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To cite this article: Lorraine Cale & Jo Harris (2009) Fitness testing in physical education – a misdirected effort in promoting healthy lifestyles and physical activity?, *Physical Education and Sport Pedagogy*, 14:1, 89-108, DOI: [10.1080/17408980701345782](https://doi.org/10.1080/17408980701345782)

To link to this article: <https://doi.org/10.1080/17408980701345782>



Published online: 28 Jan 2009.



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Fitness testing in physical education – a misdirected effort in promoting healthy lifestyles and physical activity?

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Background: Physical fitness testing is commonplace within schools and the physical education (PE) curriculum, with advocates claiming one of the key purposes of testing to be the promotion of healthy lifestyles and physical activity. Despite this, much controversy has surrounded the fitness testing of young people.

Purpose: This paper draws on selected findings of a recent ‘fitness testing children feasibility study’ to explore the key issues, concerns and debates regarding fitness testing, as they relate to encouraging a physically active lifestyle.

Research design: The feasibility study was commissioned by the National Assembly for Wales and involved two main parts: a comprehensive review of the literature (using metalib) to establish the key findings/issues, and consultation with key ‘stakeholders’ and ‘experts’ to ascertain their views, understanding and experiences of fitness testing children. The consultation was carried out via questionnaires and interviews.

Data analysis: The key issues and themes emerging from the literature from 1985 onwards were identified and served as evidence for the debate. The questionnaire and interview data were analysed by quantifying the questionnaire responses and identifying the common issues and themes emerging from the transcripts (and the open items within the questionnaires). These were then used to reinforce, substantiate and illustrate key points.

Findings: The findings reveal that the role fitness testing plays in PE in promoting healthy lifestyles and physical activity is questionable and cannot be taken for granted. For example, little evidence was found to support the notion that fitness tests promote healthy lifestyles and physical activity, motivate young people, or develop the knowledge and skills that are important to a sustained engagement in an active lifestyle.

Conclusion: Based on the evidence, the paper concludes that much of the fitness testing carried out in PE may well represent a misdirected effort in the promotion of healthy lifestyles and physical activity, and that PE time could therefore be better spent.

Keywords: fitness; fitness testing; physical activity promotion; physical activity; healthy lifestyles; children

Introduction

Schools are acknowledged as the primary institution with responsibility for promoting physical activity in young people (McBride and Midford 1999; Sallis and Owen 1999; Cardon and Bourdeaudhuij 2002) and school physical education (PE) in particular is recognized as having a key role to play (see for example, Cale 2000; Shephard and Trudeau 2000;

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McKenzie 2001; Cardon and Bourdeaudhuij 2002; Green 2002, 2004; Cale and Harris 2005). Green (2002, 95) for example, refers to the 'taken-for-granted role of PE in health promotion', and McKenzie (2001) views PE as the most suitable vehicle for the promotion of active, healthy lifestyles among young people. Clearly though, if PE is to be successful in this regard, then the content and delivery of the curriculum is critical and it is important that young people are provided with the knowledge, understanding and skills required for life-long participation in physical activity and with positive, meaningful and relevant physical activity experiences that will foster positive attitudes and confidence. Indeed, Green (2004) acknowledges how the popularity of sport and physical activity among young people, both now and in the future, remains contingent upon them being 'presented appropriately ...' 'not least within PE' (74).

Physical fitness testing is commonplace within schools and the PE curriculum (Harris 1995; ACSM 2000), with most secondary schools including it as a compulsory component of their PE programmes (Ross et al. 1985; Harris 1995; Cale 2000). Advocates claim that fitness testing in schools promotes healthy lifestyles and physical activity, motivates young people to maintain or enhance their physical fitness or physical activity levels, facilitates goal setting, self-monitoring and self-testing skills, promotes positive attitudes, and enhances cognitive and affective learning (Whitehead et al. 1990; Pate 1994). Other reported purposes of testing include programme evaluation, tracking of fitness over time, identification of children at risk or in need of improvement and/or with potential, and screening and diagnosis of fitness needs for individual exercise prescription and improvement (Whitehead et al. 1990; Pate 1994; Freedson et al. 2000).

Despite its popularity and proposed purposes, controversy has surrounded the fitness testing of young people for a number of years and various issues have been debated and concerns expressed over the use of fitness tests with this group [see for example, ACSM 1988; Physical Education Association (PEA) 1988; Armstrong 1989; Safrit 1990; Rowland 1995; Cale and Harris 1998; Freedson et al. 2000; Keating 2003; Cale and Harris 2005]. Issues debated most commonly and consistently relate to concerns with respect to the type, validity, and reliability of fitness tests and to the ethics and value or purpose of testing.

Given that so many authors and organizations have expressed concerns over the use of fitness testing with young people, this raises questions as to whether fitness tests do actually serve the purposes for which they are intended, and in particular, whether they promote healthy lifestyles and physical activity, motivate young people, and develop the knowledge and skills that are important to the sustained engagement in an active lifestyle. Keating (2003) claims that unless youth fitness testing actually improves fitness and increases involvement in physical activity, the need for it is questionable. This paper draws on selected findings of a recent 'fitness testing children feasibility study' to explore the key facts, issues, concerns and debates regarding fitness testing, as they relate to encouraging participation in a physically active lifestyle. Based on the evidence from the literature and supported by the views, experiences and observations of identified 'stakeholders' and 'experts' in the field, the paper considers whether fitness testing in PE represents a worthwhile or a misdirected effort in the promotion of healthy lifestyles and physical activity.

Fitness testing children feasibility study

The aim of the feasibility study was to determine whether there was a need and whether it would be cost effective and practical to carry out a research project investigating the fitness levels of Welsh children. The study was commissioned by the National Assembly for Wales

and was conducted over a six month period. The methodology involved two main parts: a comprehensive review of the relevant literature to establish the key findings and issues, and consultation with key 'stakeholders' and 'experts' to ascertain their views, understanding and experiences of fitness testing children.

The specification for the study identified key stakeholders to comprise representatives from universities in Wales and England, the PE advisory/inspection service, schools (primary and secondary teachers), physical activity/health promotion, the Sports Council for Wales, and the Welsh Assembly. These were taken to be individuals with some working knowledge, experience and/or authority with regards to physical activity promotion and fitness testing policy and/or practice. Experts were taken to be individuals who, as evidenced from their biographies, were highly research active and of international recognition in the fields of paediatric exercise and/or health/physical activity promotion.

The literature search was carried out using metalib (a multi-database research tool) and focused on the following combinations of key terms: young people (and children, youth, adolescents) with physical activity, physical fitness, and health; young people (and children, youth, adolescents) with physical activity status and physical fitness status; young people (and children, youth, adolescents) with monitoring physical fitness; the role/place of fitness testing with schools; and the role/place of fitness testing with physical activity and fitness promotion. Multiple searches were conducted in which the above terms were cross-referenced until 'saturation' point was reached (i.e. the point at which the searches revealed no new literature). The key findings from 1985 onwards with respect to the above areas were summarized.

Consultation with the key 'stakeholders' and 'experts' was via questionnaire and interview. A detailed questionnaire, informed by the findings of the literature review, was designed to elicit information regarding key stakeholders'/experts' knowledge, understanding, experiences, attitudes and views about the fitness testing of children. The questionnaire comprised three sections and included a mix of closed and open ended questions. The first section sought background information on the respondents' interests, experiences and involvement in fitness testing of children, as well as their awareness of studies of fitness testing on children. Section two sought the respondents' views on fitness testing of children generally, including the perceived benefits, pitfalls, and the role of fitness testing in promoting children's health, fitness and activity, whilst the final section focused on their views on the introduction of fitness testing of children in Wales and on fitness testing in the PE curriculum.

The questionnaire was sent to 35 individuals, 28 stakeholders and seven experts, who were predominantly determined from the specification for the study. A covering letter explained the purpose of the study, requested their involvement, and for completed questionnaires to be returned by a specified date.

Following administration of the questionnaire, a semi-structured interview schedule was devised with the questions being derived from the findings of the literature review and the preliminary data. The primary purpose of the follow-up interviews was to clarify, substantiate and enhance the questionnaire data.

Due to limited availability and the time constraints of the study, only a small number of individuals were able to participate in a follow-up interview. Six individuals were selected based on a preliminary analysis of the questionnaire findings. In order to gain a representative reflection of the stakeholders'/experts' views, two individuals who were generally for, one who was generally against, and three who were undecided or neutral about fitness testing children were chosen. This selection reflected the mix of questionnaire responses that were received. The sample included two experts: a head of a university

department and a senior university lecturer; and four stakeholders: a local authority inspector, a local authority adviser, a PE and School Sport (PESS) consultant, and a teacher. The interviews followed a semi-structured format, lasted for approximately one hour, and took place in the workplaces of the individuals concerned. Permission was obtained to record the interviews and each was transcribed verbatim as soon as possible afterwards by the interviewer. All protocols associated with the methodology were in line with the authors' institutional ethical guidelines.

Following data collection, the questionnaires were analysed by quantifying the responses to the closed question items and identifying the common issues and themes reported in the open ended questions. The interview data were analysed by the identification of the common themes and consistent issues emerging from the transcripts.

A substantial amount of literature and data were generated by the study, the full details and findings of which are presented in the final report (Harris et al. 2004). However, for the purposes here, only those aspects which relate to fitness testing in schools and the role of testing in the promotion of healthy lifestyles and physical activity are incorporated to inform the debate and highlight and exemplify key points. The literature serves as the evidence for the debate whilst the findings from the stakeholders and experts are used to reinforce, substantiate and illustrate key points and examples in practice.

Faith in the tests and the data?

Fitness tests are plagued by severe limitations and the appropriateness, validity, and reliability of some fitness tests and fitness test batteries for use with children have been questioned by a number of researchers (see for example, Safrit 1990; Rowland 1995; Freedson et al. 2000; Rice and Howell 2000).

Whilst fitness tests claim to encourage safe healthy practice and the development of and maintenance of good fitness behaviours, paradoxically the tests or batteries themselves do not always reflect this behaviour. On this issue, it is argued that some involve children performing tests or exercises which not only violate healthy behaviour (Safrit 1990) but common sense (Cale and Harris 2002). Examples include exercising to exhaustion as in the Multistage Fitness test (commonly referred to as the 'bleep test') or executing as many sit ups as possible in one minute. The appropriateness of some tests, such as the Multistage Fitness test, is questionable for children, the primary reason being that they have been developed for use with elite, adult populations and are often applied to young people with little consideration of the differences between children and adults' physiological and psychological responses to exercise (see Bar-Or 1993). Further, the suitability of the test to accurately predict children's aerobic fitness has been questioned (Winsley 2003). Winsley (2003) found that the test significantly underestimated children's peak VO₂ when adult equations were used. When child-specific equations were adopted the degree of error was reduced. Given this, he recommends that if schools wish to employ the test it is crucial that child-specific equations are used, rather than the adult-specific equations supplied with the commercially available product. Risks associated with using the Multistage Fitness test with young people have also been identified and safety advice has been given on how to reduce risks with the test (Eve and Williams 2000).

Despite the above, the Multistage Fitness test has been found to be one of the two most commonly employed fitness tests in schools in the UK (Harris 1995). If its popularity continues, then other and possibly more favourable options for using the test would be to use it as a sub-maximal test, using heart rate elicited at different levels of the test as the indicator of fitness, or as a 'novel' educational tool. For example, Mullineaux (2001) suggests the test

could be used as a warm up or cool down, as an interval training tool, for steady paced running, and to encourage teamwork and co-operation.

Concerns with the test go beyond those expressed in the literature. Based on their experiences, some of the stakeholders involved in the feasibility study made some strong and at times emotive comments concerning the inappropriate or misuse of the 'bleep test'. A PESS consultant's experience of the test was described as follows during the interviews:

the bleep test is a classic of mis-use really, you know, children just running up and down till they fall over, what's the use of that?

Risk of injury was also identified as a concern by a university lecturer who had been alarmed that his son had to perform this test in bare feet which, as he explained:

... not only invalidates the test ... but also puts him at risk of an injury, things that like concern me.

In addition, the relevance and appropriateness of the mile run, another commonly employed fitness test in schools (Harris 1995), and other tests for children have been queried (Hopple and Graham 1995). Following reports from children that they did not enjoy taking the mile run, Hopple and Graham (1995, 416) remind us that children are not miniature adults and claim that current tests 'which were designed by adults do not seem to mesh with children's perceptions of the world ...'. Such issues have led some to conclude that tests suitable for use in the school environment and which provide valid and objective measures of fitness are simply not available (Armstrong 1989; Armstrong and Welsman 1997).

Further, the practice of applying norm and/or criterion referenced standards in fitness testing is known to have limitations. For example, norm tables do not indicate desired levels of physical fitness, provide any diagnostic feedback about whether fitness is adequate, and they imply that 'more is better' (Cureton 1994). Equally, Freedson et al. (2000) identify three main limitations of criterion referenced standards. They report how the setting of the standards is somewhat subjective, youth may be misclassified, and because the standards represent desired minimum levels of fitness, they do not offer adequate incentive for maximal achievement or improvement.

The methodological limitations associated with testing were also appreciated by both stakeholders and experts in the feasibility study, with problems relating to the validity and reliability of tests being the second most commonly stated pitfall in the survey. Typical responses from the questionnaire data concerning such limitations included:

- limited validity and reliability of tests; tests fraught with validity, reliability difficulties;
- limited reliability of data, especially with young children; inconsistency and lack of standardization of testing procedures;
- norms lead to difficulties comparing children, and there is no scientific consensus on criterion-referenced ranges.

Example comments highlighting some of the difficulties included:

... The extrapolation of field test data is fraught with problems. (Expert)

Even in a well-equipped sports science laboratory using 'scientific' tests, one might consider the error to be around 10%. In the field situation using simpler methods (e.g. sit-up tests or shuttle runs), the error is likely to be huge. (University lecturer)

Another university lecturer who was interviewed expressed particular concern over the limited validity and reliability of fitness test data collected in schools:

... there seems to be a lot of ad hoc fitness testing going on ... I think that a lot of this ... is being conducted badly, in uncontrolled environments ...

The above limitations are perhaps better appreciated when one considers the many factors that influence fitness test performance. Factors such as the environment/test conditions, lifestyle (exercise/nutrition), motivation, intellectual and mechanical skill at taking the test, test practice, and in particular heredity or genetic potential and maturation all affect fitness performance and will be reflected in fitness test scores (Docherty and Bell 1990; Pangrazi 2000). The relative contribution of these factors varies from test to test, and between testing sessions, though heredity or genetic potential and maturation are considered to most strongly influence test results (Pangrazi and Corbin 1990; Bouchard et al. 1992). In articles on the assessment of health-related fitness in schools and health-related physical activity in the National Curriculum, Armstrong (1995) and Armstrong and Biddle (1992) respectively recognize the importance of both maturation and motivation to test scores, claiming that fitness tests simply determine the obvious, at best only distinguishing the mature and/or motivated from the immature and/or unmotivated. The influence of maturation on fitness was also recognized as a limitation by some of the stakeholders in the feasibility study. Within the survey, one university lecturer reported how:

The biological changes with growth and development are of considerably more impact than the biological changes caused by training ...

Similarly, during the interviews a PESS consultant aired the following concern about testing children's fitness:

... my understanding is that pre-puberty, you know, its very difficult to get any true measurement of children's fitness anyway ... until children actually reach maturation I don't think, so I was led to believe from dim and distant reading, that they don't actually mean a lot do they?

Misinterpretation of the data?

Despite the limitations, it is still often assumed that fitness in young people is primarily a reflection of the amount of activity performed, and that those who score high on fitness tests are active and those who do not are inactive (Pangrazi 2000). Cale and Harris (2005) however, note how this assumption is inaccurate. The evidence suggests that the relationship between physical fitness and physical activity is low among children (Armstrong and Welsman 1997) and a child's activity level cannot be judged from his or her fitness level (Corbin 2002). Armstrong and Welsman (1997) explain that the lack of relationship between physical activity and fitness probably lies in the low level of physical activity of most young people. In addition, the two are distinct in that physical activity is a behaviour (process) and fitness is a parameter (product). Physical activity is an important variable in fitness development for adults, but for children and youth, other factors are of equal or greater importance (Pangrazi 2000). In terms of promoting physical activity to young people, Cale and Harris (2005) warn how problems can arise if fitness test scores are linked to activity levels. On the one hand, an active child who scores poorly on a test may become disappointed, disillusioned, de-motivated and 'turned off' activity because

he/she feels it does not 'pay off' (Corbin 2002), whilst an inactive child who scores well may be delighted with the outcome, conclude that everything is alright when it is not, and consequently may not be motivated to change.

The importance, but difficulty of conveying the correct or right messages to children concerning their fitness scores was raised by several individuals in the feasibility study. On this issue, one teacher reported that testing 'could be divisive', and during the interviews, an adviser expressed concern about how children might respond to low fitness scores:

I guess you're going to get, as in all instances really, perhaps, quite a large variation in the way in which children are going to respond to that sort of information.

Impact of fitness testing?

As noted earlier, advocates of fitness testing in schools argue that testing motivates young people, enhances learning and promotes positive attitudes which would seem to be compelling from the viewpoint of physical activity promotion (Seefeldt and Vogel 1989; Cale and Harris 2002). Yet, when debating the role or value of fitness testing, researchers have expressed concern that fitness testing may, to the contrary, be repetitive and boring (Keating 2003), de-motivating and counterproductive to the promotion of active lifestyles in young people (Corbin et al. 1995; Rowland 1995). Rowland (1995) argues that fitness tests are anti-ethical to the goal of promoting physical activity in so far as they can be demeaning, embarrassing and uncomfortable for children (often those about which there is most concern), and may reinforce the notion that exercise is competitive and unpleasant. Keating (2003) warns of problems relating to lack of privacy with testing and test results, whilst Corbin et al. (1995) caution that testing that is done improperly may turn many youngsters 'off' rather than 'on' to activity and should therefore be discontinued.

Although a good deal of research has been conducted on measurement issues and the reliability and validity of fitness tests over the years, research has largely ignored the effects of youth fitness testing in schools (Keating 2003). Relatively little attention has been paid to the motivational effects of fitness testing (Fox and Biddle 1988; Jackson 2000) or fitness test awards on young people (Keating 2003), or on young people's perspectives of, or knowledge and/or attitudes towards tests (Fox and Biddle 1988; Jackson 2000). The need for research of this nature is recognized by Pate (1991, 233) who suggests:

It would be desirable to know how children respond to participation in these (physical fitness) tests. Are tests viewed as fun? Do tests have differential effects on different types of children?

Studies that have been conducted on the motivational effects of testing (Luke and Sinclair 1991; Whitehead and Corbin 1991; Goudas et al. 1994; Adams 1996) have revealed variable results and it has been concluded that motivational enhancement from testing cannot be taken for granted (Goudas et al. 1994) and that there is no empirical data to indicate that students value fitness test awards (Keating 2003). Attitudes towards fitness tests have been found to be unfavourable (Luke and Sinclair 1991) and some youngsters (and teachers) have been accused of not taking testing seriously (Keating 2003). The motivation of young people towards testing has been found to be influenced by feedback following tests, perceived competence (Whitehead and Corbin 1991) or perceived success, and achievement goal orientation and performance in the tests (Goudas et al.

1994). Likewise, the PEA has also noted that there is no hard evidence that fitness tests motivate individuals and suggest that in parallel areas of education there is supportive evidence that tests only motivate those who do well (PEA 1988).

Concerning knowledge and attitudes, Hopple and Graham (1995) investigated what children 'thought, felt and knew about' the mile run test. They revealed that children generally showed little or no understanding of why they were being asked to complete the test and many disliked taking it, viewing it as a painful, negative experience to be either actively or passively 'dodged'. It would therefore seem that from the evidence available, albeit limited, the motivational and/or educational role of fitness testing in schools is questionable, certainly for a number of youngsters.

Despite the limited evidence from the literature, the motivational and particularly the educational role of fitness testing came through as justifications for testing in the findings of the feasibility study. Responses from the questionnaire survey data from one expert and a number of stakeholders relating to motivation included:

- can be motivational if health-related, linked to physical activity, and used/taught in the right way;
- can motivate some children into 'beating' their previous test scores;
- can be used as a lever to stimulate interest in exercise.

With regards to the educational role of fitness testing, typical responses, this time from one expert and a few stakeholders included:

- to educate pupils with regard to the different components of fitness;
- to aid learning and support children in maintaining a fit and healthy lifestyle;
- can be educational as part of understanding the various ways in which the body moves;
- to inform pupils about their own relative fitness levels and enable pupils to make informed decisions;
- gives children knowledge of their strengths and limitations of their own bodies;
- to help older pupils learn how to improve their personal fitness.

There was also generally agreement amongst those interviewed that fitness testing could educate children about health, activity and fitness, their own fitness, and help them to set specific targets. A university lecturer, whilst describing fitness testing in schools as 'highly unsophisticated', noted that it had a purpose in helping children to 'have a good understanding about their own body, their own fitness and the things that govern that'. In addition, a PESS consultant considered that fitness testing might 'encourage children to take more responsibility for their own actions, their own choices ...'.

In addition though, concerns were commonly reported by stakeholders and experts with respect to the motivational and educational role of testing. They warned how tests could demotivate, cause discomfort, stress, label and embarrass children and make them look 'daft' in front of their peers. They also noted how some children may hate testing, perceive it as threatening (especially if results are made public and children lack confidence), fear failure and therefore be 'turned' or 'switched off'.

Based on her experiences, one PESS co-ordinator had the following to say:

PE teachers who use fitness tests regularly on any and every group of children should be encouraged to stop! Children often hate and dread them, they don't tell us very much, and why should children be forced to endure them?

A university lecturer also expressed concern over the effects of overexposure of children to some tests explaining:

... the tests tend to be driven by the motivation of the child, and I think the more they do it the more de-motivated some of them are becoming ...

Whilst acknowledging that fitness testing could possibly be used as a 'fun' activity for pupils to 'have a go', a PESS consultant commented that 'you would need to know your pupils well to determine whether it would be fun or scary'. However, she and others were of the view that other forms of activity including game-like activities and exercise experiences such as walking, dancing, aerobics, boxercise, circuits with a 'fun' element were more appropriate for promoting activity. In conclusion, it was proposed that fitness testing should only be adopted if it was meaningful, relevant and had 'a direct and positive influence on motivating teachers/pupils to develop active lifestyles'.

Misdirected interest and confusion?

One of the reasons why physical fitness testing may have assumed such popularity in schools in recent years relates to the widespread and growing concerns over young people's physical fitness and the implications of this for their current and future health. However, efforts to advocate fitness testing on these grounds are considered misguided. According to Cale and Harris (2005), much media attention and 'hype' has been afforded to young people's fitness, with messages leading us to believe that all, or at least most of today's youth are unfit, unhealthy, and far less fit than in previous decades. On this issue, Corbin (2002, 139) suggests that the media 'likes bad news' and that 'much talk about lack of fitness of our youth is hyperbole, designed to create a need for physical education in the eyes of the public'. Following a comprehensive literature review of young people and physical fitness, Cale and Harris (2005) summarize their findings as follows: 'there is no evidence to suggest that low levels of aerobic fitness are common amongst young people' and 'no convincing evidence to suggest that young people's aerobic fitness has declined over time' (32).

Alarmed by reports to the contrary, PE teachers and others may feel compelled and even duty bound to respond by focusing on and measuring young people's physical fitness (Cale and Harris 2005). A university lecturer who was surveyed held similar views reporting how:

Fitness testing is something that at first glance is appealing to the public and politicians and seems to be a simple step towards improving health. But once consideration is given to the issue ... then the problems become clear.

During the interviews a PESS consultant stated:

what I would hate to happen, as will very often happen ... they would think, oh yes, OK then, I gotta make my children run, I gotta, you know, ... without the educational component in there. That is my concern, and I think that teachers will very often latch on to something that they think they are doing because it's right, and sometimes for the wrong reasons ...

The implications of children's fitness and fitness test scores to their health are not well established and conclusions are equivocal. In addition, there is no evidence that children's health and/or fitness, or the monitoring of either, influences their participation. With regards to the

former point, studies which have been conducted have largely focused on associations between children's cardiorespiratory fitness and cardiovascular disease (CV) risk factors (Boreham and Riddoch 2001). Some claim there is only weak evidence that physical fitness is related to health in young people (Twisk 2000) and little or no direct evidence that physical fitness during childhood and adolescence is related to adult health (Twisk 2000; Thomas et al. 2003). More recently however, two large-scale studies, the European Youth Heart Study and the Amsterdam Growth and Health Longitudinal Study, have reported associations between physical fitness and CVD risk factors in children and adolescents (Wedderkopp et al. 2003; Andersen et al. 2003), between physical fitness in adolescence and adulthood, respectively (Twisk et al. 2002), and a clustering of risk factors in children and adolescents with low fitness (Wedderkopp et al. 2003; Andersen et al. 2003). Consequently, it seems that the role of at least cardiorespiratory fitness in enhancing health should certainly not be dismissed, but further studies are required (Boreham and Riddoch 2001).

Perhaps not surprisingly given media messages and the limited research evidence, there was confusion amongst some of the stakeholders in the feasibility study with respect to children's fitness status, as well as with the concepts of health, fitness and activity and the relationships between them. Indeed, the terms were sometimes used interchangeably as though they were synonymous.

One PE adviser who was in favour of fitness testing children expressed concern that children usually overestimate their capabilities and are not fully 'aware of their low levels of fitness'.

Some held the view that fitness testing would impact on children's fitness, with one inspector/adviser claiming also that 'a better physical health status for children' should come out of fitness testing. Furthermore, it was suggested by another adviser that:

in terms of the health of our nation, we really do need to look at the fitness of our youngsters very, very seriously . . .

whilst a PE teacher considered fitness testing to be very important in order 'to gain evidence and facts about children's health'.

One adviser/inspector also suggested that it was important to:

address this critical issue of (children's) health and fitness status, otherwise we could have the most knowledgeable and articulate spectators in the world who have poor health and lack participation.

Some stakeholders however, demonstrated a broader understanding of the concepts and issues. One PESS co-ordinator reported:

Health isn't really about fitness

and went onto explain:

and I think it would give the wrong message if we promoted health as being 'fit'. This would put a lot of people off trying to be healthy if they thought they'd have to have a high fitness level to be healthy.

Similarly another PESS consultant did not see the connection between fitness testing and the promotion of physical activity/health and thought that instead, the latter should be

promoted by giving children exercise experiences which would 'enthuse and inspire them to continue with exercise in their own time'. She was concerned that fitness testing might turn children off health-based type physical activities.

Misdirected focus or too narrow an approach?

As noted earlier, advocating fitness testing on the grounds that children are unfit and/or that their fitness (or the monitoring of their fitness) will strongly influence their current or future health (fitness) or participation is misguided. Given though, that a sizeable proportion of young people have been reported to be inactive and to lead sedentary lifestyles (Armstrong and Welsman 1997; Armstrong and Van Mechelen 1998) there would seem to be a need to focus attention on influencing young people's physical activity behaviour (Cale and Harris 2005). In other words, to place the emphasis on the 'process' of physical activity rather than on the 'product' of fitness.

Yet, there is concern that fitness testing could lead to more attention being given to the product and product-related issues, namely 'fitness' and 'performance' within a PE programme, than to the process and process-oriented issues of 'health' and 'physical activity' behaviour (Harris and Cale 1997; Cale and Harris 2002). Other good reasons have also been given for trying to influence physical activity rather than physical fitness (Rowland 1995; Pangrazi 2000; Cale and Harris 2002; Corbin 2002). For example, Corbin (2002) argues that the idea that physical fitness is a paramount goal for children is a misconception and reminds us that an overemphasis on fitness can have as many negative consequences as positive ones. It is also claimed that the focus on raising fitness levels which was common practice for many years, has been unsuccessful (Pangrazi 2000). In contrast increased physical activity, which is relatively free from genetic and maturational influences, is an outcome that can be accomplished by all children regardless of ability (or disability) or personal interests, and will further benefit those young people who need it most (Pangrazi 2000). Likewise, Rowland (1995) suggests that a shift to promoting physical activity is more likely to be acceptable to the general public, particularly to those who are sedentary or have low fitness levels. He views the routine field testing of children as 'archaic' (125) and claims that a shift from a fitness to a physical activity promotion model would serve as the best argument for abandoning the practice.

Individuals surveyed in the feasibility study also appeared to endorse this view. For example, one expert noted how:

... fitness testing will set us back years and deflect us from the key issue—more activity.

One health professional was of the view that the issue of 'healthy' lifestyles, including nutrition and physical activity, was the most important priority, whilst a university lecturer who considered that fitness testing played no role in promoting activity reported:

The concepts of physical activity ... and the fitness effects activities produce (e.g. aerobic, flexibility, strength, etc.) can be better achieved by analysing the activity, not the change in fitness an activity might produce.

This individual further reinforced the point during interview:

... I think that activity data is critically important, you need to know what activity people are doing, of what type, and what activity they are not doing ...

From a theoretical perspective, another argument against focusing on fitness and fitness testing is that it provides a narrow framework for the promotion of physical activity. Fitness testing represents an individualistic approach to physical activity promotion which targets change in the individual. The limitations with this approach are that it tends to hold individuals responsible for their health or behaviour (and consequently their fitness), assumes they have control and the capacity to make decisions, and fails to acknowledge the influence of other factors in the physical and social environment. However, as previously noted, we know that fitness is largely influenced by hereditary or genetic potential and maturational factors. Further, young people in particular often have little control over, or decision making opportunities with respect to their lifestyles and behaviours, and other factors are arguably more influential.

This individualistic perspective is also illustrated within the discourse used by some of the stakeholders in the feasibility study. Comments within both the questionnaires and interviews included references to encouraging children to take 'more responsibility for their own actions' or 'individual responsibility' for monitoring their progress, showing children 'how they could shape exercise habits' and allowing them to 'make sensible decisions'. An adviser/inspector surveyed reported a pitfall of fitness testing to be the need to take:

into context the sociological issues relating to healthy and active lifestyles.

As a result of the limitations of an individualistic approach, environmental or ecological approaches to the promotion of physical activity have attracted growing interest and support more recently (Sallis et al. 1998; Spence and Lee 2003). Such approaches have, at their core, the notion that behaviour is influenced by multiple facets of the intrapersonal (e.g. psychological and biological variables, developmental history), interpersonal (e.g. family, peers), and physical and policy and legislative environments (Gorely 2005). In line with this, and with reference to the broad and multi-dimensional correlates of childhood physical activity, Welk (1999) proposes a conceptual model of physical activity promotion for children that adopts a social-ecological framework and which acknowledges the input and interaction of various personal, social, and environmental influences on children's physical activity.

To date, the promotion of physical activity in schools has primarily been limited to individualistic efforts made within the curriculum with little attention paid to the effects of environmental factors on youth (Richter et al. 2000; Wechsler et al. 2000). Fitness testing represents another 'curriculum effort' and, from the evidence so far presented, it seems a narrow and not especially effective one at that. It could even be argued that such efforts and an individualistic approach are being reinforced within both the National Curriculum for Physical Education (NCPE) and examination PE with their emphasis on 'fitness' and 'personalized' exercise programmes. 'Knowledge and understanding of fitness and health' is one of the four aspects of the NCPE and planning a personalized exercise programme is a feature of the NCPE at Key Stage 4 and a common feature of examination syllabi.

Of course, a similar criticism could be levelled at a physical activity focus in the curriculum, in that typically individualistic approaches are also relied upon. For example, PE teachers encourage young people to make healthy choices regarding their physical activity behaviour by delivering persuasive arguments for and relevant information about physical activity, and possibly involving them in learning goal setting, programme planning, self-monitoring or time management skills to encourage and facilitate their participation. The key difference, however, is the potential this focus affords for teachers to also work

within an ecological framework and to explore with young people the range of influences on their physical activity (e.g. peers, family, home, curriculum and school environment), the barriers they face, and possible strategies or measures to overcome these within and beyond the curriculum and school. Further and arguably, a combination of approaches and skills are considered important and relevant to encouraging and facilitating an active lifestyle.

Cale and Harris (2006) note how, from an ecological perspective, many aspects of the school (and wider environment) can either promote or inhibit the adoption of an active lifestyle. To increase the likelihood of positively influencing young people's physical activity an ecological framework which would address the multiple levels of influence on physical activity and explore the potential of every aspect of the school to promote physical activity would seem to be the way forward. This would involve consideration of not only the PE curriculum, but how out-of-school hours learning opportunities, the school environment (e.g. facilities, playing fields, playground, equipment), school ethos (e.g. rewards, recognition), policies (e.g. changing, kit, transport), and community links were conducive to, and could serve to promote physical activity to all pupils.

Inappropriate implementation of tests and use of test data?

Concerns have also been expressed over the way in which fitness tests are often implemented and conducted within the curriculum, which are also likely to militate against efforts to promote physical activity. Corbin et al. (1995, 348) ask, 'is it the testing itself that is "bad" or the way in which it is done?'

Pate (1989) expresses concern that too often tests have been an almost irrelevant adjunct to the curriculum or else often dominate or even constitute the entire fitness education programme. The amount of curriculum time spent on fitness testing without necessarily positively influencing young people's activity levels or their attitudes towards physical activity has been criticized (Harris and Cale 1997; Cale and Harris 2002), which would seem to suggest that such PE time could be used more wisely (Cale and Harris 2005). According to Harris (2000), the time spent on performing and scoring fitness tests may detract from promoting the process of being active and may be at the expense of time spent on more useful activity promoting activities, including developing knowledge and understanding about physical fitness and what physical fitness tests measure.

Concerns over the implementation of tests were also evident within the feasibility study. It was noted how 'fitness testing lessons can be bland and not very active' and how children may come to 'associate PE lessons with testing rather than being active and appreciating the value and benefits of exercise'. An interviewee, a PESS consultant, appeared to hold similar views commenting:

I'm not against knowing where we are with regard to our children's fitness but I am against how it could possibly be done, and I'd hate it to be mis-used along the way.

Individuals surveyed were also critical of the time spent on testing and/or of fitness testing dominating programmes. One expert stated:

Fitness testing in schools is of little value and curricular time could and should be better spent ...

whilst a teacher acknowledged how:

we must incorporate testing within a quality scheme of work, not testing for testing's sake.

One expert speaking of his aspirations for and views concerning the future of fitness testing reported how tests should be:

... a personal, educational and development tool—no more.

Finally, the way in which fitness test results are used is important. Fitness test scores may be put to a number of uses, some of which may be considered inappropriate, undesirable and counterproductive to the promotion of physical activity. Examples of inappropriate uses of tests include: to grade pupils as a primary indicator of achievement in PE, to evaluate teacher competence, or to use them as a measure of the success of an institution or programme (Corbin et al. 1995; Corbin 2002). Corbin (2002) however, challenges employing fitness tests for such purposes and is highly critical of schools that use fitness test scores in this way, suggesting they obviously and mistakenly subscribe to the idea that fitness is the paramount goal of PE. Further, he warns that this could have the following potential negative consequences:

- loss of interest in PE and physical activity;
- teaching to the test;
- student and teacher cheating on fitness tests;
- undermining the confidence of students who find that, even with effort, they cannot achieve the fitness goals necessary to get good grades or to meet teacher expectations (Corbin 2002, 134–5).

Some of these consequences may seem extreme, but are nonetheless legitimate if tests scores are, as we are led to believe, commonly used for such purposes (Corbin et al. 1995; Corbin 2002). Further, and more importantly, they will do little to support young people's engagement in healthy active lifestyles. Armstrong and Welsman (1997) advise 'teachers must ask themselves why they are testing young people's fitness, and if the answer is for classification purposes, then we suggest that they would be better employed seriously addressing the problem of young people's sedentary lifestyles' (257). Several individuals in the feasibility study also expressed concern over the inappropriate use of fitness test results. For example, an expert reported in the survey that 'in the hands of sports coaches and many teachers, fitness testing will be badly used', whilst a PESS consultant commented 'I'm afraid that in the wrong hands, fitness testing of children is used inappropriately ...'.

A worthwhile or misdirected effort?

Given the preceding discussion, it seems that fitness testing may not always serve the purposes for which it is intended. In particular, the role fitness testing plays in PE in promoting healthy lifestyles and physical activity is questionable and cannot be taken for granted. For example, little evidence has been found to support the notion that fitness tests promote healthy lifestyles and physical activity, motivate young people, or develop the knowledge and skills that are important to the sustained engagement in an active lifestyle. To the contrary, without careful consideration of the issues, limitations and factors influencing fitness tests and the way in which tests are administered, fitness testing can be unpleasant, embarrassing and meaningless for many young people, and scores can be inaccurate, misleading, unfair and de-motivating (Cale and Harris 2005). In this respect and, as acknowledged earlier, fitness testing is likely to be counterproductive (Docherty and

Bell 1990; Corbin et al. 1995; Rowland 1995). Keating (2003) claims that in the United States (US) three facts cast doubt on the role of fitness testing in promoting physical activity (and improving youth fitness): (a) children have failed to show improvements in fitness and have become less physically active; (b) the percentage of overweight youth has increased substantially in recent years; and (c) the proportion of inactive adults has also increased dramatically.

Despite mixed views, some individuals in the feasibility study questioned the place of fitness testing within the PE curriculum and its role in the promotion of physical activity. When asked whether they thought there was a place for fitness testing in the curriculum, a third of individuals reported they were unsure and a fifth considered it had no place. Those against fitness testing offered the following reasons:

- misguided, backward looking step;
- fraught with validity, reliability difficulties;
- has not been effective in the past;
- it serves no real purpose in terms of increasing participation or promoting interest in sport.

Further, over a third of individuals responded negatively and over 40% neutrally with regards to the question ‘what are your views concerning the role of fitness testing in the promotion of children’s physical activity?’

A PESS consultant and a teacher who felt fitness testing had no role to play in promoting activity argued respectively that testing wasn’t necessary as ‘enjoyment was more important’ and that physical activity could be promoted ‘without having to test the fitness of pupils’. In agreement, another teacher explained:

I feel physical activity can be promoted better through ‘fun’ game like activities and training methods such as aerobics, step, boxercise, circuits . . .

It has also been suggested that fitness and fitness testing is limited in that it represents an individualistic approach to physical activity promotion which fails to acknowledge factors in the physical and social environment which influence physical activity. Thus, based on the evidence from the literature, and taking account of the views, understanding, experiences and observations of individuals within the feasibility study as well as our own theoretical stance, we suggest that much of the fitness testing conducted within PE (though certainly not necessarily all) may well represent a misdirected effort in the promotion of healthy lifestyles and physical activity, and that PE time could therefore be better spent. Further, we call for increased attention to be paid to the ecological approach to physical activity promotion within schools and PE whereby all avenues for promoting physical activity including the curriculum, out-of-school hours learning, the school environment, ethos, policies, and community links would be considered.

If appropriately employed however, and provided all relevant factors and limitations are taken into account, there is no reason why fitness testing cannot play a role in supporting healthy lifestyles and physical activity and in educating young people about physical activity and fitness. To achieve this though, clear guidance on the appropriate use of fitness testing in young people is needed. In 1994, Pate noted how, despite its popularity over a number of years, there was little scientific evidence to guide us in deciding how best to incorporate fitness testing into PE. Over 10 years on, it seems little has changed. As already noted, most of the research in this area has addressed issues of measurement,

validity and reliability and relatively little attention has been paid to understanding how young people respond to fitness tests or how tests can best be used to attain important educational and physical activity promotion objectives.

Recommendations concerning the implementation of fitness testing with young people have been made by a number of researchers and professional organizations [e.g. ACSM 1988; Pate 1994; Corbin et al. 1995; American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) 1999a, 1999b, 1999c; Harris 2000; Cale and Harris 2005], but these have been based more on common sense than on scientific evidence. The latter recommendations (Cale and Harris 2005) represent a summary and interpretation of the former and teachers intent on implementing fitness testing in PE are advised to consult these. In addition, it is recognized that teachers may need specific guidance, support and training in the implementation of fitness testing within the curriculum and in particular in how to use tests and test results to achieve cognitive, affective and behavioural objectives with young people (Cale and Harris 2005).

This view was also supported by the stakeholders and experts in the feasibility study, with several highlighting the need for appropriate guidance and support materials to assist teachers, including programmes to work from. One university lecturer surveyed reported:

there is a need to convert the extensive detailed scientific knowledge about fitness testing into appropriate educational tools so that teachers (and coaches) can be provided with material that allows them to offer children a contemporary understanding of the facts and issues.

When asked about his aspirations for the future of fitness testing, one teacher reported:

I would like to see fitness development as a stand alone unit of work within the National Curriculum; all children following a similar scheme of work . . .

One PE adviser felt confident that in fact most of the problems associated with fitness testing in schools could be overcome by making it 'very specific, very explicit, providing support and guidance and making it simple'.

On this, there have been very positive developments in the US with the production of fitness resources for teachers such as 'Physical Best' (AAHPERD 1999a, 1999b, 1999c) and 'FITNESSGRAM/ACTIVITYGRAM' (The Cooper Institute 2003; www.fitness-gram.net). The resources represent comprehensive fitness education programmes which recognize the importance of physical activity, as well as fitness, by seeking to develop the affective, cognitive and behavioural components associated with physical activity participation. The latest version of FITNESSGRAM/ACTIVITYGRAM (8.0) includes fitness and activity assessments and personalized reporting programmes, and the accompanying reference guide provides guidance on the appropriate and inappropriate use of the resource. Teachers in the UK require and would welcome an equivalent resource or resources.

Finally, given the limitations of individualistic approaches outlined earlier and our call for more attention to be paid to the ecological approach to physical activity promotion, we suggest teachers also need specific guidance, support and training in how to embrace and incorporate this approach in their efforts to promote healthy lifestyles and physical activity. This will involve recognizing and helping young people to recognize the range of influences on their physical activity behaviour and implementing and/or proposing strategies within and beyond the curriculum and school which take account of these.

Conclusion

Drawing on the findings of a recent 'fitness testing children feasibility study', this paper has considered the role of fitness testing in PE in the promotion of healthy lifestyles and physical activity. The key facts, issues, concerns and debates with regards to fitness testing young people have been explored, as they relate to promoting a physically active lifestyle. Based on the evidence available, it is suggested that much of the fitness testing carried out in PE may well represent a misdirected effort in the promotion of healthy lifestyles and physical activity, and that PE time could therefore be better spent. There appears to be little evidence that fitness tests promote healthy lifestyles and physical activity, motivate young people, and develop the knowledge, understanding and skills that are important to engagement in an active lifestyle. To the contrary, there is evidence to suggest that fitness testing may be counterproductive to the goal of promoting physical activity for some youngsters. Given then, the limitations of fitness testing as a model of physical activity promotion, along with the plea to focus more on young people's physical activity than on their physical fitness, we appeal for more attention to be paid to the ecological approach to physical activity promotion within schools and PE.

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