A physical activity programme for primary school children
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Throughout history human beings have played an active role in their survival and have evolved to become capable of performing an enormous range of physical tasks (Cavill et al. 2006). Life in the twenty-first century now offers fewer opportunities for physical activity (PA). Contributory factors include motorized transport, labour-saving devices in the home, the phasing out of physically demanding manual tasks in the workplace and leisure time that is largely devoted to physically undemanding pastimes (World Health Organization [WHO] 1990). The WHO now classifies physical inactivity as one of the leading global risks for mortality accounting for 6% of deaths annually and approximately 3.2 million deaths in 2004 (WHO, 2009). It also concludes that physical inactivity and unhealthy diets are among the leading causes of the major non-communicable diseases, including cardiovascular disease, type 2 diabetes and certain types of cancer (WHO 2004a). The estimated cost of inactivity in England is £8.2 billion annually (Department for Culture, Media and Sport [DCMS] 2002). In recognition of these factors the British government is now calling for a ‘culture shift’ to increase levels of PA in England (Department of Health [DoH] 2005a). This account aims to address PA in relation to primary school children aged four to eleven years attending state schools in the United Kingdom. The rationale for focusing on this group and for developing a school-based programme will be discussed. On the basis of the literature reviewed a Personal Activity (PA) programme specific to this client group will be developed.

Health promotion and disease prevention are two features now firmly enshrined in UK government policy (DoH 1999, DoH 2004). This is the premise for targeting children without significant pathology, with a PA programme. Initiating such programmes within a young population can contribute towards preventing health problems, such as obesity, is now regarded as a major global health concern (Doak et al. 2006), often resulting from a longstanding imbalance between energy intake and energy expenditure (Zahner et al. 2006). One study has highlighted how children are expending approximately 600 kcal a day less than their counterparts 50 years ago (Durnin, 1992). Although this study is dated it may offer some insight into why, in England in 2005, 16.6% of boys and 16.7% of girls were classified as obese (DoH,
Consequences of childhood obesity include slipped capital femoral epiphysis and Blount’s disease, gall bladder disease, diabetes, sleep apnoea and obesity hypoventilation syndrome, which can be fatal (Barlow and Dietz 1998). Obese children may experience skin fungal infections and psychological and behavioral problems (Deckelbaum and Williams 2001). Furthermore, childhood obesity and the various adverse biochemical, physiological, and psychological effects can track into adulthood particularly among those children who have one or two obese parents (DoH 2004). A review by Lobstein et al. (2004) concluded that only combined programmes involving dietary interventions and exercise can help prevent obesity in childhood. Ebbeling et al. (2002) contend that programmes aimed at prevention could also avoid potential stigmatization of obese children who often feel embarrassed and ashamed.

In addition to helping maintain a healthy body weight PA programmes in childhood can contribute to the healthy growth and development of the musculoskeletal and cardiorespiratory systems, improved cognitive functioning and the opportunity for social interaction and achievement (DoH 2004). Moderate benefits include improved self-esteem, aerobic fitness, blood pressure, blood lipids, psychological well-being and a reduction in depression (WHO 2004b).

Whilst there is little doubt that exposure to risk factors for chronic disease in later life occur throughout childhood (DoH, 2004) some authors postulate that morphological and functional changes, such as damage to arterial walls, may begin in utero (Barker, 1992). There is now a growing conviction that the process leading to coronary atherosclerosis, which manifests as coronary heart disease (CHD) in adult life, is initiated during childhood (Armstrong and Simons-Morton 1994). Physical inactivity is instrumental in the development of atherosclerotic cardiovascular disease (Meyer et al. 2006) and in the development of several other chronic diseases, including diabetes and colon cancer (Williams et al. 2002). Since the risk factors for CHD can be present even in young children (Young-Hyman et al. 2001) it makes sense to initiate programmes involving PA early in life. In line with this thinking many health organizations now advocate a life-course perspective for the prevention and control of non-communicable diseases (Health Education Authority [HEA] 1998, DoH 2004, WHO 2004a). Riddoch (1998) suggests that the time to initiate programmes of prevention should be in the first decade of life. Childhood may also be the best time to introduce interventions as children are
more disposed to behaviour change than adults (Steinbeck 2001). Children are also inherently active and require periodic movement opportunities to control restlessness (Torbert 2005).

All children in England between the ages of five and sixteen are entitled to a free place at a state school and the majority attend this type of school (Direct.gov.uk 2009). School-based physical activity interventions therefore offer a good opportunity to work with large groups of average children (Zahner et al. 2006) from the full socioeconomic spectrum of the population (Fox et al. 2004). Disadvantaged groups, such as children from a lower socioeconomic background who show generally lower levels of physical activity and higher levels of obesity (DoH 2005b), can be reached in this setting. This is seen as an important factor by the UK government who are committed to reducing health inequalities (DoH 1999). Other groups identified as priority groups for interventions include the inactive, the special needs populations and ethnic minorities (HEA 1998; Stone et al. 1998) and girls in whom activity levels are known to decrease with age (Ridgers et al. 2006; Ondrak and Morgan 2007). The WHO (2004a) has acknowledged schools as the primary institution with responsibility for promoting activity in young people. In the UK they influence 40–45% of youngsters’ waking time (Fox et al. 2004). Accordingly, promoting PA in this environment, particularly in Physical Education (PE), has been a top priority for the UK government in recent years and there have been a number of publications that have attested to this (DoH 1999; DoH 2005a; DCMS 2002). School based interventions can also become institutionalized into the regular school curriculum (Stone et al. 1998).

Whilst some authors concur that devoting more school time to physical education does not have a detrimental effect on academic performance (Sallis 1999; Dobbins et al. 2009), the feasibility of this is questionable when considering the extra demands placed on teachers to increase student scores in standardised tests (Pate et al. 2006). In some schools the current curricular time allocated for Physical Exercise (PE) may not be meeting statutory guidelines, with PE making way for supposedly more valuable areas of the curriculum, such as numeracy and literacy (Ridgers et al. 2006). Also, while two hours of timetabled PE may be offered by many schools, Fox et al. (2004) have highlighted how a 40-minute PE lesson resulted in only eight minutes of moderate or vigorous physical activity with time taken up for changing, organizing and instructing. Some teachers may not be adequately trained to deliver the expected PA programmes (Davidson 2007).
Physical activity programmes therefore do not have to be confined to PE lessons or curricular time. Intervention programmes performed before and after regular school hours may be more appropriate. After-school programmes are considered to have great potential to provide opportunities for increasing PA (Pate et al. 2006). Supervised programmes, organized by trained individuals with knowledge of exercise could help overcome some of the barriers to PA, including reluctance of parents to allow their children to play outdoors due to heavy traffic and ‘stranger danger’ (DoH, 2004). After school activities extending to 6.30pm could potentially involve working parents. Some studies have shown that parental support and encouragement increases the chances of children being attracted to and socialized into PA (Brustad, 1993). A study by Moore et al. (1991) has highlighted how children with two active parents were six times more likely to be active than children whose parents were both inactive.

UK government guidelines should be considered when developing a PA programme for this population. They currently recommend that all children should engage in at least 60 minutes of moderate intensity PA every day of the week (DoH 2004). The new emphasis on 'moderate' activity is useful in that many children are discouraged by the thought of vigorous exercise (Epstein et al. 1991). However the guidelines do not exclude vigorous activity. Whilst the main aims of this type of exercise are to improve cardiovascular fitness and maintain a healthy body weight thereby avoiding risk factors such as hypertension and abnormal lipid profile, any increase in PA is welcomed by the UK government. Activity may be achieved either all in one session, or through several shorter bouts of activity of ten minutes or more, as this may be more reflective of a child's natural activity pattern (DoH, 2004). Examples of moderate to vigorous activities for this population include brisk walking, jogging, swimming, basketball, racquet sports, football, dance, cycling badminton and strength training (Dobbins et al. 2009).

The guidelines also emphasize the need to perform activities that produce high physical stresses on the bones. Evidence now points to maximizing peak bone mass in childhood, particularly during early puberty, in order to offset future development of osteoporosis and bone fragility in adulthood (MacKelvie et al. 2002). Although it still remains unclear as to what constitutes the optimal exercise programme and which specific exercises will provide the optimal stimulus for peak bone mineral accretion (Hind and Burrows 2007), weight bearing, high impact exercises such as jogging, aerobics, hiking, walking, stair climbing, gardening, weight training, tennis, and
dancing (National Institute for Arthritis and Musculoskeletal and Skin Diseases 2007), gymnastics, volleyball, racquet sports and activities involving jumping and football – may be particularly effective. Maximum benefit of these activities appears to occur after only a few repetitions (DoH 2004). These types of exercise should be performed at least twice a week.

Exercises targeting strength and flexibility can provide numerous benefits for children including enhanced performance, improved posture, reduced risk of injury, and protection against future back pain and osteoporosis (HEA 1998). Active play, involving carrying, climbing, and rough and tumble, will help develop and maintain muscular fitness and flexibility in a younger child. An older child may benefit more from structured exercise, including resistance exercises (DoH 2004). A study by Christou et al. (2006) has illustrated how a programme of football and resistance training could be used to improve overall development of physical capacities in young boys. Given that football is a national sport in the UK (Sport England 2009) the principles used in this programme could be incorporated into the PA programme developed for this account for both genders. The authors of this paper suggest that the best age to begin children on such a programme is eight years and onwards. Malley (2006) suggests that a lot of static stretching exercises for younger children may be inappropriate as they conflict with a child's relentless persistence for play. This may be overcome by disguising them. For example, children could be told “Move your arms and legs like an octopus moving slowly through the water”. Children should be as active as possible during any PA programme and there should be sufficient equipment and adequate facilities (Manners 1995). This is supported by West and Shores (2008), who contend that when children have to wait for equipment, their activity levels decline drastically.

As balance is not fully developed in young children a programme incorporating balance activities may also be useful as it may reduce the risk of injury (Payne and Isaacs 2005). Behm and Anderson (2006) advocate such exercises alongside resistance training, on the basis that there are many instances in every day life and sport when force is exerted and when an individual is in an unstable position. Tai chi is a form of balance exercise and has been practiced in China for centuries as a form of art, religious relaxation, exercise and self-defence. It is now being introduced into some UK schools in support of the government’s 'Healthy Schools Initiative' and exercises can be combined in different ways to encourage relaxation or to energize
children (Primary Tai chi 2009). Teachers at a primary school in Wiltshire have reported that children respond better in class since they began morning exercises (BBC News 2000). Crider and Klinger (2000) have suggested that participants should not feel rushed as the element of relaxation will be obscured from the activity. Based on this information it may be a worthwhile introducing Tai chi into the prospective exercise programme performing sessions in the morning and devoting the whole session to this activity.

Children’s capabilities at different ages should be considered when developing a PA programme. The rationale for initiating a programme to include children as young as four years is that by this age, in most children, motor and cognitive skills are sufficiently developed to enable them to participate in PA programmes (Sheridan et al. 1999). According to Manners (1995) by the ages of five to six children are capable of play with other children involving rules and cooperation. They can catch a ball, skip, jump and land safely and swing on a rope. By seven upwards they should be able to catch and throw a ball with a degree of accuracy, run well, roll, balance and jump with confidence and play simple games involving three or four children. A study by West and Shores (2008) has highlighted how children under the ages of nine and ten lack the interpersonal skills to manage team games without supervision. On this basis they suggest that too many unsupervised formal games prior to this age would be unsuitable because children would not maintain adequate activity levels. The authors recommend pairing children with play leaders or older role models to sustain activity.

Cale and Harris (2001) contend that children are not a homogenous group and that activity should be tailored to meet individual requirements. Including a period of personal development time within the proposed PA programme could contribute towards achieving this. Children could utilize this time to continue with the activities that they most enjoy or to improve personal skills. Goal setting may be a powerful tool for enhancing personal skills. Cale and Harris (2001) suggest setting attainable, short term goals relevant to the individual’s preferences. This process can aid motivation, focus attention, encourage persistence and practice over time and generate the motivation to develop relevant and alternative strategies for reaching goals. It should be adapted to suit not only physical maturity but also the cognitive development of the child (Martin 1993).
The way physical activity or exercise is experienced in childhood can impact on subsequent participation with negative experiences affecting people’s willingness to take part in physical activities in adulthood (HEA 1998). This is an important consideration when bearing in mind that PA levels decline with age (WHO 2004b). Participant enjoyment should therefore be a top priority for anyone developing a PA programme. In addition to mastery of skills, recent research suggests that being with and making friends, positive team interactions and support from coaches are other sources of positive effect (Scanlan and Simons 1992). Anyone developing a programme should provide and enhance these opportunities for children. Whilst the UK government aims to encourage grass-roots participation in PA and sport it also strives for sporting excellence and achievement (DCMS 2002). To this end some degree of competitive participation may be beneficial to children. However, Martin (1993) states that recent research suggests fear of failure and concerns about adequacy of performance are a major source of anxiety for some children and this could lead to withdrawal from activity. He suggests that participation should be stressed and competition de-emphasized to overcome this.

In developing a PA intervention it is necessary to establish the duration of the programme and methods of measuring the effectiveness of the intervention (Cale and Harris 2001). Bearing in mind the government’s commitment to increase daily PA levels in this population and engender life-long participation in PA (DCMS 2002 ) it would seem appropriate to suggest that this programme should run indefinitely within the parameters of school authority and holidays. Based on the knowledge that children have other periodic movement opportunities throughout the day (DoH 2004) the maximum time allocated for a session would be one hour, to include warm up and cool down periods, which are essential in any activity programme (Carnell et al. 2008). A study by Sirard and Pate (2001) has highlighted direct observation and accelerometry as valid and reliable methods of measuring PA in this population. Although they confer that direct observation is probably the most appropriate criterion, it would be inappropriate for large groups of children because of the long measurement time periods. Accelerometers are therefore the most viable alternative. These electronic devices measure accelerations produced by body movement and have the advantage of being able to store large amounts of data enabling physical activity patterns to be stored over time (Ridgers et al. 2006). For this population data could be compared at the end of each school term.
The main themes from this account are that all children attending state schools without pathology will be targeted, as they are an easily accessible group representing all socioeconomic dimensions of the population. UK government policy strongly advocates disease prevention. Modern lifestyles now predispose children to the risk of chronic diseases in later life. This risk can be modified positively with suitable PA programmes. Based on government guidelines the PA programme suggested for this account (Appendices I - V) will include activities to enhance cardiovascular fitness, bone health, muscular strength and flexibility. A balance component should also be incorporated. It should be delivered by trained staff during extra-curricular hours with the potential of involving all school children and possibly parents. Goal setting and an individualized approach are major themes and enjoyment for all should be a top priority. Hopefully then, this programme would be sustainable.

References


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