article 1: Adolescents' perceptions of physical activity: a systematic review of randomised control trials

Authors: A. du Toit and C.J. Wilders

ABSTRACT

During adolescent years, physical activity rates decline dramatically. The need for a clear understanding of the perceptions of physical activity among adolescents is important as healthy physical activity habits are already formed in youth. The aim of this study is to establish from the literature the main perceptions of physical activity among adolescents. The review consisted of 29 articles being identified as eligible, then screened and fully studied. The results showed that physical activity decreases with age and this trend is particularly concerning during adolescence. All 29 articles reviewed, agree on this statement and found that low physical activity levels during adolescence are a public health concern. Adolescents' perceptions are influenced by several factors: personal factors, physical maturation, demographic factors and peer and family factors. Perceptions youth have of physical activity will influence their participation in physical activity. A comprehensive understanding of the determinants of physical activity among youth is essential for the identification of appropriate points of intervention to promote an active lifestyle and its associated health benefits for adolescents as a strong foundation for later in life.

Key words: Physical activity, adolescents, exercise, physical wellness, physical activity perceptions

1. INTRODUCTION

1.1 Physical activity

Physical activity (PA) is defined as bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure (ACSM, 2009:3; Bouchard *et al.,* 2007:4). The benefits of regular physical activity on the health of the youth (Rhodes & Nasuti, 2011:17; Peltzer, 2010:272; Draper *et al.,* 2009:578; Brosnahan *et al.*, 2004:822) and its potential for reducing the incidence of chronic physiological and psychological disorders that are manifested in adulthood are widely proven (Hawley *et al.*, 2012:260; Aires *et al.,* 2011:198; Parikh & Stratton, 2011:478; Knowles *et al.,* 2009:556; Barr-Anderson *et al.,* 2007:404; Hume *et al.,* 2005:1; Strong *et al.*, 2005:732). In this regard participation in regular PA has been associated with a positive mood, greater self-esteem, and greater physical and psychological well-being (Jacka *et al.,* 2011:222; Kelly *et al.,* 2011:30; Rhodes & Nasuti, 2011:17; Whitelaw *et al.,* 2010:61; Polman & Borkoles, 2006:1; Brosnahan *et al.,* 2004:818).

Low levels of PA among children and adolescents and the failure to meet PA recommendations have notable health consequences (Kelly *et al.*, 2011:31; Rangul *et al.*, 2011:616; Ortabag *et al.*, 2010:56; Davison & Lawson, 2006:19). The need to increase PA is a public health priority and therefore it is necessary to understand the factors that may influence their participation in order to promote PA among youth more effectively (Aires *et al.,* 2011:204; Mota *et al.,* 2005:834). Draper *et al.* (2009:578) found that in some developing countries such as South Africa concern has been expressed regarding the high levels of physical inactivity, and it has been estimated that physical inactivity caused 3,3% of all deaths in South Africa, and was ranked 9th compared with other risk factors for attributable deaths.

During adolescent years, PA rates decline dramatically (Kelly *et al.,* 2011:31; Rangul *et al.,* 2011:616; Anderssen *et al.,* 2006:514; Pate *et al.,* 2005:1582). The National Heart, Lung & Blood Institute's Growth and Health Study reported that girls' median activity scores decreased dramatically between the ages of 9 and 18 years (Cohen *et al.,* 2006:1382; Davison & Lawson, 2006:19; Pate *et al.,* 2005:1582; Adkins *et al.,* 2004:39). Adolescence is a critical period in the study of PA (Duncan *et al.,* 2007:80).

A better understanding of how perceived PA barriers and attitudes as well as PA behaviours differ in youth (Ortabag *et al.,* 2010:68), could be useful in the development of more effective PA intervention programs (Katzmarzyk *et al.,* 2008:375).

1.2 Perceptions, self-efficacy and personal factors influencing PA

Perceptions are defined as the way in which something is regarded, understood or interpreted (Oxford dictionary, 2009:477). Alternatively, self-concept beliefs are more general self-perceptions related to a domain that can include an evaluative or affective component (Rittmayer & Beier, 2008:2). The belief in one's ability to perform a specific task is referred to as self-efficacy. Self-efficacy influences the choices individuals make in term of goal choice, the effort expended to reach those goals, and persistence when difficulties arise (Rittmayer & Beier, 2008:1). Self- concept comprises several domains: academic and non-academic, social and emotional, and physical (sport competence, strength or endurance, appearance) (Strong *et al.,* 2005:735). During the transition into puberty and during adolescence, the structure of self-concept changes and becomes more clearly differentiated (Haugen *et al.,* 2011:50; Newmark – Sztalner, 2008:124; Strong *et al.,* 2005:735) and therefore the influence of self-concept on PA may be mediated by different factors (Haugen *et al.,* 2011:49). The need for a clear understanding of the perceptions of PA among adolescents is important as healthy PA habits are already formed in youth (Haugen *et al.,* 2011:50; Cox *et al.,* 2010:47).

Self-efficacy and body-image beliefs in general have been shown to influence adolescent PA (Gillison *et al.,* 2011:45; Duncan *et al.,* 2007:81). Perceptions of body image decrease with age in early adolescents (Knowles *et al.,* 2009:563). This finding is consistent with previous research highlighting a decrease in physical self-perceptions as there is an increase in grades (Gyurcsik *et al.,* 2006:704). Thus perception of physical attractiveness or body image influences adolescents' decision to take part in PA or not (Haugen *et al.,* 2011:49). Adolescence is considered a period of experimentation when multiple health risk behaviours, such as a lack of exercise, emerge (Jovanovic & Brdaric, 2012:380). Adolescents' perception of perceived benefits of PA are: fun, achievement, and other physical related factors (Jacka *et al.,* 2011:222; Hohepa *et al.,* 2006:328), but the personal barriers are more prevalent (Hohepa *et al.,* 2006:328).

In a study by Gyurcsik *et al.*,(2006:708) lack of skill, negative self-presentation, to rather relax, seeing it as being too much effort, friends that aren't physically active, feeling intimidated due to physical environment, issues related to coaches and negative experiences with peers where all considered to be personal barriers to PA.

Preferences for PA and self-efficacy to be physically active are positively related to activity levels among girls (Polman & Borkoles, 2006:1; Adkins *et al.,* 2004: 39). A study by Lindwall and Lindgren (2005:643) showed changes in physical self-perceptions following a 6-month exercise intervention programme (Strong *et al.,* 2005:735). PA was associated with an increase in body image and several other domains of self-perception (Haugen *et al.,* 2011:49; Goldfields *et al.,* 2007:788; Ekelund *et al.,* 2004). Adolescents who reported enjoying PA and feeling confident in their ability to perform the task reported being more active (Adkins *et al.,* 2004:39).

1.2.1 Physical maturation

Physical maturation is characterised by a continuous increase in physical size and a greater complexity in functional ability controlled by genes and mediated by the environment and usually occurs around the age of 12 – 13 years (Oxford dictionary 2009:375). The variation of skeletal maturity with chronological age is a sensitive indicator of adolescence health (Hawley *et al.,* 2009:584). Age appropriate or advanced skeletal maturity is a reflection of adequate environmental and social conditions (Hawley *et al.,* 2012:259).

A drop in PA is coincident with maturation (Kelly *et al.,* 2011:31; Knowles *et al.,* 2009:556). This tentatively suggests that the physical changes associated with maturation may influence physical self-perceptions (Davison & Lawson, 2006:19). The physical changes that accompany maturation are characterised by an increase in fat mass by approximately 22% which is not matched by an increase in muscle mass or skeletal tissue (Knowles *et al.,* 2009:556). Evidence has shown that the increase in body mass associated with maturation was related to perceptions of body attractiveness and physical self-worth becoming less positive (Lamb *et al.,* 2011:326; Katzmarzyk *et al.,* 2008:372).

Individuals with a higher body mass index (BMI) tend to be less active than those with a lower BMI. A higher BMI associated with weight criticism and perceived body-related barriers during PA may play a role in reduced sports enjoyment among overweight adolescents (Gillison *et al.,* 2011:46; Jowett & Cramer, 2010:140; Fulkerson *et al.,* 2004:259). Research has shown that overweight children and adolescents have lower PA self-efficacy than their non-overweight counterparts (Strong *et al.,* 2005:734). However, many of the perceived barriers and attitudes towards PA that have been identified are the same attitudes that differentiated the non-overweight subjects from the overweight subjects (Fulkerson *et al.,* 2004:263).

Perceived deficits in physical self-perceptions are often associated with real deficits, both of which may act as barriers to participating in physically active games or sports (Olds *et al.*, 2011:189; Goldfields *et al.*, 2007:784; Norman *et al.*, 2006; Brosnahan *et al.*, 2004:822). In a study by Hussin *et al.* (2011:368) the authors found that adolescents' perception of being overweight is eating too much food (42.6%), genes (18%) and lack of exercise (33%).

The influence of idealised body shapes has been associated with self-imposed pressure on individuals to lose weight; deeming being fat and unfit as sociably unacceptable (Dishman *et al.*, 2009:442; Polman & Borkoles, 2006:1). In a study by Ohlmer *et al.* (2012:1) the authors found that this may lead to a risk of developing eating disorders like Anorexia or bad eating and PA habits in adulthood (Kimani – Murage *et al.*, 2010:158). Having a target, like losing weight, that seems out of reach may undermine PA participation (Davison & Lawson, 2006:19) especially during early adolescence, when PA increasingly becomes a leisure choice (Dishman *et al.*, 2009:441).

1.3 Family factors influencing youth physical activity

Family support has been a consistently reported correlate of PA among adolescents (Anderssen *et al.*, 2006:513; Dowda *et al.*, 2007:153; Adkins *et al.*, 2004:43). Families teach skills and inculcate beliefs that can help to shape important attitudes and behaviour associated with physical activity (Edwardson & Gorely, 2010:522), but there is increasing pressure from society (including parents) on adolescents to perform in all fields (Tesnear & Meyer, 2008:107). The U.S. Department of Health and Human Services also found that social support from family and friends has been consistently and positively related to regular PA (Rangul *et al.*, 2011:619; Anderssen *et al.*, 2006:513). Although a parent's perception of support for their child's PA was related to their own activity (Hussin *et al.*, 2011:367; Van der Velde *et al.*, 2011:1581), a child's perception of his/her parent's support for PA was not correlated with their parent's activity level (Adkins *et al.*, 2004:43). Self-efficacy mediates the effect of parental support for youth PA participation (Duncan *et al.*, 2007:81). Recent reports of longitudinal, cohort studies suggest that declines in PA during the period from late middle school through late high school are inversely associated with self-efficacy for overcoming barriers to PA and also with perceived support from family (Dowda *et al.*, 2007:154) and friends (Dishman *et al.*, 2009:442; Duncan *et al.*, 2007:81). Jowett & Cramer (2010:140) recommended that adults, especially coaches and parents, should transmit positive feedback to help adolescents formulate high perceptions of self-competence. Regardless of who is being targeted to take responsibility for children's PA, it is not clear

whether perceptions of responsibility are associated with healthier levels of PA and better health (Cox *et al.*, 2010:47; Lubans *et al.*, 2010:1020).

1.4 Peer factors influencing youth physical activity

Participation in PA and team sports activities may provide adolescents with a social network that tends to support and protect them from bad self-esteem (Brosnahan *et al.*, 2004:819). During adolescence, peers represent important role models and sources of social support for PA and for efficacy beliefs regarding activity (Dishman *et al.*, 2009:441; Duncan *et al.*, 2007:81). Thus part of the hypothesized effect of self-efficacy on PA might be mediated by perceptions of social support (Dishman *et al.*, 2009:442) and therefore youths who are not physically active are denied the positive social and emotional benefits of physical activity (Davison & Lawson, 2006:19; Hume *et al.*, 2005:1). In contrast with these findings Hussin *et al.* (2011:370) noted that peer influence may play a role in a child's body perception and teasing and joking can be hurtful in any situation, especially when dealing with body image. In a study by Olds *et al*. (2011:194), the authors found that teenagers often underestimate their abilities and therefore are fearful of the scrutiny they will receive from their peers.

1.5 Demographic factors influencing youth physical activity

Schools can be an ideal venue for providing lifestyle-oriented PA education (LaTorre, 2006:5; Stevens *et al.*, 2005:233). Brosnahan *et al*. (2004:822) found that there was a positive association between lifestyle-oriented PA education participation and a lower risk of feelings of sadness. This is of great public health interest given that many schools are currently cutting back on physical education funding and equipment, and many schools do not require physical education after the 8th grade (Brook *et al.*, 2011:1447). Girls who reported having access to a safe place to play or equipment necessary to play a sport were more active (Katzmarzyk *et al.*, 2008:379; Adkins *et al.*, 2004:39). This is consistent with a study by Norman *et al.* (2006:124) showing that access to recreational facilities is related to levels of physical activity.

A better understanding of how perceived PA barriers and attitudes as well as PA behaviour differ in youth, could be useful in the development of more effective PA intervention programs. Therefore, the aim of this study is to determine what the literature says about adolescents' perception of physical activity.

2 METHOD

The systematic review was, where possible, undertaken in line with the recommendations of the guidelines of the Cochrane Handbook for Systematic Reviews of Interventions (Loke *et al.*, 2008). The following methods, including identification, screening, eligibility and inclusion, were used in the systematic review. References were identified by searching an electronic database. An electronic search of the following electronic databases was undertaken: MEDLINE (US National Library of Medicine, Bethesda, MD; Ovid interface: http://ovidsp.ovid.com) from 2004 to March 2011 and CINAHL (CINAHL Information Systems, USA; EBSCO host interface: http://search.ebscohost.com) from 2004 to March 2011. The final search date was 30 May 2011. The search used combinations of the terms physical activity, health, exercise, physical wellness, physical activity perceptions and adolescents as a combination of key or free text words and included a wide range of derivations to ensure as wide a search strategy as possible. The inclusion criteria were any articles published in English in a peer-reviewed journal between 2004 and 2011 and included information about perceptions of physical activity as well as adolescents' and adults' perceptions of physical activity. Details of the inclusion and exclusion criteria are described in Table 2.1. The researchers independently reviewed the title and abstract of each reference to assess its eligibility. The full article was obtained for all potentially eligible references and the inclusion criteria were applied to each (Table 2.1).

Table 2.1: Detailed inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Types of study	A review of randomised control trials (RCT's), Meta-Analysis, Case Reports and non-randomised trial articles were used (2004 to March 2011).	Articles older than 2004
Types of participants	Articles which include both male and female adolescents were used for this review. The focus of this study is to evaluate the main perceptions of physical activity among adolescents and not to see the difference between male and female adolescents' perceptions.	
Types of interventions	Interventions that focus on increasing daily activity levels as well as improving perceptions of physical activity in health enhancement.	
Types of outcomes measured	The primary outcome is to establish from the literature the main perceptions of physical activity among adolescents. The secondary outcome is to establish the main perceptions of physical activity in health enhancement for adolescents.	

3 RESULTS

A total of 1 113 non-duplicated articles were identified in the search. The titles and abstracts were reviewed, and only 116 were deemed potentially eligible. After a review of the full article, 29 fulfilled the inclusion criteria (Figure 2.1).

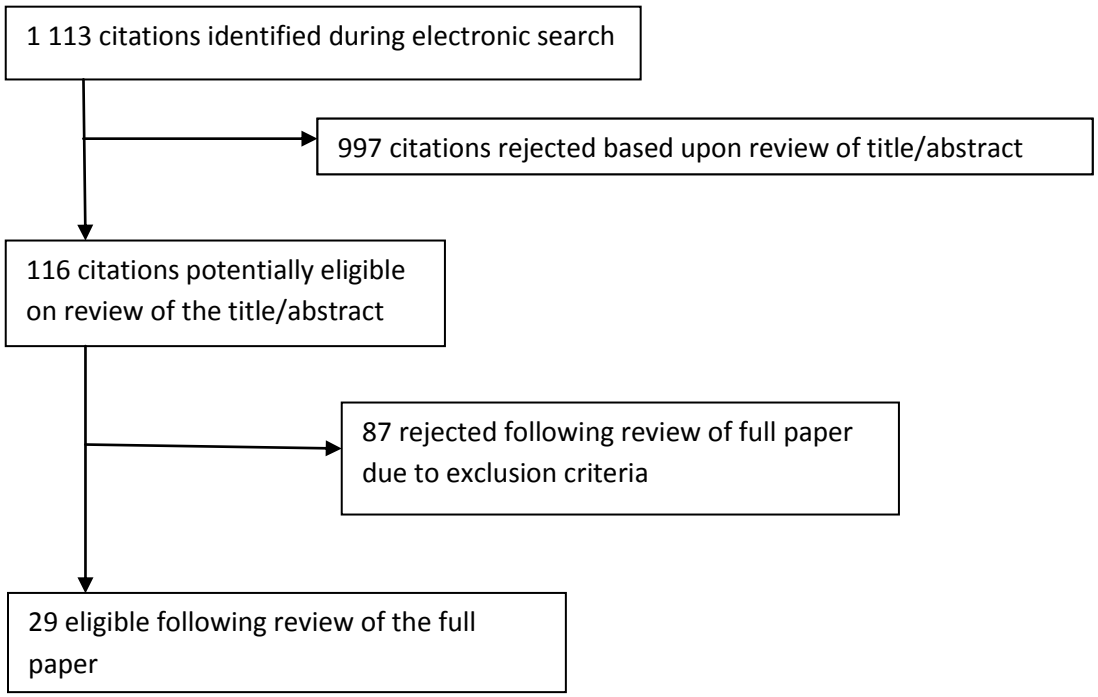

Figure 2.1 Diagram of citations included and excluded during the systematic review

The trials were based in a variety of locations including schools, parks and homes and the number of subjects varied from 30 – 8 670 youth subjects tested. The variables tested included questionnaires on physical activity, physical maturation, parental and social support, self- perception, activity-related psychosocial measures and photographic mapping. Personal and anthropometric measures included height, weight, ethnicity, age, gender and family and neighbourhood environment measures.

3.1 Adolescent physical activity

Physical activity (PA) decreases with age and is particularly concerning during adolescence (Duncan *et al.*, 2007; Dwyer *et al.*, 2006; Stevens *et al.*, 2005). All 29 articles reviewed, agree on this statement and found that low PA levels during adolescence are a public health concern.

3.2 Adolescents' perception on physical activity

Different factors influence adolescents' perception on and level of PA participation. Adolescents believe that a lower body mass index (BMI) increases the enjoyment of PA participation (Stanley & Bohnert, 2011; Graham *et al.*, 2011; Martin *et al.*, 2010). Therefore, a high BMI was associated with low levels of PA and inaccurate perceptions of body weight (Lanigan, 2011; Stanley & Bohnert, 2011; Gesell *et al.*, 2010; Chen *et al.*, 2009; Polman & Borkoles, 2006; Adkins *et al.*, 2004).

Although no relationship was found between maturation and PA (Niven *et al.*, 2007), the change in physical appearance associated with maturation influences PA decisions due to self-perception (Polman & Borkoles, 2006). Negative self-perception leads to negative thoughts, for example the perceived lack of skills to participate in any physical activity (Goldfields *et al.*, 2007).

An increase in PA have a linear increase in perceived physical conditioning as well as self- worth and self-perceptions (Lawman *et al.*, 2011; Li *et al.*, 2011; Gesell *et al.*, 2010; Graham *et al.*, 2011; Martin *et al.*, 2010; Dishman *et al.*, 2009; Goldfields *et al.*, 2007; Niven *et al.*, 2007; Stein *et al.*, 2007; Polman & Borkoles, 2006). In addition a few studies found that unhealthy eating habits decrease self-concept and therefore PA (Cumming *et al.*, 2011; Yoo *et al.*, 2010; Mehlenbeck *et al.*, 2009).

3.3 Other factors influencing adolescent physical activity

One of the other factors influencing the perceptions adolescents have about PA is the social interaction with peers during PA. With an increase in PA the social network advantages adolescents experience are high (Mulhall *et al.*, 2011; Stanley & Bohnert, 2011; Dishman *et al.*, 2009; King *et al.*, 2008; Ries *et al.*, 2008; Duncan *et al.*, 2007; Stein *et al.*, 2007; Hume *et al.*, 2005).

In contrast with this Cumming *et al.* (2011) found that adolescents tend to make bad decisions regarding PA if their peers aren't physically active. The fear of teasing and making mistakes while participating in a specific sport also contributes to a lack of PA (Duncan *et al.*, 2007).

Family support has been a consistently reported correlate of PA in adolescents (Lawman *et al.*, 2011). Seven studies have reported that parents have a significant influence on adolescent PA. Support from both peers and parental influences also positively increase the participation in PA and improve self-esteem and self-worth (Barkin *et al.*, 2011; Mulhall *et al.*, 2011; Chen *et al.*, 2009; Ries *et al.*, 2008; Duncan *et al.*, 2007; Hume *et al.*, 2005; Adkins *et al.*, 2004).

Perception of a safe and easy accessible environment for PA is another factor that influence the decisions an adolescent has to make regarding PA (De Farais *et al.*, 2011; Mulhall *et al.*,2011; Ries *et al.*, 2008; Duncan *et al.*, 2007; Hume *et al.*, 2005). Access to facilities at school will make these decisions a lot easier (Pate *et al.*, 2005). Physical education in schools is an important intervention to promote adolescents' perception of PA (Lawman *et al.*, 2011; Chen *et al.*, 2009; Stevens *et al.*, 2005) (Appendix A).

4 DISCUSSION

Perceptions young people have of physical activity (PA) will influence their participation in PA (Duncan *et al.,* 2007; Dwyer *et al.,* 2006; Stevens *et al.,* 2005). This systematic review has identified numerous factors influencing youth participation in PA:

4.1 Body image

Several studies (Lawman *et al.,* 2011; Yoo *et al.,* 2010; Dishman *et al.,* 2009; Goldfields *et al.,* 2007; Polman & Borkoles, 2006) have proven that adolescents' perception of their body is a major factor that influences the decision of being physically active or not. Adolescents believe that if they have a higher BMI the participation in PA will be less enjoyable and uncomfortable, and more importantly socially unacceptable (Lanigan, 2011; Li *et al.,* 2011; Niven *et al.,* 2007). Therefore, a high BMI is associated with low levels of PA and negative perceptions of one's body weight (Lanigan, 2011; Stanley & Bohnert, 2011; Gesell *et al.,* 2010; Chen *et al.,* 2009). In contrast with this Adkins *et al.* (2004) found that adolescents, even though they have a high BMI, are more physically active if their parents are physically active and supportive, although not active enough. The change in physical appearance (often a higher BMI) associated with maturation, influences PA decisions due to self-perception (Gesell *et al.,* 2010; Graham *et al.,* 2011; Chen *et al.,* 2009). However, a study by Niven *et al.* (2007) disagrees with this statement. The author found that there was no relationship between maturation and PA. He did find that maturation will influence physical self-perception.

Adolescents' physical self-worth perception is directly related to their self-esteem and consequently participation in PA will be affected. Those with a higher self-esteem are more willing to participate in PA (Dishman *et al.,* 2009; Goldfields *et al.,* 2007). Negative self-perception leads to negative thoughts, for example the perceived lack of skills to participate in any physical activity (Cumming *et al.,* 2011; Mehlenbeck *et al.,* 2009; Stein *et al.,* 2007).

An increase in PA will have a linear increase in perceived physical conditioning as well as self- worth and self-perceptions (Lawman *et al.,* 2011; Li *et al.,* 2011; Gesell *et al.,* 2010; Graham *et al.,* 2011; Martin *et al.,* 2010; Dishman *et al.,* 2009; Goldfields *et al.,* 2007; Niven *et al.,* 2007; Stein *et al.,* 2007; Polman & Borkoles,2006). In addition a few studies found that unhealthy eating habits decrease self-concept and therefore PA (Cumming *et al.,* 2011; Yoo *et al.,* 2010; Mehlenbeck *et al.,* 2009).

4.2 Social support

Adolescence is a stage where young people need to be accepted by their peers and family in order to have a good self-esteem (Hume *et al.,* 2005).

4.2.1 Peers

Participation in PA and team sports activities may provide adolescents with a social network that tends to support and protect them from bad self-esteem. In all the studies reviewed, it was found peers represent important role models and sources of social support for PA and for efficacy beliefs regarding activity (Dishman *et al.,* 2009; King *et al.,* 2008; Ries *et al.,* 2008; Duncan *et al.,* 2007; Hume *et al.,* 2005). Thus part of the hypothesized effect of self-efficacy on PA might be mediated by perceptions of social support. Peers can have a negative influence on adolescents as well. Adolescents often underestimate their abilities and therefore are fearful of the scrutiny they will receive from their peers (Ries *et al.,* 2008).

4.2.2 Parents

Physically active parents are considered good role models for adolescents. Studies by Adkins *et al.* (2004) and Hume *et al.* (2005) found that positive support from either one or both parents' shows a linear increase in adolescents' PA. Reviewed studies suggest that a decline in PA during the period from late middle school through late high school are inversely associated with self- efficacy for overcoming barriers to PA and also with perceived support from family and friends (Barkin *et al.,* 2011; Mulhall *et al.,* 2011; Dishman *et al.,* 2009; Duncan *et al.,* 2007; Adkins *et al.,* 2004).

4.3 Demographic factors

Some perceived neighbourhood environmental characteristics such as aesthetics and recreational facilities were found to be associated with levels of physical activity among adolescents (De Farias *et al.,* 2011). Thus if adolescents don't feel safe or feel uncomfortable in their environment, they are less likely to be physically active. No or less access to recreational facilities also affects adolescents' participation in PA. Walking or cycling to school appears to contribute to higher levels of total physical activity and improved weight status in youth (Mulhall *et al.,* 2011; Ries *et al.,* 2008; Duncan *et al.,* 2007; Hume *et al.,* 2005).

5 CONCLUSION

Perceptions youth have about PA will influence their participation in PA. Numerous factors influence youth participation in PA. Youth need to become more active and physical-activity interventions in schools have the potential to reach nearly all children and adolescents (Pate *et al.,* 2005, Stevens *et al.,* 2005). Therefore it is necessary to provide appropriate physically active role models for youth as well as to encourage healthcare providers to talk routinely to adolescents and young adults about the importance of incorporating physical activity into their routine. A comprehensive understanding of the determinants of physical activity among youth is essential for the identification of appropriate points of intervention to promote an active lifestyle and its associated health benefits for adolescents as a strong foundation for later in life.

6 RECOMMENDATION

Given the complex relationship between perception of PA and sedentary lifestyles in adolescents, more research is necessary on this subject. The need to increase PA is a public health priority and therefore it is necessary to understand the factors that may influence their participation in order to promote PA among youth more effectively.

7 LIMITATIONS

Firstly, the method of testing the variables wasn't the same in all the studies. Some studies used questionnaires, and others used verbal communication. Second, perceptions of teenagers are often examined in terms of physical activity in general, with little exploration of perceptions of specific activity contexts (structured sport, active transportation, physical education classes). Third, few studies have examined gender- or ethnic-specific perceptions.

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Article 2: Adolescents' perceptions of physical activity in relation to health enhancement: a systematic review

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CONTENTS

ABSTRACT

Adolescents are usually considered to be in good health, but their well-being tends to decrease from primary school to high school. Knowledge and health beliefs of physical activity (PA) and health may affect whether preventative behaviours are practised. The aim of this study is to determine what the literature says about adolescents' perception of physical activity in relation to health enhancement. The review consisted of 17 articles being identified as eligible, then screened and fully studied. The results of this study demonstrate that there is a low level of knowledge and awareness regarding physical activity and health. Perceptions young people have of physical activity in relation to health enhancement will influence their participation in physical activity. A comprehensive understanding of the determinants of physical activity and perceived health among youth is essential for the identification of appropriate points of intervention to promote active lifestyles and their associated health benefits for adolescents as a strong foundation.

Key Words: Physical activity, adolescents, exercise, health, knowledge, perceptions

1 INTRODUCTION

Adolescence is regarded as the transition period between childhood and adulthood, which lasts from approximately 12 to 18 years of age, including the periods immediately prior to, and after, puberty (Öngen, 2006:794). This period is typically characterized by increased demands for coping with multiple social, biological, and psychological changes and the emergence of the cognitive foundations of adulthood (Dorak, 2011:553). Few interventions have been well designed to understand the unique developmental features of adolescents, yet this may be precisely the time to encourage health changes (De Bar *et al.*, 2004:1047).

Adolescents are usually considered to be in good health (Haarasilta *et al.*, 2004:280), but their well-being tends to decrease from primary school to high school (Burnett & Spelman, 2011:23). When youths participate in at least 60 min of PA every day several health benefits accrue: healthy musculo-skeletal development, improved muscular strength and endurance, reduced risk of developing chronic disease risk factors, improved self-esteem, as well as reduced stress and anxiety (Antikainen & Ellis, 2011:198; Han *et al.*, 2009:665; Butcher *et al.*, 2008:360; Brodersen *et al.*, 2005:2). Most youth, however, are not engaging in the recommended level of physical activity (Butcher *et al.*, 2008:360; Brodersen *et al.*, 2005:2).

Motivating adolescents to change dietary and exercise habits to reduce long-term health risks may be particularly challenging (De Bar *et al.*, 2004:1048). Behavioural weight control programs have demonstrated efficiency in the treatment of overweight children between 8 and 12 years of age, with some promise regarding long-term outcomes; findings for adolescents are less consistent (Jelalian *et al*., 2008:1318). In addition, weight problems can lead to serious health risks during childhood, including diabetes, hypertension, glucose intolerance, metabolic syndrome, and orthopaedic problems (Arkes, 2009:1943; De Bar *et al.*, 2004:1048).

1.1 Physical activity as health enhancement modality

Physical activity is defined as any bodily movement produced by skeletal muscle contracture that results in caloric expenditure and includes competitive or recreational sport, exercise, active hobbies like walking, cycling, and some activities of daily living (for example household chores) (Clanchy *et al.*, 2011:499; ACSM, 2009:3). A growing body of evidence indicates that physical activity is important for healthy growth

and development in children and adolescents (Clanchy *et al.,* 2011:499; Elinder *et al.,* 2011:482; Wills *et al.,* 2006:396).

1.2 Perceptions of health

In assessing an individual's overall perception of their own health status, one of the most commonly used single items is to ask about their self-rated health (SRH) (Breidablik *et al.,* 2008b:73). Several studies report that adolescents' general perception of health include immediate issues like body awareness and not other health risks like osteoporosis, cholesterol and high blood pressure (Sundblad *et al.,* 2008:240; Gurney & Simmonds, 2007:270). In a study by Wills *et al.* (2006:403) some participants used the words "overweight" and "obesity" when talking about "unhealthiness". Few teenagers mentioned being overweight in relation to consequences for health and only a minority of teenagers raised any benefits at all of losing weight (Rutkowski & Connelly, 2011:52; Yates *et al.,* 2011:2; Han *et al.,* 2009:666; Wills *et al.,* 2006:397). In contrast with this the results of a study by Breidablik *et al.* (2008b:78) indicate that self-ratings of health during adolescence are less influenced by bodily and environmental feedback than by the individual's prior beliefs about him/herself as a healthy or unhealthy person.

Adolescence is a time of turbulence which tests young people's ability to cope with life events, changing body images, and issues of belonging to and acceptance within peer groups (Dorak, 2011:553; Breidablik *et al.,* 2008b:74; Backett - Milburn *et al.,* 2006:625). Such events and their meaning are determined by the adolescents' perceptions and coping resources (Puskar *et al.,* 2008:15; Wills *et al.,* 2006:396). Adolescents perceive their bodies according to both their outward appearances as well as the benefits (the body provides the opportunity for reaching their goals for themselves. Interest in outward appearance (clothing, hairstyle) is excessive during this period (Dorak, 2011:554). Although teenagers with a BMI over the threshold for their age are defined as being overweight or obese, there has been little research which has examined how individuals who describe themselves as fat conceptualise their body size or shape (Dorak, 2011:554; Elinder *et al.,* 2011:482; Wills *et al.,* 2006:399).

Studies have shown that not all respondents use the same frame of reference in rating their health (Breidablik *et al.,* 2008b:74; Øverland *et al.,* 2006:219). Because of its important consequences in adult life, investigating the assessment of perceived health in early life may be of particular interest. Previous studies suggest that health is conceptualised during childhood and adolescence, and that adolescents define health in a broad and global way (Geckil & Dundar, 2011:219). However, during early adolescence SRH deteriorates, especially among girls, and a large number of adolescents report health complaints and concerns (Boardman, 2006:403).

In an earlier cross-sectional study among adolescents, the authors found that SRH was associated with a broad spectrum of medical, psychological, social and lifestyle factors for both genders, where both the positive and negative ends of the SRH scale were affected in a similar but inverse manner (Breidablik *et al.*, 2008a:13).

Western societal norms, strongly reflected in the media, are promoting a thin body ideal for women and a muscular body ideal for men (Hogan & Strasburger, 2008:521). Adolescents are picking up these messages and for many of them this leads to the perception of being too heavy or too thin (Elinder *et al.,* 2011:484). Underweight and thinness is mainly discussed in the literature on body image and mental health because body weight and shape are issues of great importance and especially for adolescents' emotional health (Elinder *et al.,* 2011:482; Arkes, 2009:1943; Breidablik *et al.*, 2008b:74).

Current evidence demonstrates a strong relationship between a negative weight perception and depressive symptoms in adolescents, even when physical weight is within a normal range (Puskar *et al.,* 2008:13; Daniels, 2005:35; Eaton *et al.,* 2005:514). In a study done by Cheung *et al.* (2007:19), the authors found that females were more likely to employ weight control behaviours, based on their perceived weight, while males used weight control behaviours based on their perceived and actual weights (Puskar *et al.,* 2008:13). Treating and preventing obesity and overweight among adolescents is a salient public health nutrition priority (Abood *et al.,* 2008:168).

The literature offers evidence that, regarding adolescent health risk behaviour, the economy can affect teenage substance use, thus decreasing adolescent health (Arkes, 2009:1943). Media and academic attention has tended to focus on other health-relevant behaviours of teenagers, such as smoking, drug and alcohol misuse, unsafe sex and the risks of their lifestyle choices in these areas and not so much on perception of physical activity as health modality (Backett-Milburn *et al.,* 2006:625). SRH is significantly related to whether or not the adolescents were currently physically active (Elinder *et al.,* 2011:484).

1.3 Perceptions of physical activity and health

It is important to consider PA as it relates to the multiple demands of childhood and adolescence associated with physical growth, biological maturation, and behavioral development. It provides the backdrop against which youth evaluate their own status among peers, especially during adolescence (Strong *et al*., 2005:736). Evidence from an observational study also demonstrates dose-response relations between physical activity and health (Davison & Lawson, 2006:11). Social cognitive variables (i.e., beliefs that are formed by social learning and reinforcement history) are definite influences on self-initiated change in health behaviours such as physical activity (Dishman *et al.,* 2009). Programs that promote PA vary from simple knowledge-based programs and exercise prescription to theory-based behaviour modification programs (Antikainen & Ellis, 2011:198).

Associations between PA and health in children and adolescents have been analysed in cross-sectional studies, which show that vigorous activity is associated with significant health (Elinder *et al.,* 2011:482; Han *et al.,* 2009:667; Richter *et al.,* 2009:400). Being busier longer hours could also affect the amount of PA a person does, but this would depend on both the level of activity involved with these activities and how much exercise the teenager gets in his/her spare time when not being busy (Arkes, 2009:1944).

1.4 The influence of parents and peers on adolescents' perception of health

Youth is often seen as a period of invulnerability by adults and young people themselves, when the body is least likely to get ill or have a disease, and activities like smoking, drinking and eating unhealthy foods are considered enjoyable and fun (Backett-Milburn *et al.,* 2006:625). It is valuable to understand more about the social, cultural and family conditions which might be seen as promoting more positive dietary health and physical well-being in the face of trends which seem to be challenging these aspects of adolescents' lives (Backett-Milburn *et al.,* 2010:1317; Neumark-Sztainer *et al.*, 2006:245; Wills *et al.*, 2006:400; Kubik *et al.*, 2005:496).

Adolescents are in a critical period of personality development and social adaptability during which they experience substantial qualitative and quantitative changes in physical, psychological, emotional, moral, and social development (Cheng *et al.,* 2011:322). Therefore, participation in an exercise programme would potentially influence global self-perceptions (Polman *et al.,* 2006:2).

Social support has been cited as an important correlate of PA, but the impact of social support on adolescent physical activity has not been widely assessed (Duncan *et al.,* 2005:3). The family is an important source of social support for children and adolescents (Dowda *et al.,* 2007:153; Anderssen *et al.,* 2006:513). Most research in this area has examined parent modelling of PA, which tends to be related to the frequency of adolescent exercise (Hussin *et al.,* 2011:367; Van der Velde *et al.,* 2011:1581). In general, more active parents tend to have more active adolescents (Adkins *et al.,* 2004:43).

In a study by Abood *et al.* (2008:173), the role of friends was associated with motivating positive dietary behaviour and healthy weight maintenance. Teenage weight gain can have many consequences. First, overweight and obese children and adolescents are subject to stigmatization and discrimination from peers and adults (Arkes, 2009:1943). Second, parents' views about their teenager's health and lifestyle must also be set in the context of their image of that young person, his/her age and life stage, and against the background of the interactive nature of the socialisation process (Rutkowski & Connelly, 2011:51; Backett - Milburn *et al.,* 2010:1317; Christensen, 2004:378).

Third, despite exhibiting awareness of healthy eating messages, the eating practices of many youth do not reflect this knowledge, and what parents consider "healthy" or "balanced" may not always be in line with published guidelines for eating a healthy diet (Backett-Milburn *et al.*, 2006:625). The need to attend to the role of parents in adolescent weight loss is important (Jelalian *et al*., 2008:1322).

Although socio-economic status was not consistently related to PA, one study found adolescents had a greater probability of engaging in higher levels of PA when their mothers were well educated or their parents' income high (Butcher *et al.*, 2008:361). Concerns about child abduction could also lead parents to restrict physical activity, particularly unsupervised physical activity or active travel in one's neighbourhood (Ding *et al.*, 2012:190). Schools provide a link to parents/caregivers who can reinforce health-promoting behaviours at home (Hammerschmidt *et al.*, 2011:63).

The physical self is not only an important contributor to overall perceptions of self-worth; it is also related to health behaviour. It is important to assess the knowledge and health beliefs of adolescents in order to understand what interventions should be put in place. Knowledge and health beliefs of physical activity and illnesses like osteoporosis may affect whether preventative behaviours are practised. Therefore, the aim of this study is to determine what the literature says about adolescents' perception of physical activity in relation to health enhancement.

2 METHOD

2.1 *Conceptual definitions*

The research on this topic suggests that adolescents' perception of PA can be influenced by different factors (e.g., socio-demographic variables, physical appearance, parental and peer approval), and as a result, the existing literature examines a wide range of variables. Some important terms are defined in ***Fig. 3.1***.

Physical activity:

Physical activity is any bodily activity that enhances or maintains physical fitness and overall health or wellness. (ACSM, 2009:3; www.who.com, date of access: 10 June 2012).Being physically active is defined as the accumulation of 30 minutes of moderately intense activity such as brisk walking, on at least 5 days of the week (Blair & Morris, 2009:255; Harrison *et al.*, 2006:207).

Health:

At its simplest, the absence of physical and mental disease. Health is an optimal state of well-being. A wider concept promoted by the World Health Organisation is that all people should have the opportunity to fulfill their genetic potential. This included the ability to develop without the impediments of poor nutrition, environmental contamination, or infectious disease (Illustrated Medical Dictionary, 2008:270).

Adolescent:

The period between childhood and adulthood, which broadly corresponds to the teenage years. Adolescence commences and overlaps with, but is not the same as, puberty (Geckil & Dundar, 2011:219).

Perception:

The interpretation of a sensation. Information is received through the five senses and organised into a pattern by the brain. Factors such as attitude, mood, and expectations affect the final interpretation (Illustrated Medical Dictionary, 2008:440).

Figure 3.1: Conceptual definitions

Inclusion criteria

The following criteria were used to identify published studies for inclusion in this review. Studies had to be published between 2004 and June 2012; present original data; be published in English; focus on adolescents; include perceptions of health, health risk behaviour, physical activity, self-rated health and any factor influencing adolescent health and physical activity participation. Studies were excluded for not meeting the above criteria. Review articles were excluded from the coding and analysis portion of this review, although their reference lists were used to identify original research to be reviewed for inclusion ***(Table 3.1)***.

Identification of studies that met the inclusion criteria

Studies were identified through a search of six electronic databases (ERIC, Google Scholar, PubMed, ScienceDirect, SPORTDiscus and EBSCO Host) using a pre-established set of search terms that included "physical activity", "adolescent" and "health". Additional studies were located from reference lists of the identified articles.

Classification of studies

The search yielded 203 articles. The researchers examined each article to determine its match with the inclusion criteria; it was then classified as "included for review" or "excluded from review". Where the match was unclear, articles were temporarily classified as "possible inclusion" before being reviewed again by the researchers for final classification. Overall, 17 articles met the inclusion criteria and were read, abstracted, and coded for this synthesis ***(Fig. 3.2)***.

Table 3.1: Detailed inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Types of Study	A review of randomised control trials (RCTs), Meta-Analysis, Case Reports and non-randomised trial articles will be done (2004 to March 2011).	Articles older than 2004
Types of Participants	Articles which include both male and female adolescents will be used for this review. The focus of this study is to evaluate the main perceptions adolescents' have of physical activity in health enhancement.	
Types of Interventions	Interventions that focus on increasing daily activity levels in order to improve adolescents' perception of health.	
Types of Outcomes Measured	The primary outcome is to establish from the literature the main perceptions of physical activity as modality in health enhancement for adolescents.	

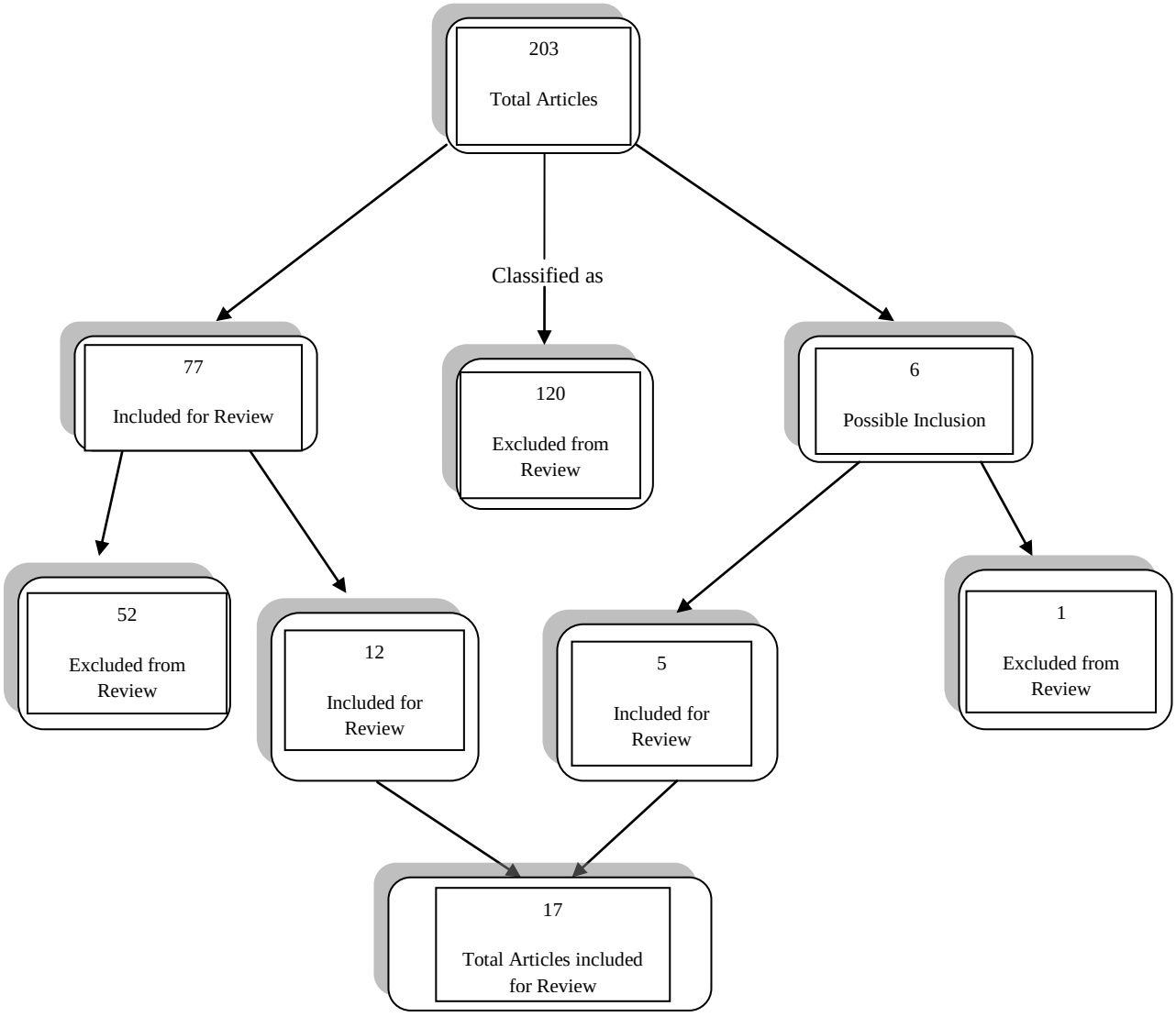

Figure 3.2: Article classification diagram

3. RESULTS

This review examines the findings of 17 articles (Appendix B) that explored adolescents' perception of health and physical activity. The number of subjects tested varied from 10 – 97 721 adolescent subjects. The variables tested included questionnaires, physical interviews and telephonic interviews on physical activity, health, health risk behaviours, parental and social support, and self-perception.

According to Elinder *et al.* (2011), adolescents don't meet the prescribed PA guidelines and thus increase their risk for multiple health problems. A study done by Butcher *et al.* (2008) reported that approximately 40% of the females and 57% of the males complied with the national physical activity guidelines. A majority of the girls and a large portion of the boys failed to meet the current guidelines, thereby increasing their risk of multiple health problems. Several barriers to physical activity (e.g. general discomfort, lack of time, disinterest and adolescents' perceived health) decrease adolescents' actual health (Swisher & Erickson, 2008).

There are controversies in the literature about adolescent's perceived health (an individual's overall perception of their own health status (Breidablik *et al.*, 2008b)). Arkes (2009) found that adolescents' perceived health increases with age with girls, and decreases with boys (Geçkil & Dündar, 2011; Sundblad *et al.*, 2008). In contrast to these findings Breidablik *et al.* (2008b) and Han *et al.* (2009) found that adolescents' perceived health stays the same with aging. In another study done by Butcher *et al.* (2008), the authors found that adolescents' perceived health decreases with age in girls, but stays the same with boys.

Gurney and Simmonds (2007) tested a total of 224 16–18-year-olds in full-time education and found that almost one-third of subjects reported they don't know anything about osteoporosis. The results of this study demonstrate that there is a low level of knowledge and awareness regarding the prevalence of osteoporosis and other health issues among 16–18-year-olds in full-time education. In a study by Swisher and Erickson (2008), ten participants with Cystic fibrosis aged 13-17 were interviewed and asked about their perceptions of PA for themselves and other adolescents. The results showed that all participants articulated understanding the importance of participating in PA for health benefits like Cystic fibrosis as well as positive general and lung health effects. They also showed perceived barriers to participating in regular PA.

Geçkil and Dündar (2011) examined the health risk behaviours and self-esteem of 1 361 adolescents in Adiyaman, Turkey. The most frequent predictor of risky behaviour in adolescents was lack of PA. Nutrition, psychosocial behaviour, hygiene, and substance abuse issues were also significant predictors of risky behaviour.

In a prospective study (Sundblad *et al.,* 2008) conducted in Swedish schools the authors found that physical inactivity predicted headache, abdominal pain, musculoskeletal pain, tiredness, loneliness, and sadness among adolescents (Wills *et al*., 2006; Brodersen *et al.,*2005). According to Swisher & Erickson (2008) there is a linear relationship between health and PA. In a study by Han *et al.* (2009) the purpose was to investigate the association between level of PA and poor self-rated health among Korean adults. The prevalence of poor SRH was significantly lower as the level of PA increased, and odds ratios for poor SRH were significantly lower for higher levels of PA and the authors support public health programmes that encourage regular PA (Elinder *et al.,* 2011; Iannotti *et al.,* 2009; Swisher & Erickson, 2008; Brodersen *et al.,* 2005). In another prospective study from Norway, Breidablik *et al.* (2008a) found that of 15 potential predictor variables, "lack of general well-being" and "lack of sports and exercise" were the strongest independent predictors of low self-rated health in adolescents over a 4-year period. These authors further concluded that self-rated health among adolescents represents a broad construct related to the self-concept of health, rather than reflecting the actual medical health status. SRH among adolescents is an independent and strong predictor of early mortality and therefore self-rated health and quality of life could be important outcomes to target in future longitudinal and intervention studies on adolescents (Elinder *et al.,* 2011; Lien *et al.,* 2009; Wills *et al.,* 2006). Adolescents take health risk behaviours according to their knowledge of health as well as their self-rated health (Sundblad *et al.,* 2008).

Another factor that increases health risk behaviour is low self-esteem (Geçkil and Dündar, 2011; Neumark-Sztainer *et al.,* 2006). In Elinder *et al.*'s (2011) study the purpose was to examine the relationship between PA among 15-year-old students, weight status and self-rated perceived health 3 years later. Overweight or obesity was not significantly predicted by PA. A significant risk of low SRH was found at follow-up in boys active for < 4 hours per week compared with those active for > 4 hours per week and concluded that PA is important to maintain a healthy body weight and for future SRH and improved self-esteem.

Health risk knowledge has been identified as a key to making informed decisions regarding healthy lifestyle choices. Rutkowski and Connelly's (2011) study describes a descriptive, correlation study conducted with adolescents and their parents to examine the relationship between obesity risk knowledge and PA levels in families of adolescents. A statistically significant inverse relationship was found between parental physical activities and the activity levels of adolescents. Although a relationship between physical activity and obesity risk knowledge among parents is supported, the phenomenon is not found in adolescent participants. However, Abood *et al.* (2008) found that adolescents' intention to maintain a healthy body weight through the right nutrition and PA are because of its importance to friends. Several studies support this finding (Elinder *et al.*, 2011; Neumark-Sztainer *et al.*, 2006; Wills *et al.*, 2006; Kubik *et al.*, 2005).

The socio-cultural contexts within which young teenagers become overweight, and lay conceptualisations of fatness, have largely been ignored. Participants in a study by Wills *et al.* (2006) rarely mentioned any health-related consequences of their own and others' fatness, although wearing 'nice' clothes and being slower in general were raised as considerations by girls and boys, respectively. The teenagers in this study were rarely supportive of friends or family who attempted to lose weight and frequently disagreed with others' perceptions of fatness. These findings are important as they contradict the common perception that being overweight or obese is related to body dissatisfaction and that young people have a fear of fatness (Richter *et al.*, 2009; Butcher *et al.*, 2008; Brodersen et al., 2005). According to Elinder *et al.* (2011) PA is important to maintain a healthy body weight for future self-rated health.

Richter *et al.* (2009) conducted a study in 33 European and North American countries. They found that the majority of behavioral factors were significantly associated with family affluence in all countries and explained part of the relationship between SRH and family affluence. Behavioral factors in early adolescence partly account for the association between SRH and socio-economic status. In a cross-sectional survey of 2 578 boys and 1 742 girls from 36 schools stratified by socio-economic background and gender mix of students, Brodersen *et al.* (2005) found that ethnicity, socio-economic factors, developmental stage, environmental factors, and psychological variables were associated with PA and sedentary behavior.

In a multiple regression used, sedentary behaviour was greater among ethnic minority groups, and lower social groups. Vigorous PA was associated with good self-rated health (Arkes, 2009). Study findings of Kubik *et al.* (2005) suggest that programs that target social-environmental factors that include norms, role models, social support, and opportunities to practice health behaviour have the potential to affect positively the dietary and physical activity practices of teenagers.

The conclusion the authors came to is that health awareness programs increase adolescents' knowledge of health and should be implemented for prevention of health risks later in life (Elinder *et al.,* 2011; Geçkil and Dündar, 2011; Han *et al.,* 2009; Abood *et al.,* 2008; Gurney & Simmonds, 2007). This suggests that this population is unlikely to make lifestyle choices which would reduce the risk of developing diseases. Targeted education programmes are therefore needed and should be aimed at both improving knowledge and affecting health beliefs in a manner appropriate and appealing to this age group.

4. DISCUSSION

The majority of adolescents do not meet physical activity guidelines and this increases their risk for multiple health problems (Elinder *et al.,* 2011; Butcher *et al.,* 2008). The need to increase PA is a public health priority and therefore it is necessary to understand factors that may influence their participation in order to promote PA among youth more effectively (Mota *et al.,* 2005:834). In contrast to this Rutkowski and Connelly (2011) indicates that most adolescents as measured by PACE+ are meeting the recommended guidelines, but there are specific barriers to physical activity (general discomfort, lack of time, disinterest, peer pressure and perceived health) that decrease health among especially adolescents (Swisher & Erickson, 2008). Several studies (Geckil & Dundar, 2011; Arkes, 2009; Sundblad *et al.,* 2008) found that perceived health increases with age with girls and decreases with boys. Butcher *et al.* (2008) on the other hand found that perceived health decreases with age with girls and stays the same with boys and two studies (Han *et al.*, 2009; Breidablik *et al.*, 2008a) say perceived health stays the same with age.

Either way the majority adolescents studied had a low level of awareness and knowledge about health in general as well as their own health (Gurney & Simmonds, 2007), but adolescents who perceive their health status as excellent, had fewer health risk behaviours (Geckil & Dundar, 2011; Swisher & Erickson, 2008). Stress related to health complaints are the most frequent among inactive adolescents (Sundblad *et al.*, 2008; Wills *et al.*, 2006; Brodersen *et al.*, 2005). PA not only increases health but emotional wellness and self-rated

health as well (Elinder *et al.*, 2011; Han *et al.*, 2009; Iannotti *et al.*, 2009; Swisher & Erickson, 2008; Brodersen *et al.*, 2005).

Adolescence is a stage where teens tend to adhere to health compromising behaviour (e.g. sedentary behaviour, crash dieting and stress) and this kind of behaviour decreases self-rated health (Elinder *et al.*, 2011; Lien *et al.*, 2009; Breidablik *et al.*, 2008b; Wills *et al.*, 2006). Low self-esteem, typical among adolescents, also increases the prevalence of health risk behaviours (Elinder *et al.*, 2011; Geckil & Dundar, 2011; Neumark-Sztainer *et al.*, 2006). One such health risk behaviour is weight. Overweight or obesity was not significantly predicted by physical activity (Elinder *et al.* 2011) and Rutkowski and Connelly (2011) found no statistically significant relationship between adolescent obesity risk knowledge and adolescents' physical activity level. On the other hand the intention to maintain a healthy body weight through the right nutrition and PA because of peer pressure or support from family was identified in several studies (Elinder *et al.*, 2011; Abood *et al.*, 2008; Neumark-Sztainer *et al.*, 2006; Wills *et al.*, 2006; Kubik *et al.*, 2005). PA is important to maintain a healthy body weight for future self-rated health (Elinder *et al.*, 2011). Health awareness programs increase adolescents' knowledge about health (Elinder *et al.*, 2011; Geckil & Dundar, 2011; Han *et al.*, 2009; Abood *et al.*, 2008; Gurney & Simmonds, 2007).

Ethnicity, socio-demographic factors, developmental stage, environmental factors and psychological variables are also associated with PA and sedentary behaviour (Arkes, 2009; Richter *et al.*, 2009; Brodersen *et al.*, 2005;) and therefore PA decreases in ethnic minority groups and lower social classes (Richter *et al.*, 2009; Butcher *et al.*, 2008; Wills *et al.*, 2006; Brodersen *et al.*, 2005; Kubik *et al.*, 2005).

5. CONCLUSION

The results of this study demonstrate that there is a low level of knowledge and awareness regarding PA and health in the majority of adolescent studied. Perceptions young people have of PA in relation to health enhancement will influence their participation in PA. Numerous factors influence youth participation in physical activity. Youth need to become more active, and physical activity interventions in schools have the potential to reach nearly all children and adolescents (Pate *et al.*, 2005, Stevens *et al.*, 2005). Therefore it is necessary to provide appropriate physically active role models for youth as well as to encourage health care providers to talk routinely to adolescents and young adults about the importance of incorporating physical activity into their lives.

A comprehensive understanding of the determinants of PA and perceived health among youth is essential for the identification of appropriate points of intervention to promote active lifestyles and their associated health benefits for adolescents as a good foundation. This suggests that adolescents are unlikely to make lifestyle choices which would reduce risk to their health. Targeted education programs are therefore needed and should be aimed at both improving knowledge and affecting health beliefs in a manner appropriate and appealing to this age group.

6. RECOMMENDATIONS

Given the complex relationship between perception of PA, health and sedentary lifestyles among adolescents, more research is necessary on this subject. The need to increase PA and health knowledge is a public health priority and therefore it is necessary to understand the factors that may influence their participation in order to promote PA among youths more effectively.

7. LIMITATIONS

Firstly, the methods of testing the variables weren't the same in all the studies. Some studies used questionnaires, whereas others used verbal communication. Secondly, teenagers' perceptions are often examined in terms of PA and health in general, with little exploration of perceptions around specific activity contexts (structured sport, active transportation, physical education classes). Thirdly, few studies have examined gender- or ethnic-specific perceptions.

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Chapter 4

Summary, conclusions and recommendations for further research references

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4.1 Summary

Adolescents are usually considered to be in good health (Haarasilta *et al.,* 2004:280). During adolescent years, physical activity (PA) rates decline dramatically (Kelly *et al.,* 2011:31; Rangul *et al.,* 2011:616; Anderssen *et al.,* 2006:514; Pate *et al.,* 2005:1582). Low levels of PA among children and adolescents and the failure to meet PA recommendations have notable health consequences (Kelly *et al.,* 2011:31; Rangul *et al.,* 2011:616; Ortabag *et al.,* 2010:56; Davison & Lawson, 2006:19). However, motivating adolescents to change dietary and exercise habits to reduce long-term health risks may be particularly challenging (De Bar *et al.,* 2004:1048). It seems therefore, that a lack of physical activity as a health modality (prevention, maintenance and rehabilitation) remains an imminent public health issue (Lopez-Quintero *et al.,* 2009:1769; Magnusson, 2009:271; Kallings, 2008:67; Haskell *et al.,* 2007:1082; Marcus *et al.,* 2006:2739).

With this study it was attempted to answer the following questions:

- What are the main perceptions of physical activity for adolescents according to the literature?
- What are the main perceptions of physical activity in health enhancement for adolescents according to the literature?

Answers to these questions can help healthcare professionals understand the perceptions adolescents have about physical activity in the literature as well as the different factors that influence adolescents' physical activity. Knowledge of these findings will help healthcare professionals to implement successful interventions in order to improve adolescent health through physical activity.

With the above mentioned questions in mind, the objectives of the study were:

- To establish from the literature the main perceptions of physical activity for adolescents;
- To establish from the literature the main perceptions of physical activity in health enhancement for adolescents.

The problem statement, objectives and hypothesis of this study are presented in Chapter 1.

Chapters 2 and 3 are presented in the form of research articles. The method, research design, results, discussion and conclusion of each article are presented in the chapters. The explanation of the different articles is as follows:

- ✓ In chapter 2 several terms like physical activity, perceptions, self-efficacy and physical maturation are defined. Secondly, the influence family, peer and demographic factors have on youth physical activity is discussed. The perceptions adolescents have of physical activity as well as personal factors influencing their perceptions are also discussed.

- ✓ In Chapter 3, physical activity is discussed as a health enhancement modality. Adolescent's perceptions of health, physical activity and health, as well as the influence of parents and peers on adolescent's perception of health are broadly discussed.

4.2 Conclusions

The conclusion of this research will be handled according to the following hypothesis:

4.2.1 The literature will show that the main perceptions of physical activity amongst adolescents are influenced by cultural and social factors as well as parents' beliefs.

Perceptions youth have about PA will influence their participation in PA. Numerous factors influence youth participation in PA. Youth need to become more active and physical-activity interventions in schools have the potential to reach nearly all children and adolescents (Pate *et al.,* 2005, Stevens *et al.,* 2005). Therefore it is necessary to provide appropriate physically active role models for youth as well as to encourage healthcare providers to talk routinely to adolescents and young adults about the importance of incorporating physical activity into their routine. A comprehensive understanding of the determinants of physical activity among youth is essential for the identification of appropriate points of intervention to promote an active lifestyle and its associated health benefits for adolescents as a good foundation for later in life. According to the literature the main perceptions of physical activity for adolescents are influenced by cultural and social factors as well as parents' beliefs. Hypothesis 1 is thus accepted.

4.2.2 The literature will show opposing perceptions of physical activity in health enhancement for adolescents.

The results of this study demonstrate that there is a low level of knowledge and awareness regarding physical activity and health. Perceptions young people have of physical activity in relation to health enhancement will influence their participation in physical activity. Numerous factors influence youth participation in physical activity.

Young people need to become more active, and physical activity interventions in schools have the potential to reach nearly all children and adolescents (Pate *et al.*, 2005, Stevens *et al.*, 2005). Therefore it is necessary to provide appropriate physically active role models for youth as well as to encourage healthcare providers to talk routinely to adolescents and young adults about the importance of incorporating physical activity into their lives.

A comprehensive understanding of the determinants of physical activity and perceived health among youth is essential for the identification of appropriate points of intervention to promote an active lifestyle and its associated health benefits for adolescents as a good foundation. This suggests that adolescents are unlikely to make lifestyle choices which would reduce risk to their health. Targeted education programs are therefore needed and should be aimed at both improving knowledge and affecting health beliefs in a manner appropriate and appealing to this age group. The literature shows opposing perceptions of physical activity in health enhancement for adolescents. Hypothesis 2 is thus accepted.

4.3 Further research

It shows from this study that there is a need to do further research on:

- ✓ Given the complex relationship between perception of PA, health and sedentary lifestyles in adolescents, more research is necessary on this subject. The need to increase PA and health knowledge is a public health priority and therefore it is necessary to understand factors that may influence their participation in order to promote PA among youth more effectively.

- ✓ Given the complex relationship between perception of PA and sedentary lifestyles in adolescents, more research is necessary on this subject. The need to increase PA is a public health priority and therefore it is necessary to understand the factors that may influence their participation in order to promote PA among youth more effectively.

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List of Abbreviations

PA	Physical activity
SCM	Stages of Change Model
BMI	Body Mass Index
RCT	Randomised control trials
SRH	Self-rated health

Appendixes

APPENDIX A: Chapter 2

TITLE OF STUDY	AUTHOR(S) & YEAR	NUMBER OF PARTICIPANTS	VARIABLES TESTED	RESEARCH SIGNIFICANT FACTORS IDENTIFIED FROM STUDY
Physical activity among African-American girls: the role of parents and the home environment	Adkins *et al.* (2004:39)	52 subjects	• BMI • Physical activity • Self- perception	↑ BMI = ↓ PA ↑ Parental support = ↑ PA
Changing overweight Latino preadolescent Body Mass Index: The effect of the parent-child dyad	Barkin *et al.* (2011:30)	72 subjects	• BMI, • Self-perceptions	↑ Parental support = ↑ PA
Do overweight adolescents perceive the need to reduce weight and take healthy actions?	Chen *et al.* (2009:271)	217 subjects	• BMI • Self- perception • Physical activity	↑ BMI = ↓ PA ↑ Parental support = ↑ PA School-based intervention programs ↑ PA
The mediating role of physical self-concept on relations between biological maturity status and physical activity in adolescent females	Cummings *et al.* (2011)	407 subjects	• Physical activity • Self-perceptions	↓Self-concept = ↑ unhealthy eating = ↓ PA
Perception of the social and built environment and physical activity among north-eastern Brazil adolescents	De Farias *et al.* (2011)	2 876 subjects	• Physical activity • Self- perception	Bad environment = ↓ PA
Self-efficacy moderates the relation between declines in physical activity and perceived social support in high school girls	Dishman *et al.* (2009:442)	195 subjects	• Physical activity • Self- perception	↑ Social interaction = ↑ PA ↑ in perceived physical conditioning and self-worth/perception =↑ PA
A cohort-sequential latent growth model of physical activity from ages 12 to 17 years	Duncan *et al.* (2007:81)	371 subjects	• BMI • Physical activity, • Self- perception	Youth PA ↓ with age ↑ Parental support = ↑ PA ↑ Social interaction = ↑ PA Bad environment = ↓ PA

Adolescent girls' perceived barriers to participation in physical activity	Dwyer *et al.* (2006)	73 subjects	• Physical activity	Youth PA↓ with age
Accuracy of perception of body size among overweight Latino preadolescents after a 6-month physical activity skills building intervention	Gesell *et al.* (2010:324)	61 subjects	• BMI • Self- perception	↑ BMI = ↓ PA ↑ in perceived physical conditioning and self-worth/perception =↑ PA
Effects of modifying physical activity and sedentary behavior on psychosocial adjustment in overweight/obese children	Goldfields *et al.* (2007:784)	30 subjects	• BMI • Physical activity • Self-perception	↑ in perceived physical conditioning and self-worth/perception =↑ PA
Adolescents' attitudes toward sports, exercise, and fitness predict physical activity 5and 10 years later	Graham *et al.* (2011)	1 902 subjects	• BMI • Physical activity • Perception	↑ in perceived physical conditioning and self-worth/perception =↑ PA ↓ BMI = ↑ PA enjoyment
Childrens' perceptions of their home and neighborhood environments, and their association with objectively measured physical activity: a qualitative and quantitative study	Hume *et al.* (2005:2)	147 subjects	• Physical activity • Perceptions	↑ Parental support = ↑ PA ↑ Social interaction = ↑ PA Bad environment = ↓ PA
Effect of social support on adolescents' perceptions of and engagement in physical activity	King *et al.* (2008)	535 subjects	• Physical activity • Self-perceptions	↑ Social interaction = ↑ PA
The substance and sources of young children's healthy eating and physical activity knowledge: implications for obesity prevention	Lanigan (2011)	81 subjects	• BMI • Physical activity	↑ BMI = ↓ PA
The relationship between psychosocial correlates and physical activity in underserved adolescent boys and girls in the ACT trial	Lawman *et al.* (2011:255)	1 422 subjects	• Physical activity	↑ in perceived physical conditioning and self-worth/perception =↑ PA School -based intervention programs ↑ PA
Effect of perceived sport competence on intentions to exercise among adolescents: mediating or moderating?	Li *et al.* (2011)	248 subjects	• Physical activity • Self-perception	↑ in perceived physical conditioning and self-worth/perception =↑ PA
Weight control beliefs, body shape attitudes, and physical activity among	Martin *et al.* (2010)	369 subjects	• BMI • Physical activity	↓ BMI = ↑ PA enjoyment

adolescents				
Effects of behavioral weight control intervention on binge eating symptoms among overweight adolescents	Mehlenbeck *et al.* (2009:778)	194 subjects	• BMI, • Physical activity • Self-perception	↓self -concept = ↑ unhealthy eating = ↓ PA
Early adolescent participation in physical activity: correlates with individual and family characteristics	Mulhall *et al.* (2011)	1 578 subjects	• Perceptions	↑ Parental support = ↑ PA ↑ Social interaction = ↑ PA Bad environment = ↓ PA
Maturational differences in physical self-perceptions and the relationship with physical activity in early adolescent girls	Niven *et al.* (2007)	208 subjects	• Physical Activity • Self-perception	↑ in perceived physical conditioning and self-worth/perception =↑ PA No relationship between maturation and PA
Promotion of physical activity among high school girls: a randomized controlled trial	Pate *et al.* (2005:1582)	2 744 subjects	• BMI • Physical activity	School -based intervention programs ↑ PA
Relationship between physical self-perceptions and body composition following a 10-week exercise program for previously sedentary participants	Polman & Borkoles(2006:2)	92 subjects	• Self-perception • BMI	↑ BMI = ↓ PA ↑ in perceived physical conditioning and self-worth/perception =↑ PA
Adolescents' perceptions of environmental influences on physical activity	Ries *et al.* (2008)	50 subjects	• Self-perception	↑ Parental support = ↑ PA ↑ Social interaction = ↑ PA Bad environment = ↓ PA
The moderating effects of organized activities on the relations between body mass and social adjustment in adolescents	Stanley & Bohnert (2011)	86 subjects	• BMI • Physical activity	↑ BMI = ↓ PA ↑ Social interaction = ↑ PA ↓ BMI = ↑ PA enjoyment
Adolescent physical activity and perceived competence: does change in activity level impact self-perception?	Stein *et al.* (2007)	8 670 subjects	• Perceptions	↑ Social interaction = ↑ PA ↑ in perceived physical conditioning and self-worth/perception =↑ PA
Design of the trial of activity in adolescent girls (TAAG)	Stevens *et al.* (2005:6)	96 subjects	• Physical activity	Youth PA↓ with age School-based intervention programs ↑ PA

Adolescent gender and ethnicity differences in physical activity perceptions and behaviour	Yoo *et al.* (2010)	175 subjects	• Self-perceptions • Physical activity	↓self-concept = ↑ Unhealthy eating = ↓ PA

Appendix B: Chapter 3

TITLE OF STUDY	**AUTHOR(S) & YEAR**	**NUMBER OF PARTICIPANTS**	**METHOD OF TESTING**	**RESEARCH SIGNIFICANT FACTORS IDENTIFIED FROM STUDY**
Is the relationship between smoking and mental health influenced by other unhealthy lifestyle factors? Results from a 3-year follow-up study among adolescents in Oslo, Norway	Lien *et al.*, (2009)	2 489 subjects	Health and Lifestyle Questionnaire	Bad lifestyle factors ↓ mental health
The role of behavioural factors in explaining socio-economic differences in adolescent health: A multilevel study in 33 countries	Richter *et al.*, (2009)	97 721 subjects	Health and Lifestyle Questionnaire	↓ PA associated with social & ethnic factors ↓ Social class = ↓ PA
Self-rated pain and perceived health in relation to stress and physical activity among school-students: A 3 year follow-up	Sundblad *et al.*, (2008)	1 276 subjects	Health and Lifestyle Questionnaire	Perceived health ↑ with age with girls, ↓ with boys ↓ PA ↑ stress-related health complaints
Socio-demographic, developmental, environmental, and psychological correlates of physical activity and sedentary behaviour at age 11 to 12	Brodersen *et al.*, (2005)	4 320 subjects	Health and Lifestyle Questionnaire	↓ PA ↑ stress-related health complaints ↓ PA associated with social & ethnic factors ↓ Social class = ↓ PA ↑ Self-rated health = ↑ PA
Self-rated health during adolescence: stability and predictors of change (Young-HUNT study, Norway)	Breidablik *et al.*, (2008b)	2 399 subjects	Health and Lifestyle Questionnaire	Perceived health stay the same with ↑ age Health compromising behaviour = ↓ self-rated health
Evaluation of a school-based teen obesity prevention minimal intervention	Abood *et al.*, (2008)	880 subjects	Health and Lifestyle Questionnaire	Health awareness programs ↑ health knowledge ↑ Social support = ↑ healthy lifestyle choices

How the economy affects teenage weight	Arkes, (2009)	24 310 subjects	Health and Lifestyle Questionnaire	Perceived health ↑ with age with girls, ↓ with boys ↓ PA associated with social & ethnic factors
Correlates of physical activity guideline compliance for adolescents in 100 U.S. cities	Butcher *et al.*, (2008)	6 125 subjects	Phone interview	↓ PA = ↑ health risk Perceived health stays the same with age with boys, ↓ with girls ↓ Social class = ↓ PA
Low physical activity is a predictor of thinness and low self-rated health: gender differences in a Swedish cohort	Elinder *et al.*, (2011)	250 subjects	Health and Lifestyle Questionnaire	Health awareness programs ↑ health knowledge ↓ PA = ↑ health risk Body weight not significantly predicted by PA Low self-esteem ↑ health risk behaviours ↑ Self-rated health = ↑ PA Health compromising behaviour= ↓ self-rated health ↑ Social support = ↑ healthy lifestyle choices
Turkish adolescent health risk behaviours and self-esteem	Geçkil and Dündar, (2011)	1 361 subjects	Health and Lifestyle Questionnaire	Health awareness programs ↑ health knowledge Low self-esteem ↑ health risk behaviours Good health perception =↓ health risk behaviour Perceived health ↑ with age with girls, ↓ with boys
Osteoporosis: a teenage perspective	Gurney and Simmonds, (2007)	224 subjects	Health and Lifestyle Questionnaire	Health awareness programs ↑ health knowledge Adolescents' = Low level of awareness & knowledge about health
Association between levels of physical activity and poor self-rated health in Korean	Han *et al.*, (2009)	7 800 subjects	Physical Interview	Health awareness programs ↑ health knowledge Perceived health stay the same with ↑ age

adults: The third Korea national health and nutrition examination survey (KNHANES), 2005				↑ Self-rated health = ↑ PA
Patterns of adolescent physical activity, screen-based media use, and positive and negative health indicators in the U.S. and Canada	Iannotti *et al.*, (2009)	22 084 subjects	Health and Lifestyle Questionnaire	↑ Self-rated health = ↑ PA
Fruits, vegetables, and football: Findings from focus groups with alternative high school students regarding eating and physical activity	Kubik *et al.*, (2005)	70 subjects	Physical interview	↓ Social class = ↓ PA ↑ Social support = ↑ healthy lifestyle choices
Obesity risk knowledge and physical activity in families of adolescents	Rutkowski and Connelly, (2011)	188 subjects	Health and Lifestyle Questionnaire	Obesity risk knowledge ≠ PA participation
Perceptions of physical activity in a group of adolescents with cystic fibrosis	Swisher and Erickson, (2008)	10 subjects	Phone interviews	Good health perception = ↓ health risk behaviour PA barriers = ↓ health ↑ Self-rated health = ↑ PA
Young teenagers' perceptions of their own and others' bodies: A qualitative study of obese, overweight and 'normal' weight young people in Scotland	Wills *et al.*, (2006)	36 subjects	Physical interview	↓ PA ↑ stress-related health complaints ↓ Social class = ↓ PA Health compromising behaviour = ↓ self-rated health ↑ Social support = ↑ healthy lifestyle choices

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Appendix D: Author Guidelines

Journal of Health Psychology

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