Working Paper

Making the case for UK Physical Activity Guidelines for Early Years:

Recommendations and draft summary statements based on the current evidence

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1.0 Background and Aims

Current physical activity guidelines for children and young people from the four health departments in the UK (see Table 1) are being revised in 2009/2010 along with those for adults and older adults. The revised guidelines, like the previous guidelines, will include the healthy population age from the age of 5 years, and will exclude the 'Early Years'. Throughout this paper the term 'Early Years' is used to refer to children who have not attained the age at which they would normally start school in the UK (that is the school year, September to August, in which their fifth birthday falls).

Table 1: Summary of current Physical Activity Guidelines for School-Age Children and Young People across the four U.K. countries.

Country	Guidelines
England	A total of at least 60 minutes of at least moderate intensity physical activity each day At least twice a week this should include activities to improve bone health, muscle strength, and flexibility
Scotland	At least 60 minutes of moderate activity on most days of the week
Wales	60 minutes of moderate intensity physical activity on at least 5 days of the week 5 x 60 minutes of physical activity per week
Northern Ireland	A total of at least 60 minutes of at least moderate intensity physical activity each day
Notes	**Age range not stated clearly on all guidelines. In most cases specified as age 5 years and above, where not stated usually interpreted as age 5 years and above (i.e. school age; excludes those younger than school age)**

Health departments from a number of other nations have produced guidelines on physical activity and sedentary behaviour for the Early Years, and these are increasingly evidence-based (informed by systematic reviews of the evidence, with an attempt to place less emphasis on expert opinion). Of particular note are the guidelines from Australia (Australian Government Department of Health & Ageing,

2009), the USA (NASPE, 2009), and Canada (Timmons et al, 2007), summarised in Table 2 below. The 2009 Australian Department of Health and Ageing guidance on physical activity and sedentary behaviour for the under-5's provides the most appropriate foundation for new UK guidelines as it is recent and is based on a process of systematic review and evidence appraisal, it has identified sufficient evidence on which to develop guidelines, and has reviewed evidence which is applicable to the UK.

There appears to be a general consensus in these countries, and the UK, that the Early Years is one of the critical time periods in the establishment of sedentary and physical activity behaviours. The evidence suggests that physical activity, especially in the form of play, during the first five years of life is a basic and essential dimension which must be fostered, encouraged and provided. Conversely there are many opportunities for young children to spend excessive time in sedentary behaviour which should be limited and replaced with more physically active options. Moreover, formal and informal learning in these areas at this age is vitally important as it establishes the building blocks for later formal learning in school settings (Hall et al, 2009; Kato, 2006).

There is concern over levels of habitual physical activity and sedentary behaviour among young children, and increasing demand from a number of sectors for guidelines on physical activity (and sedentary behaviour) for the Early Years in the UK.

Table 2: Summary of recent Guidelines for Physical Activity and/or Sedentary Behaviour in the Early Years

Country	Guidelines
Australia 2009	For infants (0-1y) physical activity should be encouraged from birth, particularly floor based play in safe environments. Toddlers (1-3y) and pre-schoolers (3-5y) should be physically active every day for at least 3 hours. For 2-5y olds TV and other screen-based electronic media (DVD, computer and other electronic games) should be limited to <1h per day Children under the age of 2y should not spend any time watching TV or using other screen-based electronic media. Infants, toddlers, and pre-schoolers should not be sedentary for more than one hour at a time during the day, except when sleeping.
Canada 2007	*For pre-school children (2-5y olds):* Promotion of physical activity should consider their natural activity patterns (typically spontaneous and intermittent). Physical activity should focus on gross motor play and locomotor activities that children find fun. Physical activity experiences will be enhanced by adult facilitation (including modelling) that provides mastery experiences and contingent feedback about those experiences. Access should be given to play spaces and equipment outdoors.
USA 2009	*Guidelines for Infants (0-12 months):* Infants should interact with caregivers in daily physical activities that are dedicated to exploring movement and the environment Caregivers should place infants in settings that encourage and stimulate movement experiences and active play for short periods of time several times a day. Infants' physical activity should promote skill development in movement. Infants should be placed in an environment that meets or exceeds recommended safety standards for performing large-muscle activities. Those in charge of infants' well-being are responsible for understanding the importance of physical activity and should promote movement skills by providing opportunities for structured and unstructured physical activity. *Guidelines for Toddlers (12-36 months):* Toddlers should engage in a total of at least 30 minutes of structured physical activity each day. Toddlers should engage in at least 60 minutes, and up to several hours, per day of unstructured physical activity and should not be sedentary for more than 60 minutes at a time, except when sleeping. Toddlers should be given ample opportunities to develop movement skills that will serve as the building blocks for future motor skilfulness and physical activity. Toddlers should have access to indoor and outdoor areas that meet or exceed recommended safety standards for performing large-muscle activities. Those in charge of toddlers' well-being are responsible for understanding the importance of physical activity and promoting movement skills by providing opportunities for structured and unstructured physical activity and movement experiences. *Guidelines for Preschoolers (3-5 years):* Preschoolers should accumulate at least 60 minutes of structured physical activity each day. Preschoolers should engage in at least 60 minutes, and up to several hours, of unstructured physical activity each day, and should not be sedentary for more than 60 minutes at a time, except when sleeping. Preschoolers should be encouraged to develop competence in fundamental motor skills that will serve as the building blocks for future motor skilfulness and physical activity. Preschoolers should have access to indoor and outdoor areas that meet or exceed recommended safety standards for performing large-muscle activities. Caregivers and parents in charge of preschoolers' health and well-being are responsible for understanding the importance of physical activity and for promoting movement skills by providing opportunities for structured and unstructured physical activity.
Notes	Australian guidelines are based on a combination of systematic review, evidence appraisal, and expert opinion. Guidelines from Canada and the USA are based on narrative review and expert opinion.

Existing UK guidelines for children are not applicable to the Early Years because:

- infants (aged 0-12 months) are not capable of the frequency, intensity, time and type (FITT) of activity as are children aged 5 and over;
- they recommend a specific intensity of activity (at least moderate-to-vigorous) which is not developmentally appropriate for children under 5 years. Children of pre-school age who are capable of standing and walking unaided need recommendations that incorporate all types of activity especially unstructured, physically active or energetic play (see Box 1) which is the main form of physical activity in the Early Years, and has many social, emotional and cognitive benefits. In addition, the Early Years are when children need time to develop their fundamental movement skills and gain physical mastery over their environment. This cannot be accomplished in one hour per day but requires ample time spread throughout the day to reflect the sporadic activity patterns of young children;
- there was insufficient evidence on which to base authoritative guidelines for the Early Years when the English Chief Medical Officer made his recommendations in 2004; and
- it is known that physical activity levels decline from early to late childhood. If the recommendations for children under 5 years are the same as for older children (60 minutes) then there is a great chance that those pre-school children who are meeting the recommendation in the Early Years will no longer be meeting it in primary school as a result of the natural decline in their activity levels upon transition to primary school.

The present document, produced by the expert group listed on page 1, therefore aims to:

a. Provide a brief summary of the case for the development of Physical Activity Guidelines for the Early Years in the UK during 2009-2010.
b. Outline the scope of the guidelines.
c. Outline the process and milestones involved in producing draft summary statements by end November 2009, and final summary statements by spring 2010 which will provide the starting point for the Guidelines Writing Group.
d. Provide draft summary statements for consultation.

e. Align the process for developing physical activity guidelines for the Early Years with the process which is underway to update guidelines for Children and Young People, Adults and Older Adults in the UK in 2009-2010. Once agreed, the Early Years guidelines can, therefore, be reviewed alongside the guidelines for older groups as the need arises in future.

Box 1: Defining the physical activity of young children

The description "physically active play" is used in this paper as a convenient label for the type of physical activity that has health and developmental benefits for young children. However, not all forms of physical activity involve play e.g. walking to the shops. Physically active play typically will include activity that involves trunk movements and involve more exertion than the minimal movement required to carry out simple everyday tasks such as washing, bathing, dressing, or activities such as playing board games or other passive play (such as craft activities, drawing, dressing up, playing at a sand table). However, the authors acknowledge that different authorities may use a range of terms to describe forms of physical activity that provide health and developmental benefits for young children. These include at a minimum the examples below:

- Activities which involve movements of all the major muscle groups, i.e. the legs, buttocks, shoulders and arms, and translocation of the trunk (movement of the trunk from one place to another)
- Energetic play e.g. climbing frame or riding a bike
- Energetic bouts of activity e.g. running and chasing games
- Informal, unstructured or free play with no rules (apart from safety) and little input or direction from parents/carers.
- Walking to shops, a friend's home, park or to and from a school
- Swimming (play or learning to swim)
- Skilful play practice

But we also note that adult-led play (facilitating, prompting, stimulating or focusing) can provide at least some of the recommended physical activity (e.g. through adults leading games like Simon Says), as could non-play activities (e.g. learning to swim, gym and dance lessons with qualified instructors).

Similarly, children might also lead their own activities but at times participate in those planned by adult carers (e.g. in day care settings or to fit family circumstances).

Adults might contribute some structure or formality or facilitate play by providing enabling environments within which children can be stimulated to play more constructively and generate their own physically active games and play, e.g. a designated play area with a range of equipment and challenges and a lay out that children can use as a starting point.

2.0 Summary of the case for physical activity guidelines for the Early Years across the UK 2009/2010

2.1 Physical activity, sedentary behaviour, and obesity

The obesity epidemic, which has affected young children, is a major driver of physical activity guidelines for the Early Years. In the UK, levels of physical activity and sedentary behaviour among young children are 'obesogenic' (obesity promoting; Reilly et al, 2004; Reilly et al, 2005). In the UK, excess weight gain which has taken place by the time of adolescence may often have occurred largely by the time children enter primary school (Gardner et al, 2009). The National Child Measurement Programme (NCMP), which aims to weigh and measure all English school pupils in Reception Year (the school year in which their fifth birthday falls) and Year 6 (the school year in which their eleventh birthday falls), shows that almost one in four children are overweight or obese when the data are collected in the Reception Year (NCMP 2007-2008). Furthermore, excess weight gain in the period birth to 4 years is strongly predictive of later risk of obesity (Reilly et al, 2005). Prevalence of overweight and obesity have been increasing. Around 10% of Scottish children are obese, defined as BMI at or above the 95th percentile, at the time of entry to primary school, compared to 5% in 1990 (age 4-5 years; Reilly, 2006)**.** In England, 9.9% of children aged 2 – 10 were obese in 1995, by 2007 (Health Survey for England, 2007) the rate had risen to 15.4%. An additional concern is the evidence that obesity in childhood and adolescence is socially patterned (higher prevalence in lower socio-economic status families and in children from some ethnic minority groups; Reilly, 2006).

2.2. Biological basis of physical activity- health and sedentary behaviour-health relationships in the Early Years.

Recent systematic reviews have concluded that physical activity in childhood and adolescence has a wide range of health and other benefits, which greatly outweigh any risks (Strong et al, 2005; US Department of Health & Human Services, 2008). As noted above, these reviews excluded the age range 0-5 years, but some level of physical activity is believed to be required for normal growth and development (Australian Department of Health & Ageing), and there is a good deal of evidence that more physical activity is better than less. The idea that the benefits of physical

activity only emerge suddenly at age 5 years is biologically implausible. Indeed, for some health outcomes it is likely that the benefits of physical activity are greater in infancy and early childhood than later in life**.** In addition, there is an argument that physical activity in the Early Years will promote later physical activity and health: if physical activity can be promoted (and similarly sedentary behaviour discouraged) to young children, there is evidence that these behaviours may track moderately well at least into lower primary school (Certain & Kahn, 2002; Zimmermann et al, 2005; Janz et al, 2005; Pate et al, 1996; Saakslahti et al, 2004).

The Blair conceptual model of physical activity and health from 1989 (adapted in the 2009 Physical Activity guidance for the under-5's) provides a convincing set of pathways which link physical activity in the Early Years to both current physical activity and health, and future physical activity and health. The Australian guidelines also applied the Blair model convincingly to sedentary behaviour in the Early Years.

2.3 Developments in the evidence base and the availability of recent systematic reviews of the evidence.

There is now sufficient evidence on which to base guidelines for the Early Years in the UK. The evidence from the international literature (much of which was UK-based) on both physical activity and sedentary behaviour and health in the age range 0-5 years, was reviewed systematically to February 2008 in order to inform the Australian Department of Health and Ageing 2009 guidelines, and we believe this evidence is generalisable to the UK and not specific to Australia. The evidence base continues to improve, and relevant systematic reviews are becoming increasingly available. Since the Australian guidelines were written four systematic reviews on physical activity -or sedentary behaviour - in the Early Years have been published. In summary, these recent systematic reviews conclude that:

- levels of objectively measured habitual physical activity in pre-school children continue to give cause for concern (Tucker, 2008);
- higher levels of objectively measured physical activity are associated with lower body fatness or indices of body fatness (Jimenez-Pavon et al, 2009);
- a number of 'correlates' of physical activity in preschool children have now been identified (Hinkley et al, 2008);

- motor development can be improved by physical activity interventions (Riethmuller et al, 2009).

These new systematic reviews confirm the conclusions of the Australian 2009 guidelines and do not suggest that any changes to the 2009 guidance are necessary. However, the Australian guidelines remain subject to formal endorsement and are being updated with more recent literature searches, and we hope to have access to the final version in spring 2010.

The authors of the present document accept that there are a number of weaknesses and gaps in the evidence, and have highlighted some of these below. For example, we are not currently aware of any evidence based on studies of pre-school age children to support a recommendation for a dosage of moderate-vigorous intensity physical activity (MVPA), and any such MVPA recommendation would simply be an extrapolation from older child evidence, which we have tried to avoid. However, physical activity guidelines for Early Years should specify that being physically active must stress engagement in play, and that both structured and unstructured opportunities should be encouraged. We took views on this at the consensus event in Marlow October 2009, where feedback from those present was supportive and gave no indication of any opposition to the development of physical activity guidelines for the Early Years in the UK, and we will continue to consult through the subsequent web-based consultation due to take place between November and December 2009 and which will be open to academics and Early Years practitioners.

Weaknesses and gaps in the evidence have also been highlighted in recent physical activity guidelines for all age groups. We are confident that guidelines for the Early Years which are logical, safe, and consistent with the evidence can be produced now. We intend that the new UK guidelines will stimulate the collection of more and better evidence in future, with guidelines which are more specific and more evidence based. Future guidelines are likely to be more developmental-specific or gender-specific, or focus on specific social or population groups, or are likely to be more detailed and precise on the intensity and duration of physical activity (i.e. 'dose – response' issues).

2.4 Demand for physical activity guidelines for the Early Years

There is now a substantial demand for physical activity guidelines for the Early Years in the UK, from various sectors, and there is a responsibility to produce guidelines given the combination of this demand and the rationale outlined in 2.1 - 2.3 above.

In England, the Government is taking forward its obesity strategy (Healthy Weight, Healthy Lives) across the whole obesogenic environment. In implementing this strategy in respect of children in their Early Years the need for physical activity guidelines for this age-group has become apparent in order to inform the Healthy Child Programme (the universal health promotion programme for young children led by Health Visitors), the Early Years Foundation Stage, and the social marketing campaign Change4Life.

In surveillance of the health and development of children the ability to be able to assess the adequacy of levels of physical activity depends on a quantitative target against which adequacy of observed levels of physical activity can be judged. Surveillance applications are particularly relevant to public health (for example the UK health surveys, Healthy Child Programme 0-5), but also for education (e.g. inspection and regulation of Early Years Establishments such as nurseries, daycare centres, childminders, and the training and development of staff working with children).

Guidelines will help Early Years educational settings foster an inclusive and comprehensive educational environment from an early age, which arguably provides the best possible start for children (Elliott, 2008).

Guidelines will also assist commissioners of child weight management services. The child weight management services framework for England covers services for children aged 2-19 years. The framework uses the National Institute for Health and Clinical Excellence (NICE) guidance for all age groups in the absence of specific Early Years recommendations.

Finally, the recommendations for updating the UK physical activity guidelines for the age group 5-18 years recommend the production of guidelines for the under 5s.

2.5 Consistency with international approaches to physical activity guidelines

As noted above, guidelines for physical activity and/or sedentary behaviour for the Early Years are now available from a number of other nations. The production of Early Years guidelines for the UK would be consistent with the international approach.

2.6 Adverse consequences of not producing guidelines

There are many and varied 'costs' to not producing guidelines for Early Years at this time. Some examples are listed below:

- Not having guidelines would lead to a missed opportunity to highlight the importance of physical activity and sedentary behaviour in the Early Years, and to highlight research gaps. The development of guidelines for Early Years will stimulate a more comprehensive portrayal of research gaps in this field and generate new research initiatives.
- The increasing demand may mean that guidelines are sought from inappropriate sources in the absence of the more informed and authoritative guidelines which we can provide.
- Physical activity guidelines for Early Years should be seen as a normal component of national physical activity guidelines. The continued absence of guidelines for the Early Years may perpetuate the mistaken belief that physical activity guidelines for this age group are not necessary and disincentivise Early Years professionals from embedding physical activity in Early Years policy and practice, in Early Years higher education training and in continuing professional development (CPD).
- Not producing guidelines at this stage will delay the long-term aim of producing better (high quality, more detailed, and more evidence based) guidelines. Production of high quality evidence based guidelines for the Early Years is best seen as a long-term process which requires a starting point. The new guidelines in 2009-2010 would act as a starting point by establishing

the Early Years as part of the UK guidelines process, by providing a helpful framework for the development of future guidelines, and by highlighting research gaps.

- Absence of quantitative targets for physical activity will limit efforts in surveillance, in health promotion, and in education. Specifically, the continued absence of guidelines for Early Years will hinder efforts to promote physical activity and reduce sedentary behaviour in the early childhood sector. Given the high and increasing number of children in this sector this has been something that has been desperately needed by those advocating for physical activity in these settings.
- A large number of initiatives are underway to promote physical activity in children, usually to combat obesity. The absence of guidelines for physical activity leads to an absence of targets against which the success of these initiatives can be measured.

2.7 Development of draft summary statements, to inform future guidelines

The Early Years working group listed on page 1 presented its initial thinking to the UK Physical Activity Guidelines Consensus Meeting at Marlow on 21-22 October 2009, incorporated feedback from that event into the present paper, and prepared the recommendations and draft summary statements in sections 5 and 6 below for the web-based consultation alongside the consultation on summary statements for the other age groups in November-December 2009.

The Early Years working group and four UK Health Departments will then consider the responses to the consultation and discuss whether any changes can be made to the draft summary statements and if any areas of substantial dispute have been uncovered.

A further national stakeholder event for Early Years is being planned for 8 February 2010. The Early Years working group will arrange for a formal response to be made to this stakeholder event.

3. New UK summary statements on physical activity in the Early Years: Scope (inclusions and exclusions) and alignment with the 2009-2010 process of revision of physical activity guidelines in the UK for those aged 5 and over.

3.1 Age

The new UK summary statements on physical activity for the Early Years are aimed at the following age groups:

- Infants not yet walking unaided
- Children who can walk unaided but have not started school

Our rationale for this is that as children's motor skills develop at different rates, it makes sense to avoid age-based recommendations in the Early Years and that the key distinction is between 'walkers' and 'non-walkers'. In an earlier draft of this document three broad age groups were considered (infants, toddlers, and preschoolers), which would allow comparison with other international guidelines (such as those listed in Table 2), but discussion and feedback from the Marlow meeting led to the conclusion that presenting guidelines for each age group is not possible now because of lack of evidence for the 'toddler' category, and the very broad motor and physiological changes which take place in the 'toddler' age range between 30 and 42 months. We also think that the non-walking/walking distinction will more easily facilitate monitoring of compliance with the final recommendations.
However, we note that:

- the physical activity guidelines for Children and Young People in the UK currently being revised will cover the age range 5-18 years (inclusive);
- most children in the UK start school before their fifth birthday but it is not practical to devise recommendations that would require schools to follow different guidelines for the same child within the same school year (i.e. they will be under and over five years old in the same school year); and
- conversely, some children in the UK do not start school until after their fifth birthday and we should not want two different sets of guidelines to be applicable to them within the year before they start school.

Therefore, we propose to take a pragmatic approach and distinguish between children who have not started school and those who have. The Early Years draft

summary statements given below should be applied to children who have not yet started school, and the Children and Young People's draft summary statements should be applied to children who have started school. Messages about the application of the summary statements should set out the reasons for any difference in the recommendations for children in their early years and children of school age.

3.2 Consideration of sedentary behaviour

The working group considered the issue of whether the draft summary statements should include sedentary behaviour, consistent with recent Australian and USA guidelines. The Australian 2009 Department of Health and Ageing Guidelines had a wide remit, which included reviewing the evidence on the impact of TV viewing in infancy and early childhood on a range of cognitive and developmental outcomes. For the current UK draft summary statements on physical activity for the Early Years the focus was physical activity and so consideration of sedentary behaviour focused on the issue of the impact of sedentary behaviour on physical activity, not on the wider issues of sedentary behaviour (e.g. TV viewing) and cognitive development.

An international expert group has been commissioned by the Cross-Government Obesity Unit to review evidence and make recommendations on sedentary behaviour which will feed into the UK consensus process in 2010. This will not have a specific focus on the Early Years, although some data from this age group will be considered. The Early Years Group is sharing details of the content and process of their work with the sedentary behaviour group.

We include a draft summary statement on sedentary behaviour here because being sedentary:

- goes against the child's natural tendencies to be active;
- reduces the amount of physical activity that can be participated in;
- reduces the time that can be spent developing rudimentary and fundamental movement skills, as well as restricting opportunities to learn about the environment, which is mainly done through play; and
- there is evidence from studies of infants and young children that extended periods of sitting may be detrimental to health.

3.3 Exclusion of '**special populations**'.

Revised UK summary statements in 2009-2010 for Children and Young People will exclude 'special populations' (e.g. those with chronic disease), but will make reference to the applicability of recommendations for those with physical or intellectual disability. The forthcoming UK guidelines for Children and Young People will also consider the implications of guidelines for other special groups (e.g. relevance to social inequalities, ethnic minority groups). However, given the lack of evidence of the benefits of physical activity on special populations in their Early Years, they will be excluded from the current summary statements for Early Years. The Early Years working group notes that this is undesirable but it is beyond our control as there is no evidence base for making separate recommendations for these populations. As more evidence becomes available on special populations we recommend that this should be considered for inclusion in future guidelines for the Early Years.

4.0 Development of Draft Guidance

4.1 Principles underlying the drafting of guidelines for the Early Years

The recent Australian Recommendations document provides useful principles intended as a foundation for guidelines. It summarises these principles by stating that guidelines should meet three criteria. Drawing on this experience, the Early Years working group recommends that future guidelines for the Early Years should *ideally:*

- Be based on an adequate quantity of evidence linking physical activity and sedentary behaviour to a range of health outcomes.
- Be behaviourally sound, i.e. the amount and type of physical activity recommended should be translated into messages which would provide positive experiences for children at different ages and stages of development, and should encourage physical activity. Physical activity for this age group is best interpreted as active play that is naturally intermittent, spontaneous and fun, accrued primarily through physically active play but also including everyday activities such as games, as part of journeys and outings and more organised or structured activity
- Be consistent with the patterns and nature of physical activity which are typical of children at different ages and stages of development
- Be applicable to the wide range of environments relevant to the Early Years (e.g. care at home, childcare, nurseries)
- Aim to avoid extrapolation from evidence on older children wherever possible.

4.2 The evidence base

As noted in section 2.3 above the 2009 Australian Department of Health and Ageing guidance is the most recent relevant source for the current draft summary statements, and for the development of draft UK guidelines. In addition, the Australian guidelines are based on systematic review to February 2008 and formal evidence appraisal, and so are the most evidence-based of the available guidelines for physical activity in the Early Years. In addition, the Australian Recommendations are more closely aligned with current UK and international guidelines by referring to duration of physical activity and sedentary behaviour (which the Canadian guidelines avoid). The Australian Recommendations should therefore be the basis of draft UK

guidelines for the Early Years in 2009-2010, updated with inclusion of the relevant systematic reviews published after February 2008 and also updated searches from Australia when these become available.

The Australian 2009 process found:

- Level B evidence (where relatively few randomised controlled trials exist or trials were based on relatively small samples and/or were not entirely consistent in their findings) and level C evidence (from observational studies rather than controlled trials) of health enhancing associations of physical activity and a number of outcomes: body fatness (level B); cardiovascular health (levels B and C for most traditional cardiometabolic risk factors); musculo-skeletal health (largely bone health ; level C); motor development (level C). Level D evidence (i.e. based largely on expert opinion) was found for associations of physical activity and respiratory health, psychosocial health, cognitive development, and social/emotional development; and

- Level C evidence for adverse associations between sedentary behaviour and body fatness, and for cognitive development. Level D evidence was found for adverse associations between sedentary behaviour and poor diet; cardiovascular health; self-regulation; motor development.

The 2009 Australian recommended 'dose' of physical activity and sedentary behaviour for those able to walk, specify at least 3 hours daily physical activity and less than 1 hour daily screen time (see discussion below). The dose recommendation derives in part from studies of associations between physical activity and sedentary behaviour and a variety of health outcomes, in part from studies of the prevalence of objectively measured physical activity (where levels of light, moderate and vigorous intensity physical activity combined typically exceeded 2 hours per day), and the prevalence of objectively measured sedentary behaviour (and subjectively measured sedentary behaviour, particularly screen-time), and in part from studies of the tracking of physical activity and sedentary behaviour from the pre-school to primary school period. The rationale for three hours daily physical activity of any intensity in the current draft UK summary statements for Early Years was as follows:

1. The statements are framed in the form of any intensity of physical activity (i.e. whether the activity is light, moderate, or vigorous).

2. Three hours would allow for a possible decline in physical activity levels once a child starts primary school.

3. The evidence of moderate tracking of physical activity from the pre-school to primary school period.

4. While precise evidence on dose was lacking, most of the observational and intervention studies reviewed in the Australian document suggested that 'more physical activity is better' and so future recommendations should reflect more than the typical amount of daily movement (of around 2 hours per day of a typical 12 hour day).

5. It sends the message that large amounts of time should be set aside (or provided) during each day for physically active play.

The Australian 2009 guidelines also provide a rationale for the restriction of sedentary behaviour in general, and screen time in particular. The studies on sedentary behaviour reviewed to produce the Australian Recommendations broadly found that 'less sedentary behaviour was better' for body fatness and cognitive development, and less was highly likely to be better for a wide range of other outcomes, all in the context of typical screen time of around 2 hours/day for 3 and 4 year olds (and many of those under 2) during a 12 hour day. It was therefore felt prudent in the Australian guidelines to recommend restriction of screen time as exposure to a lower 'dose' of screen time than is currently typical is likely to be beneficial to young children, and because of evidence of moderate tracking of TV viewing from Early Years into the primary school period. However, the studies reviewed as part of the Australian guidelines generally used rather crude, subjective, methods (leaving doubt over the accuracy of the quantitative estimates used) and focused largely on screen time, particularly TV viewing. The Australian guidelines were framed specifically for screen time, and suggested that a limit of 1 hour per day would provide sufficient opportunities for exposure of 2-4 year olds to high quality educational programming and/or 'active gaming'.

In the current draft summary statements for the UK we have not considered TV viewing and development to be part of our remit, and have taken the view that TV watching and other screen time are specific examples of the general case of sedentary behaviour. We are also conscious that our remit is to develop summary statements for physical activity rather than for children's cognitive, social and general development. However, we shall invite the sedentary behaviour working group to examine the evidence assessed for the Australian guidelines.

5.0 Recommendations underpinning the Early Years Draft Summary Statements

Taking account of the foregoing discussion, the Early Years working group identified a range of recommendations outlining key elements they felt should be included within the Draft Summary Statements and future guidelines:

Physical activity recommendations for infants

1. The U.K. summary statements on physical activity should recommend that all infants*, should be encouraged from birth to be physically active.

2. The U.K. summary statements on physical activity for infants* should encourage floor-based play in safe environments.

3. The U.K. summary statements on physical activity for infants* should recommend “daily physical activity”.

Physical activity recommendations for children of pre-school age

4. The U.K. summary statements on physical activity for children of pre-school age* should recommend physical activity daily.

5. The U.K. summary statements on physical activity for children of pre-school age* should recommend at least 180 minutes daily physical activity.

6. Messaging of future U.K. guidelines on physical activity for children of pre-school age should use the term “accumulate” when describing the recommended amount of physical activity.

7. Messaging of future U.K. guidelines on physical activity for children of pre-school age* should recommend that physical activity should be at least light intensity.

8. Messaging of future U.K. guidelines on physical activity for children of pre-school age* should recommend that periods of more energetic activity be encouraged.

Recommendations for sedentary behaviour

9. The U.K. summary statements for sedentary behaviour for infants and children of pre-school age should recommend that time spent sedentary should be limited.

10. The U.K. summary statements for sedentary behaviour for infants and children of pre-school age should recommend that children should not be restrained

within a high chair, small playpen, car, pram or buggy, watching TV or other forms of screen-based media for more than one hour at a time.

**Footnotes:*
'Infants' refers to those not yet able to walk unaided
'Children of pre-school age' refers to those able to walk unaided and who have not yet started school (i.e. toddlers and pre-schoolers).

6.0 The Early Years Draft Summary Statements

Building on the these recommendations, the Early Years working group proposes the following draft summary statements for the UK:

Physical Activity

- Infants not yet walking should be encouraged from birth to be physically active, particularly through floor-based play in safe environments.
- Children of pre-school age who are capable of walking unaided should be physically active daily for at least 3 hours. Physical activity should involve translocation of the trunk (movement of the trunk from one place to another).

We intend to test with stakeholders, through the web consultation and an event on 8 February 2010, what definitions of movement would be helpful for parents and practitioners, and in later communications on the summary statements provide some examples.

Sedentary behaviour

- Children in their Early Years, from birth to school age, should be discouraged from being sedentary. In particular, no sedentary behaviour should last for more than one hour at a time, except sleep. This includes time restrained within a high chair, small playpen, car, pram or buggy, watching TV or other screen time, or any other sedentary behaviour that limits the benefits of physical activity.

Following feedback from the web consultation and stakeholder event, the summary statements will be amended and the final summary statements will provide the starting point for the Guidelines Writing Group

7.0 Other issues: safety; surveillance; research gaps

7.1 Safety

It is a fundamental part of the Every Child Matters framework and the Children's Plan that unless children are safe they cannot be happy, healthy, enjoy their childhoods or achieve their full potential. This doesn't mean that we should over-protect children and young people. In respect of physical activity and active play, while parents and carers are responsible for their children's safety and professionals can support them, and supervise children in childcare and Early Years settings, children need a balance between being safe from harm and having opportunities to experience and ultimately develop their own resilience to risk, which in turn requires that they should undertake physical activity which is challenging, preferably outdoor play, and which promotes motor development (NICE, 2009).

7.2 Surveillance and measurement issues

The working groups responsible for producing summary statements on physical activity in the UK have been asked to comment on surveillance issues - recommendations for measurement of levels of physical activity in the relevant populations. For children in the Early Years age range we suggest:

- Surveillance of habitual physical activity in the Early Years age range ideally requires the use of objective methods, such as time-use diaries for television viewing. Objective methodology (accelerometry) is now used in addition to subjective methods in children in the English Health Surveys as in the USA.
- Systematic and comprehensive narrative reviews have concluded that objective methods are available for the 3-5 year age range which are valid, reliable, and practical for the measurement of habitual physical activity and sedentary behaviour (de Vries et al, 2009; Reilly et al, 2008; Cliff et al, 2009). Accelerometry is of particular note and this technique measures time spent sedentary, in light intensity physical activity, and in moderate-vigorous intensity physical activity.
- However, measurement of particularly important components of sedentary behaviour such as screen time is more difficult and requires more research.
- In addition, the objective measurement of habitual physical activity and sedentary behaviour in infants and toddlers has received very little research

attention to date, but recent preliminary studies provide some hope that the objective methods used widely in research with pre-school children may be suitable for use in toddlers and infants (de Vries et al, 2009b; Cardon et al, 2009). Further research is required in order to establish methods for the objective measurement of physical activity and sedentary behaviour in infants and toddlers.

7.3 Research gaps other than measurement issues

The Australian guidelines noted that the quantity, quality, and consistency of evidence relating physical activity and sedentary behaviour to health/development in the Early Years was adequate to inform guidelines, but the evidence base was not sufficient on its own. The Australian guidelines were in part based on expert opinion rather than the evidence because the evidence quantity, quality, and consistency were all less than ideal. However, the authors of the Australian Recommendations took the view that because of the problems with measurement in this age group, the absence of evidence should not be interpreted as evidence of absence.

However, the working groups providing recommendations on updating UK physical activity guidelines for Children and Young People, Adults and Older Adults have all been asked to address the issue of research gaps which are central to improved guidelines in future or which raise doubts over guidelines. The Early Years working group therefore recommends that future research should address gaps in the evidence identified in the Australian Recommendations.

Specifically more and better evidence is required on outcomes of interest which are potentially related to habitual physical activity and sedentary behaviour in infants, toddlers, and pre-schoolers, i.e. those outcomes listed in tables 3.1 and 4.1 from the Australian document:

- adiposity;
- respiratory health;
- cardiometabolic risk factors;
- musculoskeletal health;
- diet;
- psychosocial health;

- cognitive development;
- social and emotional development;
- motor development;
- sleep;

and we have identified other issues for which more research is needed:

- whether infants and pre-schoolers with impairments or complex disabilities have sufficient, appropriate opportunities for physical activity in Early Years settings;
- the relationship between physical activity in the Early Years, the development of brain structure and emotional wellbeing (although see the Foresight report on Mental Capital).

In general, better evidence is needed: that is, data based on objective methods of measurement of physical activity so as to be able to provide evidence on duration and type of activity (i.e. dose-response issues). Such studies need to be adequately powered, and there needs to be much more research on infants and toddlers - generally speaking the younger the child the less evidence. The Early Years span a wide range of ages and developmental stages (and a good deal of variation between children) but at present there is limited evidence on the extent to which guidelines should differ between the different age/stage groups. Future research should therefore provide evidence which informs the extent to which different guidelines are necessary for different age groups within the Early Years range.

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9.0 Glossary

FITT: frequency, intensity, time and type [of physical activity]

Light intensity physical activity: refers to activities which have an energy cost between approximately 1.5-2.9 times the energy expended at rest.

MET: Metabolic equivalent table, which typically lists activities by their degree of physical intensity. On a scale where sleeping has a MET value of 0.9, moderate intensity activity such as walking on a level surface has a MET value of 3.0 (consuming 3.5 to 7 kcal/min) and walking uphill has a MET value of more than 6.0 (consuming more than 7 kcal/min)

MVPA: moderate-to-vigorous intensity physical activity refers to physical activities which have an energy cost in the range 3.0 – 6.0 times the energy expended at rest.

Sedentary behaviour: is defined in this document as no translocation of the trunk (see below), and refers to activities which have an energy cost up to approximately 1.5 times the energy expended at rest.

Translocation: refers to movement of the trunk from one place to another.

Vigorous intensity physical activity: refers to activities which have an energy cost >6.0 times the energy expended at rest.