Review 'let's make Scotland more active'- updating the evidence base for the recommendations about the amount of activity needed to provide health benefits

Review completed by Nanette Mutrie on behalf of the Scottish Physical Activity Research Collaboration for the strategy review process

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Introduction

The Scottish Physical Activity Research Collaboration (SPARColl;www.sparcoll.org.uk) was asked to provide evidence concerning recommendations of the amount and type of physical activity needed for health gain. This evidence is needed to inform the five year review of the 2003 Scottish physical activity strategy, 'Let's make Scotland More Active'. This report includes a summary of the evidence considered. The report was considered by the review group and influence the conclusions made for the update of the Scottish Strategy. Readers should also seek out the report by the review group.

Methodology

A systematic review of all published evidence between 2003 and 2008 was not appropriate for this task. Therefore, sources published between 2003 and 2008 that had National and/or International impacts were considered (i.e. review articles, position statements, published guidelines and evidence reports) and conclusions were drawn from these. Individual studies were not considered. The databases PubMed and ISI web of knowledge were used with keywords relating to physical activity recommendations and physical activity promotion. Members of the SPARColl advisory board were also consulted to ensure that valid resources had not been overlooked or excluded. The sources used are presented in Appendix 1. The table in Appendix 1 also includes a summary of the key evidence from each source; these details were taken directly from the text or abstract of the source with some minimal additional commentary from the review group.

Limitations

We are aware that two other sets of recommendations are imminent: one from Pekka Oja on European recommendations and the other from the British Association of Sport and Exercise Sciences. The latter is important to take into account because of the UK perspective. We also note that there has been a substantial increase in the evidence base regarding how we should intervene to increase the level of physical activity across the population. A summary of this evidence is beyond the scope of the brief to update the evidence regarding evidence around the recommended amounts of physical activity needed for health gain. However, we have made a summary of issues regarding promotion from the sources we have read.

Results: See Appendix 1: Summary of sources reviewed

Implications for review of strategy

The evidence summarised in Appendix 1 is generally consistent with the physical activity recommendations presented in the 2003 Scottish physical activity strategy which states:

- Adults should accumulate (build up) at least 30 minutes of moderate activity on most days of the week.
- Children should accumulate (build up) at least one hour of moderate activity on most days of the week.

However, several additional components to these recommendations have also been identified which should be taken into account in any update to the Scottish strategy. These are outlined below in four sections with commentary from the writing group in bracketed italics. The four sections are 1) recommendations on the amount and type of physical activity needed for health gain; 2) strategies for the promotion of physical activity; 3) the role of the environment in physical activity; 4) guidance on implementing a national strategy:

<u>Recommendations on the amount and type of physical activity needed for health gain</u>

- To promote and maintain health all healthy adults (16-65) should accumulate at least 30 minutes of moderate-intensity physical activity on at least five days of the week *[this simply specifies what is meant by 'most days' in previous statements]* or a total of 150 minutes per week in units of no less than 10 minutes.
- The recommended level of activity can also be achieved by exercising at a vigorous intensity for a minimum of 75 minutes in a week or by a combination of moderate and vigorous intensity activity (including lifestyle activities, exercise and sport). [*There is a difficulty in expressing this for a public health strategy*.]

- The dose-response relationship between physical activity and health should be emphasised: undertaking more than the minimum recommended levels will provide greater health and fitness benefits
- All healthy adults should also perform activities that maintain or increase muscular strength and endurance on two or more days of the week [*this has been overlooked by most guidelines and is difficult to achieve in a clear public health message*]
- Recommendations for older adults are similar to those for adults but should take individual levels of aerobic fitness into account and include activities that promote and maintain strength, balance and flexibility.
- Physical activity and the obesity agenda.
    - The latest recommendations from the US create three very useful categories: those who wish to maintain their healthy weight; those who wish to lose weight; those who wish to maintain weight loss. We should seriously consider their recommendations:
        - To <u>maintain</u> a healthy weight walking at 4 miles per hour for 150 minutes per week or jogging at 6 miles per hour for 75 minutes per week is needed [*this is from latest US guidelines and falls in line with the general recommendations*]
        - To <u>lose</u> weight: walking about 45 minutes per day at 4 miles per hour or about 70 minutes per day at 3 miles per hour, or jogging 22 minutes per day at 6 miles per hour. For most people to achieve substantial weight loss (i.e., more than 5% decrease in body weight), a dietary intervention also is needed
        - To <u>prevent substantial weight regain</u> over 6 months or longer, many adults need to exercise in the range of 60 minutes of walking or 30 minutes of jogging daily (approximately 4.4 kilocalories per kilogram per day of activity energy expenditure). *[this is from latest US guidelines and is new information]*

- Children and young people should accumulate at least 60 minutes of moderate intensity activity on every day of the week. This should include a variety of activities and at least twice a week incorporate activity to enhance bone health, muscle strength, and flexibility. Appropriate activities vary with respect to the age group and developmental level of the child and include limited sedentary time, free play, outdoor physical activity, motor skills, active living, sports, and resistance exercises. The emphasis should be on enjoyable activities to be maintained across the lifespan.
- Sedentary behaviour is emerging as a risk factor for overweight and obesity independent of physical activity levels and should be recognised as such. Sedentary time should be minimised for all age groups.

<u>Strategies for the promotion of physical activity</u>

Evidence for successful strategies for the promotion of physical activity, by whatever means, across settings and populations, requires a much stronger research base and evaluation of long-term effectiveness. Some evidence does exist for positive short term change as follows:

- Interventions should be transdisciplinery and constructed using an appropriate theoretical framework.
- Practitioners, policy makers and commissioners should work together to reach all subgroups of the population, and physical activity promotion endeavours (such as exercise referral schemes and walking programmes/groups) should be properly controlled and evaluated, particularly over the longer-term.
- Physical activity is only one outcome measure and general wellbeing, mental health and social capital should also be considered. [*these bullet points are not inconsistent with the 2003 strategy but should be emphasised*].

<u>The role of the environment in physical activity</u>

The relationship between the physical environment and physical activity levels (and obesity) is inconsistent, but certain specific attributes such as destination proximity, land use mix and walking and cycling facilities have repeatedly been shown to be important for an active lifestyle.

- Planners, transport authorities, and local authorities should work together to ensure that new and existing developments, buildings, workplaces, and schools are designed to promote physical activity for all (including those whose mobility is impaired), and that community facilities have high quality active transport links. [*use NICE guidance on this topic as the way forward*]

<u>Guidance on implementing a national strategy</u>

There is a globally agreed framework in place published by the WHO 2007 to guide the implementation of National Plans.

- 'let's make Scotland more active' is following these guidelines

Appendix 1 Summary of sources reviewed [note that the summaries may have been taken directly from the cited texts and there will be some commentary from the review team added]

Author or Organisation	Abbreviated title	Country	Type of publication	Target population	Summary of recommendations
(Briffa et al., 2006)	Physical activity for people with cardiovascular disease	Australia	Recommendation	General	To provide physical activity recommendations for people with cardiovascular disease, an Expert Working Group of the National Heart Foundation of Australia in late 2004 reviewed the evidence since the US Surgeon General's Report: physical activity and health in 1996. The Expert Working Group recommends that: people with established clinically stable cardiovascular disease should aim, over time, to achieve 30 minutes or more of moderate intensity physical activity on most, if not all, days of the week; less intense and even shorter bouts of activity with more rest periods may suffice for those with advanced cardiovascular disease; and regular low-to-moderate level resistance activity, initially under the supervision of an exercise professional, is encouraged. Benefits from regular moderate physical activity for people with cardiovascular disease include augmented physiological functioning, lessening of cardiovascular symptoms, enhanced quality of life, improved coronary risk profile, superior muscle fitness and, for survivors of acute myocardial infarction, lower mortality. The greatest potential for benefit is in those people who were least active before beginning regular physical activity, and this benefit may be achieved even at relatively low levels of physical activity. Medical practitioners should routinely provide brief, appropriate advice on physical activity to people with well-compensated, clinically stable cardiovascular disease.
(Council on Sports Medicine and Fitness and Council on School Health, 2006)	Prevention of childhood obesity through increased physical activity	USA	Policy statement	Children	The following are guidelines for different age groups, consistent with the developmental level of the child from the American Association of Paediatrics (AAP). **Infants and Toddlers** There is insufficient evidence to recommend exercise programs or classes for infants and toddlers as a means of promoting increased physical activity or preventing obesity in later years. The AAP has recommended that children younger than 2 years not watch any television. The AAP suggests that parents be encouraged to provide a safe, nurturing, and minimally structured play environment for their infant. Infants and toddlers should also be allowed to develop enjoyment of outdoor physical activity and unstructured exploration under the supervision of a responsible adult caregiver. Such activities include walking in the neighborhood, unorganized free play outdoors, and walking through a park or zoo. **Preschool-Aged Children (4–6 Years)** Free play should be encouraged with emphasis on fun, playfulness, exploration,

					and experimentation while being mindful of safety and proper supervision. Preschool-aged children should take part in unorganized play, preferably on flat surfaces with few variables and instruction limited to a show-and-tell format. Appropriate activities might include running, swimming, tumbling, throwing, and catching. Preschoolers should also begin walking tolerable distances with family members. In addition, parents should reduce sedentary transportation by car and stroller and, as applies to all age groups, limit screen time to <2 hours per day. **Elementary School–Aged Children (6–9 Years)** In this age group, children improve their motor skills, visual tracking, and balance. Parents should continue to encourage free play involving more sophisticated movement patterns with emphasis on fundamental skill acquisition. These children should be encouraged to walk, dance, or jump rope and may enjoy playing miniature golf. There is little difference between the sexes in weight, height, endurance, and motor skill development at this age; thus, co-ed participation is not contraindicated. Organized sports (soccer, baseball) may be initiated, but they should have flexible rules and short instruction time, allow free time in practices, and focus on enjoyment rather than competition. These children have a limited ability to learn team strategy. **Middle School–Aged Children (10–12 Years)** Preferred physical activities that focus on enjoyment with family members and friends should be encouraged as with previous groups. Emphasis on skill development and increasing focus on tactics and strategy as well as factors promoting continued participation are needed. Fully developed visual tracking, balance, and motor skills are typical in late childhood. Middle school–aged children are better able to process verbal instruction and integrate information from multiple sources so that participation in complex sports (football, basketball, ice hockey) is more feasible. Puberty may begin at different rates, making some individuals bigger and stronger than others. Basing placement in contact and collision sports on maturity rather than chronologic age may result in less risk of injury and enhanced chance of success, especially for those at lower Tanner stages. Weight training may be initiated, provided that the program is well supervised, that small free weights are used with high repetitions (15–20), that proper technique is demonstrated, and that shorter sets using heavier weights and maximum lifts (squat lifts, clean and jerk, dead lifts) are avoided. **Adolescents** Adolescents are highly social and influenced by their peers. Identifying activities that are of interest to the adolescent, especially those that are fun and include friends, is crucial for long-term participation. Physical activities may include

					personal fitness preferences (eg, dance, yoga, running), active transportation (walking, cycling), household chores, and competitive and noncompetitive sports. Ideally, enrolment in competitive contact and collision sports should be based on size and ability instead of chronologic age. Weight training may continue, and as the individual reaches physical maturity (Tanner stage 5), longer sets using heavier weights and fewer repetitions may be safely pursued while continuing to stress the importance of proper technique. It is unlikely, however, that any single strategy will be sufficient to reverse current trends in pediatric obesity. Success is more likely to be achieved by the implementation of sustainable, economically viable, culturally acceptable active-living policies that can be integrated into multiple sectors of society.
(Department of Health, 2004)	At least five a week: evidence on the impact of physical activity and its relationship to health	England	Report from the Chief Medical Officer	General	- For general health benefit, adults should achieve a total of at least 30 minutes a day of at least moderate intensity physical activity on 5 or more days of the week. - The recommended levels of activity can be achieved either by doing all the daily activity in one session, or through several shorter bouts of activity of 10 minutes or more. The activity can be lifestyle activity* or structured exercise or sport, or a combination of these. - More specific activity recommendations for adults are made for beneficial effects for individual diseases and conditions. *All* movement contributes to energy expenditure and is important for weight management. It is likely that for many people, 45-60 minutes of moderate intensity physical activity a day is necessary to prevent obesity. People who have been obese and have managed to lose weight may need to do 60-90 minutes' activity a day in order to avoid regaining weight. For bone health, activities that produce high physical stresses on the bones are necessary. - The recommendations for adults are also appropriate for older adults. Older people should take particular care to keep moving and retain their mobility through daily activity. Additionally, specific activities that promote improved strength, co-ordination and balance are particularly beneficial for older people. - Children and young people should achieve a total of at least 60 minutes of at least moderate intensity physical activity each day. Variety of activity is important. At least twice a week this should include activities to improve bone health (activities that produce high physical stresses on the bones), muscle strength and flexibility. ** Lifestyle activity means activities that are performed as part of everyday life, such as climbing stairs or brisk walking*
(Government Office for Science, 2005)	Tackling obesity (Foresight report)	England	Project report	General	The lack even of limited opportunity for activity for many people has implications for transport policies and other aspects of the built environment. Sedentary behaviours have emerged as a specific risk factor for overweight and obesity, especially TV viewing (which may also be a marker for inter-individual differences in eating behaviours). Some success in enhancing weight control has been shown by

					reducing sedentary behaviour. Long-term interventions show that sustained changes in diet and physical activity can lead to modest but sustained reductions in body weight, of approximately 5%, over many years. Talks about an 'obesogenic environment' but no consistent pattern of associations between the majority of perceived and objective environmental variables and physical activity. There is a positive relationship between the convenience of local neighbourhoods and walking and some evidence of a relationship between the perceived and actual safety, greenery, aesthetics and upkeep of neighbourhoods and physical activity. The association between environmental characteristics and physical activity, with obesity as an outcome, has not been well studied. Nevertheless, the general picture emerging is that residents of highly walkable neighbourhoods are more active and have slightly lower body weights than their counterparts in less walkable neighbourhoods, as do those living in areas with high land-use mix. As well as the space between buildings, the design and layout of buildings themselves can support physical activity with, for example, prominent and appealing staircases rather than escalators or lifts. Increase physical activity levels by • Enhance the walkability of the living environment • Reduce the dominance of sedentary employment • Mitigate the dominance of motorised transport • Improve access to opportunities for physical exercise
(Haskell et al., 2007)	Physical activity and public health: Updated recommendations for adults (ACSM/AHA)	USA	Position statement	General population	To promote and maintain health, all healthy adults aged 18 to 65 yr need moderate-intensity aerobic (endurance) physical activity for a minimum of 30 min on five days each week or vigorous-intensity aerobic physical activity for a minimum of 20 min on three days each week. Combinations of moderate- and vigorous-intensity activity can be performed to meet this recommendation. For example, a person can meet the recommendation by walking briskly for 30 min twice during the week and then jogging for 20 min on two other days. Moderate-intensity aerobic activity, which is generally equivalent to a brisk walk and noticeably accelerates the heart rate, can be accumulated toward the 30-min minimum by performing bouts each lasting 10 or more minutes. Vigorous-intensity activity is exemplified by jogging, and causes rapid breathing and a substantial increase in heart rate. In addition, every adult should perform activities that maintain or increase muscular strength and endurance a minimum of two days each week. Because of the dose-response relation between physical activity and health, persons who wish to further improve their personal fitness, reduce their risk for chronic diseases and disabilities or prevent unhealthy weight gain may benefit by exceeding the minimum recommended amounts of physical activity.
(Institute of Medicine Food and Nutrition	Dietary reference intakes	USA		General	An average of 60 minutes of daily moderate intensity physical activity (e.g., walking/jogging at 3 to 4 miles/hour) or shorter periods of more vigorous exertion (e.g., jogging for 30 minutes at 5.5 miles/hour) was associated with a normal BMI

Board, 2005)					and therefore is recommended for normal-weight individuals. This amount of physical activity leads to an “active” lifestyle, corresponding to a PAL greater than 1.6. Because the Dietary Reference Intakes are provided for the general healthy population, recommended levels of physical activity for weight loss of obese individuals are not provided. For children, the physical activity recommendation is also an average of 60 minutes of moderate intensity daily activity. Increasing the energy expenditure of physical activity (EEPA) needs to be considered in determining the energy intake to achieve energy balance in weight stable adults, and adequate growth and development in children
(Katz et al., 2005)	Public health strategies for preventing and controlling overweight and obesity in school and worksite settings	USA	General	Report	Reducing morbidity and mortality related to overweight and obesity is a public health priority. Various interventions in school and worksite settings aim to maintain or achieve healthy weight. To identify effective strategies for weight control that can be implemented in these settings, the Task Force on Community Preventive Services (Task Force) has conducted systematic reviews of the evidence on nutrition, physical activity, combinations of these interventions, and other behavioral interventions (e.g., cognitive techniques such as self-awareness and cue recognition). Task Force recommendations are based on evidence of effectiveness, which is defined in this report as achieving a mean weight loss of > or =4 pounds, measured > or =6 months after initiation of the intervention program. The Task Force recommends multicomponent interventions that include nutrition and physical activity (including strategies such as providing nutrition education or dietary prescription, physical activity prescription or group activity, and behavioral skills development and training) to control overweight and obesity among adults in worksite settings. The Task Force determined that insufficient evidence existed to determine the effectiveness of combination nutrition and physical activity interventions to prevent or reduce overweight and obesity in school settings because of the limited number of qualifying studies reporting noncomparable outcomes. This report describes the methods used in these systematic reviews; provides additional information regarding these recommendations; and cites sources for full reviews containing details regarding applicability, other benefits and harms, barriers to implementation, research gaps, and economic data (when available) regarding interventions.
(Kushi et al., 2006)	Guidelines on nutrition and physical activity for cancer prevention	USA	Guidelines	General	Scientific evidence indicates that physical activity may reduce the risk of several types of cancer, including cancers of the breast, colon, prostate, and endometrium. Although scientific evidence for many other cancers is lacking, associations may exist. Physical activity acts in a variety of ways to impact cancer risk. The ACS Guidelines are consistent with guidelines from the American Heart Association and the American Diabetes Association for the prevention of coronary heart disease and diabetes, as well as for general health promotion, as

					defined by the Department of Health and Human Services' 2005 Dietary Guidelines for Americans. Adopt a physically active lifestyle. • Adults: engage in at least 30 minutes of moderate to vigorous physical activity, above usual activities, on 5 or more days of the week. Forty-five to 60 minutes of intentional physical activity are preferable. • Children and adolescents: engage in at least 60 minutes per day of moderate to vigorous physical activity at least 5 days per week.
(Marcus et al., 2006)	Physical activity intervention studies: what we know and what we need to know. American Heart Association Council	USA	Scientific statement	General	Although there is a great need for continued research on the efficacy and cost-effectiveness of various physical activity interventions and ways to help people maintain behaviour change, much progress has been made over the past decade. Studies of younger to middle-aged adults have demonstrated moderate effects overall, although stronger effects are evident for interventions that use behavior modification. Moreover, stronger effects are present for the adoption phase of physical activity, although few studies have examined longer-term maintenance. Recent and ongoing studies that focus on lifestyle physical activity in addition to or instead of structured, class-based activity will likely contribute to our understanding of the options available for assisting adults with physical activity behavior change. In studies of older adults, short-term efficacy has been demonstrated for behaviourally oriented approaches, although long-term maintenance has not been as strong. Although several enhanced physical education programs have been shown to be effective and are being disseminated, researchers have not yet found other consistent methods for promoting youth physical activity in school-, community-, and home-based settings. Targeting community settings where multiple generations gather on a regular basis, such as places of worship, has the potential for reaching individuals of varying ages and racial and ethnic backgrounds. Physical activity intervention research among underserved populations has been limited; however, more recent and well-designed studies have been promising, because they show positive results for interventions targeted to specific populations of ethnically diverse and low-SES individuals. Future studies should include more diverse samples and should focus on both the adoption and the maintenance of physical activity behavior. Interventions in healthcare settings can increase physical activity, at least for short-term follow-up. Some research has shown that even very brief interventions can increase physical activity. Although most studies have focused on assisting the physician with counseling about physical activity, in future research there should be a focus on working with the allied health professionals in primary and specialty care settings. Because most adults spent much of their time at work, the worksite has been examined in numerous studies as a setting for physical activity interventions. Although the overall evidence in support of worksite interventions has been mixed,

					stronger evidence supports individually tailored behaviour change– oriented programs at the workplace. Future studies should continue to use these more effective approaches and study employees over longer follow-up periods. Mediated interventions have been shown to be effective with short-term behavior change, and increasing evidence indicates that these approaches may be effective in the longer term. Although print has been studied most extensively, many studies have now demonstrated the efficacy of telephone based interventions, and studies are under way utilizing the Internet. Because these interventions rely on little or no face-to-face contact, they are likely to have great reach and favorable cost-effectiveness. Many individuals who are sedentary also have other unhealthy habits (eg, smoking, poor diet) that increase risk for cardiovascular disease if left unchanged. Although encouraging evidence is emerging with regard to targeting physical activity and other health habits, much more research is needed on whether and how to combine behavioural interventions. Changing environments to remove barriers to and create opportunities for physical activity for recreational and transportation purposes is a promising new area of research. Limited intervention research has evaluated mainly smallscale environmental changes, such as building trails and signs to promote stair use. Numerous cross-sectional studies demonstrate the promise of major environmental changes, such as creating communities with mixed land use that facilitate active transportation and ensuring that people have easy access to public recreation facilities. Because randomized trials will seldom be feasible with built-environment interventions, priority should be placed on rigorous quasiexperimental evaluations. In prior decades, physical activity research was largely atheoretical; however, in the last decade, there has been much more focus on the importance of theory. Theories that have been employed most often in intervention research fit under the larger umbrella of SCT or SLT. The transtheoretical model has also been used in numerous intervention studies. Ecological models have expanded the targets of intervention to also include environmental changes. Although theories are now being used in studies, continued work in this area is important, because the field would benefit from studies testing specific hypotheses about what theoretical factors will be changed and at what times during the course of the intervention. Although physical activity intervention research has grown considerably in the past decade, much work remains to be conducted. Understanding of human biology and behaviour continues to grow, but in a disjointed fashion. To integrate and utilize this rapidly growing knowledge base to help promote physical activity, it will be necessary to employ transdisciplinary efforts that are collaborative not only in name but in theory development and hypothesis generation, as well as in study design, implementation, and analysis. Through continued physical activity research,

					we hope to provide the types of programming and technology that will help individuals to lead more active lives and thereby improve their quality of life.
(Mutrie et al., 2008)	Promoting physical activity in primary care Draft report to NHS Health Scotland	Scotland	Review of reviews	General	The recommendations should be that all healthy adults should be encouraged to achieve a total of at least 30 minutes a day of at least moderate intensity activity on 5 or more days of the week. This activity can be achieved either in a single session or can be accumulated throughout the day with several shorter bouts of 10 minutes or more, and can be 'lifestyle' activity, structured exercise or sport, or a combination of these. Overweight or obese patients should achieve 60 minutes or more of moderate intensity activity on most days of the week to facilitate weight loss and/or maintenance. Children should accumulate at least 60 minutes of moderate intensity activity on 5 or more days of the week; such activities should also include activities that promote bone health, muscle strength and flexibility at least twice a week. Primary care staff must use their clinical knowledge to assess patient contraindications to specific forms of activity and to refer to specific treatment guidelines for individual disease states. The above guidelines can then be modified accordingly. Those patients identified as already achieving the minimum recommended levels of physical activity should be supported to maintain this activity and also educated about the additional benefits of more vigorous activity.
(NHS Health Scotland, 2008)	Commentary on NICE physical activity and the environment	Scotland	Commentary	Adults	**HS Comments/Conclusions on Recommendation 1:** 1. Cited evidence limited, particularly in respect of increasing levels of walking and cycling through changes in urban design, but Recommendation considered appropriate and supported subject to amendment of the first sentence of the second action bullet point to read 'Ensure development planning and development management give due priority to the need for people (including those whose mobility is impaired) to be physically active as a routine part of their daily life.'. 2. Scottish contextual points – With regard to the third action bullet point, the impact assessment tools included in the Strategic Environmental Assessment (SEA) toolkit and the Scottish Transport Appraisal Guidance (STAG) should be used where appropriate. In addition, health impact assessment (HIA) is of relevance here. For information on the Scottish Health Impact Assessment Network, and relevant publications, see www.healthscotland.com/resources/networks/shian.aspx. NHS Health Scotland is currently exploring the feasibility of developing an integrated impact assessment screening tool to aid in considering health, equalities and environmental impacts in the planning and policy development process. **HS Comments/Conclusions on Recommendation 2:** 1. Cited evidence limited, and contradictory in some respects, but Recommendation considered appropriate and supported subject to: 1) amendment of 'the highest priority' to 'due priority' in the main action bullet point; 2) amendment of 'highway design' to 'road design' in the fourth bulleted action sub-point; 3) explicit indication that the fifth bulleted action sub-point applies to both primary and secondary schools.

					2. Scottish contextual point – With regard to the third bulleted action sub-point, Local Authorities in Scotland have powers to introduce local road charging in their areas. To date, support for such a policy appears to have been limited, with issues such as practicality, perceived benefits and equality being cited. **HS Comments/Conclusions on Recommendation 3:** Cited evidence limited, particularly in respect of increasing levels of cycling through provision of cycle routes, but Recommendation considered appropriate and supported subject to: 1) substitution, in the Scottish context, of 'Regional Transport Partnerships' for 'regional' [authorities] in the list of those who should; take action]; 2) insertion of 'networks of' before 'routes' in the second sentence of the action bullet. **HS Comments/Conclusions on Recommendation 4:** 1. Recommendation supported subject to: 1) addition of 'owners of, and those responsible or maintaining, public open spaces, paths and rights of way' to the first bulleted list of those who should take action; 2. Substitution, in the Scottish context, of 'Local Authorities, Community Planning Partnerships and Regional Transport Partnerships' for 'regional and local authorities' in the second bulleted list of those who should take action; 3) addition of the following bulleted action point, since proximity to open spaces influences usage: • Maintain or develop open spaces within or close to populated areas where possible. **HS Comments/Conclusions on Recommendation 5:** 1. Recommendation supported with the addition of '(including Local Authority architects, and landscape architects)' after 'Architects' in the list of those who should take action. 2. Scottish contextual points – National Indicator 36 within The Scottish Government's National Performance Framework ('increase the proportion of journeys to work made by public or active transport) is of relevance to this Recommendation. Travel Plans are also relevant here. A Travel Plan is a package of measures devised by organisations or workplaces, tailored to the needs of individual sites, and aimed at promoting more sustainable travel choices and reducing reliance on car usage. A Plan can cover a single site or a cluster of organisation. For larger organisations an overarching Travel Plan can standardise measures across many sites. Bespoke assistance is available from the Energy Saving Trust, and advice in the Scottish context will soon be available at www.chooseanotherway.com. **HS Comments/Conclusions on Recommendation 6**: 1. Cited evidence limited, but Recommendation considered appropriate and supported with addition of 'hotels' to the list of public buildings under 'Who should take action?'. H**S Comments/Conclusions on Recommendation 7:**

					1. Cited evidence limited, especially with regard to whether short-term benefits are maintained in the longer term, but Recommendation considered appropriate and supported subject to: 1) adaptation to fit Scottish organisational structures etc; 2) addition of 'Local Authorities (including their education, sports and leisure services), Active School Programmes/Coordinators, and those involved in the design and redesign of schools' to the list of those who should take action; 3) emphasis in relation to the second bulleted action point that there are measures beyond painting playground paving that can be used to promote richer opportunities for playground activity.
(NHS Health Scotland, 2006)	Commentary on NICE promoting physical activity	Scotland	Commentary	Adults	Guidance examines only a small number of possible approaches to increasing individuals' activity levels, and does not cover e.g. broader environmental and organisational efforts to promote physical activity in the population. The latter points to an important wider consideration: care needs to be taken in health improvement in general to ensure that a preponderance of reviews of evidence on the effectiveness or otherwise of isolated individual-centred interventions does not skew attention away from wider policy and other action. Also, physical activity was the only outcome for the inclusion criteria (did not consider i.e. self concept, mental health, general wellbeing). Increased physical activity may be one (but not the sole) measure of success. **Commentary endorses recommendations 1, 2, 3 and 4.** **The following set of conclusions is offered as an alternative to NICEPHIG2 Recommendation 5:** A recent NICE evidence into practice briefing on the promotion of physical activity among adults has recommended the development of systems in primary care to promote access to community exercise specialists or behaviour change specialists who can offer ongoing support and advice to inactive people. However, no evidence has been found in the review for NICEPHIG2 to suggest that exercise referral schemes are effective in increasing physical activity levels in the longer term (>12 weeks) or over a very long timeframe (>1 year). A coordinated programme of evaluative research is desirable to add to the limited existing evidence base on the effectiveness of exercise referral schemes. In the meantime, it is reasonable to suggest that new exercise referral schemes should not be established other than as part of such an evaluation programme or other relevant evaluative study (eg as part of an evaluated wider pilot initiative), and that primary care practitioners and others should be aware of the above evidence points when presenting and discussing local physical activity options to help patients meet agreed physical activity goals. If establishing new schemes for evaluation, or continuing current schemes, the National Quality Assurance Framework for exercise referral systems (Department of Health [England] 2001; subsequently recommended for use in Scotland) should be applied. **The following set of conclusions is offered as an alternative to NICEPHIG2**

					Recommendation 6: In the reviews for NICEPHIG2, evidence on the short- (6-12 weeks) and longer-term (>12 weeks) effectiveness of pedometer-based interventions, in terms of increasing physical activity, was found to be equivocal, and there was a lack of evidence on very long-term effectiveness (>1 year). Evidence on the effectiveness of community-based walking schemes, in terms of increasing physical activity, was found to be equivocal, and on the effectiveness of community-based cycling schemes was lacking. A coordinated programme of evaluative research is desirable to add to the limited existing evidence base on the effectiveness of such interventions. In the meantime, primary care practitioners and others should be aware of the above evidence points when presenting and discussing local physical activity options to help patients meet agreed physical activity goals. If establishing new schemes for evaluation, or continuing existing schemes, good practice principles should applied.
(National Institute for Health and Clinical Excellence, 2006)	Four commonly used methods to increase physical activity	England	Public health intervention guidance	Adults	**Recommendation 1** Primary care practitioners should take the opportunity, whenever possible, to identify inactive adults and advise them to aim for 30 minutes of moderate activity on 5 days of the week (or more). They should use their judgement to determine when this would be inappropriate (for example, because of medical conditions or personal circumstances). They should use a validated tool, such as the Department of Health's forthcoming general practitioner physical activity questionnaire (GPPAQ), to identify inactive individuals. **Recommendation 2** When providing physical activity advice, primary care practitioners should take into account the individual's needs, preferences and circumstances. They should agree goals with them. They should also provide written information about the benefits of activity and the local opportunities to be active. They should follow them up at appropriate intervals over a 3 to 6 month period. **Recommendation 3** Local policy makers, commissioners and managers, together with primary care practitioners, should monitor the effectiveness of local strategies and systems to promote physical activity. They should focus, in particular, on whether or not opportunistic advice is helping to increase the physical activity levels of people from disadvantaged groups, including those with disabilities (and thereby tackling health inequalities). They should also assess how effective professionals from a range of disciplines are at raising long-term physical activity levels among these groups. **Recommendation 4** Local policy makers, commissioners and managers, together with primary care practitioners, should pay particular attention to the needs of hard to reach and disadvantaged communities, including minority ethnic groups, when developing service infrastructures to promote physical activity.

					Recommendation 5 Practitioners, policy makers and commissioners should only endorse exercise referral schemes to promote physical activity that are part of a properly designed and controlled research study to determine effectiveness. Measures should include intermediate outcomes such as knowledge, attitudes and skills, as well as measures of physical activity levels. Individuals should only be referred to schemes that are part of such a study **Recommendation 6** Practitioners, policy makers and commissioners should only endorse pedometers and walking and cycling schemes to promote physical activity that are part of a properly designed and controlled research study to determine effectiveness. Measures should include intermediate outcomes such as knowledge, attitude and skills, as well as measures of physical activity levels.
(National Institute for Health and Clinical Excellence, 2008a)	Physical activity and the environment	England	Public health guidance	General	**Recommendation 1** Who should take action? • Those responsible for all strategies, policies and plans involving changes to the physical environment. This includes the development, modification and maintenance of towns, urban extensions, major regeneration projects and the transport infrastructure. It also includes the citing or closure of local services in both urban and rural areas. What action should they take? • Involve all local communities and experts at all stages of the development to ensure the potential for physical activity is maximised. • Ensure planning applications for new developments always prioritise the need for people (including those whose mobility is impaired) to be physically active as a routine part of their daily life. Ensure local facilities and services are easily accessible on foot, by bicycle and by other modes of transport involving physical activity. Ensure children can participate in physically active play. • Assess in advance what impact (both intended and unintended) the proposals are likely to have on physical activity levels. (For example, will local services be accessible on foot, by bicycle or by people whose mobility is impaired?) Make the results publicly available and accessible. Existing impact assessment tools could be used. **Recommendation 2** Who should take action? • Those responsible for all strategies, policies and plans involving changes to the physical environment, including local transport authorities, transport planners and local authorities. What action should they take? • Ensure pedestrians, cyclists and users of other modes of transport that involve physical activity are given the highest priority when developing or maintaining

					streets and roads. (This includes people whose mobility is impaired.) Use one or more of the following methods: – re-allocate road space to support physically active modes of transport (as an example, this could be achieved by widening pavements and introducing cycle lanes) – restrict motor vehicle access (for example, by closing or narrowing roads to reduce capacity) – introduce road-user charging schemes – introduce traffic-calming schemes to restrict vehicle speeds (using signage and changes to highway design) – create safe routes to schools (for example, by using traffic-calming measures near schools and by creating or improving walking and cycle routes to schools). **Recommendation 3** Who should take action? • Planning and transport agencies, including regional and local authorities. What action should they take? • Plan and provide a comprehensive network of routes for walking, cycling and using other modes of transport involving physical activity. These routes should offer everyone (including people whose mobility is impaired) convenient, safe and attractive access to workplaces, homes, schools and other public facilities. (The latter includes shops, play and green areas and social destinations.) They should be built and maintained to a high standard. **Recommendation 4** Who should take action? • Designers and managers of public open spaces, paths and rights of way (including coastal, forest and riverside paths and canal towpaths). • Planning and transport agencies including regional and local authorities. What action should they take? • Ensure public open spaces and public paths can be reached on foot, by bicycle and using other modes of transport involving physical activity. They should also be accessible by public transport. • Ensure public open spaces and public paths are maintained to a high standard. They should be safe, attractive and welcoming to everyone. **Recommendation 5** Who should take action? • Architects, designers, developers, employers and planners. What action should they take? • Those involved with campus sites, including hospitals and universities, should ensure different parts of the site are linked by appropriate walking and cycling routes. (Campuses comprise two or more related buildings set together in the

					grounds of a defined site.) • Ensure new workplaces are linked to walking and cycling networks. Where possible, these links should improve the existing walking and cycling infrastructure by creating new, through routes (and not just links to the new facility). **Recommendation 6** Who should take action? • Architects, designers and facility managers who are responsible for public buildings (including workplaces and schools). What action should they take? • During building design or refurbishment, ensure staircases are designed and positioned to encourage people to use them. • Ensure staircases are clearly signposted and are attractive to use. For example, they should be well-lit and well-decorated. **Recommendation 7** Who should take action? • Children's services, School Sport Partnerships, school governing bodies and head teachers. What action should they take? • Ensure school playgrounds are designed to encourage varied, physically active play. • Primary schools should create areas (for instance, by using different colours) to promote individual and group physical activities such as hopscotch and other games.
(National Institute for Health and Clinical Excellence, 2008b)	Promoting physical activity in the workplace	Public health guidance		Adults	**Recommendation 1: policy and planning** Who should take action? • Employers in organisations of all sizes (in larger organisations this might include their representatives, for example, human resources [HR] directors and senior managers). • Public health professionals, occupational health professionals, workplace health promoters. • Trades unions, other employee representatives, employees. What action should they take? • Develop an organisation-wide plan or policy to encourage and support employees to be more physically active. This should: – include measures to maximise the opportunity for all employees to participate – be based on consultation with staff and should ensure they are involved in planning and design, as well as monitoring activities, on an ongoing basis – be supported by management and have dedicated resources – set organisational goals and be linked to other relevant internal policies (for

					example, on alcohol, smoking, occupational health and safety, flexible working or travel) – link to relevant national and local policies (for example, on health or transport). **Recommendation 2: implementing a physical activity programme** Who should take action? • Employers in organisations of all sizes (in larger organisations this might include their representatives, for example, HR directors and senior managers). • Public health professionals, occupational health professionals, workplace health promoters. • Trades unions, other employee representatives, employees. What action should they take? • Introduce and monitor an organisation-wide, multi-component programme to encourage and support employees to be physically active. This could be part of a broader programme to improve health. It could include: – flexible working policies and incentive schemes – policies to encourage employees to walk, cycle or use other modes of transport involving physical activity (to travel to and from work and as part of their working day) – the dissemination of information (including written information) on how to be more physically active and on the health benefits of such activity. This could include information on local opportunities to be physically active (both within and outside the workplace) tailored to meet specific needs, for example, the needs of shift workers – ongoing advice and support to help people plan how they are going to increase their levels of physical activity – the offer of a confidential, independent health check administered by a suitably qualified practitioner and focused on physical activity. **Recommendation 3: components of the physical activity programme** Who should take action? • Employers in organisations of all sizes (in larger organisations this might include their representatives, for example, HR directors and senior managers). • People responsible for buildings and facilities. • Public health professionals, occupational health professionals, workplace health promoters. • Trades unions, other employee representatives, employees. What action should they take? • Encourage employees to walk, cycle or use another mode of transport involving physical activity to travel part or all of the way to and from work (for example, by developing a travel plan).

					• Help employees to be physically active during the working day by: – where possible, encouraging them to move around more at work (for example, by walking to external meetings) – putting up signs at strategic points and distributing written information to encourage them to use the stairs rather than lifts if they can – providing information about walking and cycling routes and encouraging them to take short walks during work breaks – encouraging them to set goals on how far they walk and cycle and to monitor the distances they cover. • Take account of the nature of the work and any health and safety issues. For example, many people already walk long distances during the working day, while those involved in shift work may be vulnerable if walking home alone at night. **Recommendation 4: supporting employers** Who should take action? • Directors of public health, public health practitioners in the statutory and voluntary sectors. • Local strategic partnerships. • Private, statutory and voluntary organisations with responsibility for increasing physical activity levels or for occupational health. • Trades unions, business federations, chambers of commerce. What action should they take? • Offer support to employers who want to implement this guidance to encourage their employees to be more physically active. Where appropriate and feasible, this should be provided on the employer's premises. It could involve providing information on, or links to, local resources. It could also involve providing advice and other information or resources (for example, the services of physical activity experts). • If initial demand exceeds the resources available, focus on: – enterprises where a high proportion of employees are from a disadvantaged background – enterprises where a high proportion of employees are sedentary – small and medium-sized enterprises.
(Nelson et al., 2007)	Physical activity and public health in older adults: recommendations. ACSM/AHA	USA	Position statement	Older adults (above 65 years and adults aged 50-64 years with clinically significant	The recommendation for older adults is similar to the updated ACSM/AHA recommendation for adults, but has several important differences including: the recommended intensity of aerobic activity takes into account the older adult's aerobic fitness; activities that maintain or increase flexibility are recommended; and balance exercises are recommended for older adults at risk of falls. In addition, older adults should have an activity plan for achieving recommended physical activity that integrates preventive and therapeutic recommendations. The promotion of physical activity in older adults should emphasize moderate-intensity aerobic

				chronic conditions and/or functional limitations	activity, muscle-strengthening activity, reducing sedentary behaviour, and risk management.
(Physical Activity Guidelines Advisory Committee, 2008)	Physical Activity Guidelines Advisory Committee Report	USA	USA	Whole population	This is an extremely comprehensive report. It was published very recently and in some senses overtakes all of the previous references in this table. The evidence has been systematically reviewed and critiqued. The overall benefits of physical activity for health of the whole population are presented; additions to previous reports include women in pregnancy and post-partum; people with disabilities; racial and ethnic populations; and person who are overweight or obese. This evidence base has increased (both in terms of the strength of the evidence and the range of health outcomes for which there is evidence that physical activity can play a preventive role)since the US 1995 Surgeon General's report on physical activity for health and the UK Chief Medical Officer's report of 2004 on physical activity for health. Specific recommendations include: **For children** '..substantial data indicate that important health and fitness benefits can be expected to accrue to most children and youth who participate daily in 60 or more minutes of moderate to vigorous physical activity. Certain specific types of physical activity should be included in an overall physical activity pattern in order for children and youth to gain comprehensive health benefits. These include regular participation in each of the following types of physical activity on 3 or more days per week: resistance exercise to enhance muscular strength in the large muscle groups of the trunk and limbs, vigorous aerobic exercise to improve cardiorespiratory fitness and cardiovascular and metabolic disease risk factors, and weight-loading activities to promote bone health. Experiences consistent with these goals involve participation in physical activities that are developmentally appropriate, that minimize the potential risks of overtraining and injuries, and that provide children and youth with opportunities for enjoyable participation in a wide range of specific forms of physical activity.' **For adults and older adults ‹**Data from a large number of studies evaluating a wide variety of benefits in diverse populations generally support 30 to 60 minutes per day of moderate to vigorous intensity physical activity on 5 or more days of the week. For a number of benefits, such as lower risk for all-cause mortality, coronary heart disease, stroke, hypertension, and type 2 diabetes in adults and older adults, lower risk is consistently observed at 2.5 hours per week (equivalent to 30 minutes per day, 5 days per week) of moderate to vigorous intensity activity. The amount of moderate to vigorous intensity activity most consistently associated with significantly lower rates of colon and breast cancer and the prevention of unhealthy weight gain or significant weight loss by physical activity alone is in the range of 3 to 5 hours per week.'

					'Resistance or muscle-strengthening exercises are important for maintaining muscle and bone health, and these exercises enhance functional status and contribute to a reduction of falls in older adults. Most of the evidence supports a resistance activity program with the following characteristics: progressive muscle strengthening exercises that target all major muscle groups performed on 2 or more days per week.' Detailed guidance on patterns of activity, on combining vigorous and moderate activity and on special populations is also offered. Further recommendations about the amount of activity needed for weight maintenance, weight loss and achieving weight maintenance after weight loss are also made as follows: **Persons Achieving Weight Stability** The optimal amount of physical activity needed for weight maintenance (defined as less than 3% change in body weight) over the long-term is unclear. However, the evidence is clear that physical activity provides benefit for weight stability. A great deal of inter-individual variability exists with physical activity and weight stability, and many persons may need more than 150 minutes of moderate-intensity activity per week to maintain their weight at a stable level. Data from recent well-designed randomized controlled trials lasting up to 12 months indicate that aerobic physical activity performed to achieve 13 to 26 MET-hours per week is associated with approximately a 1% to 3% weight loss (i.e., an amount generally considered to represent weight stability). Thirteen MET-hours per week is approximately equivalent to walking at 4 miles per hour for 150 minutes per week or jogging at 6 miles per hour for 75 minutes per week. **Persons Achieving Weight Loss** A wide range of studies provides evidence of a dose-response relation between physical activity and weight loss. Clear, consistent data show that a large volume of physical activity is needed for weight loss in the absence of concurrent dietary changes. The physical activity equivalent of 26 kilocalories per kilogram of body weight (1,560 MET-minutes) or more per week is needed for weight loss of 5% or greater. Smaller amounts of weight loss are seen with smaller amounts of physical activity. This relatively high volume of physical activity is equivalent to walking about 45 minutes per day at 4 miles per hour or about 70 minutes per day at 3 miles per hour, or jogging 22 minutes per day at 6 miles per hour.The role of energy intake (diet) must be considered in any discussion of weight control. When calorie intake is carefully controlled at a baseline level, the magnitude of any weight loss is what would be expected given the energy expenditure of the person's physical activity. However, in situations in which people's dietary intake is not controlled, the amount of weight loss due to the increase in physical activity is not commensurate to what would be expected. Therefore, for most people to achieve substantial weight loss (i.e., more

					than 5% decrease in body weight), a dietary intervention also is needed. The dietary intervention could include either maintenance of baseline caloric intake, or a reduction in caloric intake to accompany the physical activity intervention. The magnitude of change in weight due to physical activity is additive to that associated with caloric restriction. **Persons Achieving Weight Maintenance After Weight Loss** The scientific evidence for the effectiveness of physical activity alone in preventing weight regain following significant weight loss is limited. Available data indicate that to prevent substantial weight regain over 6 months or longer, many adults need to exercise in the range of 60 minutes of walking or 30 minutes of jogging daily (approximately 4.4 kilocalories per kilogram per day of activity energy expenditure). The literature generally supports the concept that "more is better" for long-term weight maintenance following weight loss. Further, the evidence indicates that individuals who are successful at long-term weight maintenance appear to limit caloric intake in addition to maintaining physical activity.
(Saris et al., 2003)	How much physical activity is enough to prevent unhealthy weight gain?	Internatio nal	Consensus statement	General, particularly overweight and obese adults	The current physical activity guideline for adults of 30 minutes of moderate intensity activity daily, preferably all days of the week, is of importance for limiting health risks for a number of chronic diseases including coronary heart disease and diabetes. However for preventing weight gain or regain this guideline is likely to be insufficient for many individuals in the current environment. There is compelling evidence that prevention of weight regain in formerly obese individuals requires 60–90 minutes of moderate intensity activity or lesser amounts of vigorous intensity activity. Although definitive data are lacking, it seems likely that moderate intensity activity of approximately 45 to 60 minutes per day, or 1.7 PAL (Physical Activity Level) is required to prevent the transition to overweight or obesity. For children, even more activity time is recommended. A good approach for many individuals to obtain the recommended level of physical activity is to reduce sedentary behaviour by incorporating more incidental and leisure-time activity into the daily routine. Political action is imperative to effect physical and social environmental changes to enable and encourage physical activity. Settings in which these environmental changes can be implemented include the urban and transportation infrastructure, schools, and workplaces.
(Strong et al., 2005)	Evidence based physical activity for	USA (though reviews internatio	Systematic review	Children	School-age youth should participate daily in 60 minutes or more of moderate to vigorous physical activity that is developmentally appropriate, enjoyable, and involves a variety of activities. During the preschool and early school ages, general movement activities develop movement patterns and skills. As these basic

	school-aged youth	nal articles)			movements become established and skills improve, health, fitness, and behavioral components of physical activities increase in importance (solid line in Figure). Health-related activities include those that emphasize cardiovascular and muscular endurance and muscular strength and those that involve weight bearing. The recommended 60 minutes or more of physical activity can be achieved in a cumulative manner in school during physical education, recess, intramural sports, and before and after school programs. Sedentary activities such as excessive television viewing, computer use, video games, and telephone conversations should be discouraged. Reducing sedentary behaviors to <2 hours per day is important to increasing physical activity and to health.
(Transportation Research Board, 2005)	Does the built environment influence physical activity?	USA	Special report	General	In contrast to the well-documented causal connection between physical activity and health, the role of the built environment in physical activity levels is a relatively new area of inquiry. The literature in this area is at an early stage of development, although it is growing rapidly. Results of this research to date, which has been largely cross-sectional, provide a growing body of evidence that shows an association between the built environment and physical activity levels. The science, however, is not sufficiently advanced to support causal connections or to identify with certainty those characteristics of the built environment most closely associated with physical activity behavior. Thus, the committee is unable to provide specific policy guidance, although it offers several recommendations for strengthening theory, research, and data that should provide a firmer basis for future policy making and intervention. The committee presents its consensus findings, conclusions, and recommendations in the following sections, which reflect the papers commissioned for this study, input provided at a workshop, numerous briefings provided to the committee at its meetings, and the expertise and judgment of its members. The built environment can facilitate or constrain physical activity. The built environment can be structured in ways that give people more or fewer opportunities and choices to be physically active. The characteristics of the built environment that facilitate or constrain physical activity may differ depending on the purpose of the activity. For example, ready access to parks and trails may facilitate walking for exercise; sidewalks and mixed-use development are likely to be more important to encourage walking for local shopping and other utilitarian purposes. The built environment can be changed in ways that increase opportunities for and reduce barriers to physical activity. The relationship between the built environment and physical activity is complex and operates through many mediating factors, such as sociodemographic characteristics, personal and cultural variables, safety and security, and time allocation. The available empirical evidence shows an association between the built environment and physical activity. However, few

					studies capable of demonstrating a causal relationship have been conducted, and evidence supporting such a relationship is currently sparse. In addition, the characteristics of the built environment most closely associated with physical activity remain to be determined. National public health and travel surveys should be expanded to provide more detailed information about the locations of physical activity and travel, which is fundamental to understanding the link between the built environment and physical activity in all contexts.
(U.S. Department of Health and Human Services and U. S. Department of Agriculture, 2005)	Dietary guidelines for Americans	USA	National guidelines	General	• Engage in regular physical activity and reduce sedentary activities to promote health, psychological wellbeing, and a healthy body weight. • To reduce the risk of chronic disease in adulthood: Engage in at least 30 minutes of moderate intensity physical activity, above usual activity, at work or home on most days of the week. • For most people, greater health benefits can be obtained by engaging in physical activity of more vigorous intensity or longer duration. • To help manage body weight and prevent gradual, unhealthy body weight gain in adulthood: Engage in approximately 60 minutes of moderate to vigorous intensity activity on most days of the week while not exceeding caloric intake requirements. • To sustain weight loss in adulthood: Participate in at least 60 to 90 minutes of daily moderate intensity physical activity while not exceeding caloric intake requirements. Some people may need to consult with a healthcare provider before participating in this level of activity. • Achieve physical fitness by including cardiovascular conditioning, stretching exercises for flexibility, and resistance exercises or calisthenics for muscle strength and endurance. Key Recommendations for Specific Population Groups • Children and adolescents. Engage in at least 60 minutes of physical activity on most, preferably all, days of the week. • Pregnant women. In the absence of medical or obstetric complications, incorporate 30 minutes or more of moderate intensity physical activity on most, if not all, days of the week. Avoid activities with a high risk of falling or abdominal trauma. • Breastfeeding women. Be aware that neither acute nor regular exercise adversely affects the mother's ability to successfully breastfeed. • Older adults. Participate in regular physical activity to reduce functional declines associated with aging and to achieve the other benefits of physical activity identified for all adults.
(Warburton, Katzmarzyk, Rhodes, & Shephard,	Evidence-informed physical activity	Canada	Guideline	Adults	This review of the literature provides an update on the scientific biological and psychosocial bases for Canada's physical activity guide for healthy active living, with particular reference to the effect of physical activity on the health of adults aged 20-55 years. Existing physical activity guidelines for adults from around the world

2007)	guidelines for Canadian adults				are summarized briefly and compared with the Canadian guidelines. The descriptive epidemiology of physical activity and inactivity in Canada is presented, and the strength of the relationship between physical activity and specific health outcomes is evaluated, with particular emphasis on minimal and optimal physical activity requirements. Finally, areas requiring further investigation are highlighted. Summarizing the findings, Canadian and most international physical activity guidelines advocate moderate-intensity physical activity on most days of the week. Physical activity appears to reduce the risk for over 25 chronic conditions, in particular coronary heart disease, stroke, hypertension, breast cancer, colon cancer, type 2 diabetes, and osteoporosis. Current literature suggests that if the entire Canadian population followed current physical activity guidelines, approximately one third of deaths related to coronary heart disease, one quarter of deaths related to stroke and osteoporosis, 20% of deaths related to colon cancer, hypertension, and type 2 diabetes, and 14% of deaths related to breast cancer could be prevented. It also appears that the prevention of weight gain and the maintenance of weight loss require greater physical activity levels than current recommendations.
(Williams et al., 2007)	Resistance exercise in individuals with and without cardiovascular disease. American Heart Association Council on Clinical Cardiology and Council on Nutrition, Physical Activity, and Metabolism	USA	Scientific statement	Adults	Prescribed and supervised resistance training (RT) enhances muscular strength and endurance, functional capacity and independence, and quality of life while reducing disability in persons with and without cardiovascular disease. These benefits have made RT an accepted component of programs for health and fitness. The traditional prescription for RT has involved performing each exercise 3 times (sets), that is, 3 sets of 10 repetitions per set. However, during the initial training period, single- and multiple-set programs provide nearly the same relative improvement in muscular strength. For the average person beginning a strength training regimen, single-set programs performed a minimum of 2 days per week are recommended over multiple-set programs because they are highly effective, are less time consuming, and promote adherence. If time permits, participants may progress to a regimen of 3 days per week. Because the effect of physical conditioning is specific to the muscle group being trained, RT regimens should include exercises involving a variety of the major muscle groups.10 Furthermore, for those persons with CVD, the level of resistance should be reduced and number of repetitions increased, resulting in a lower relative effort and reducing the likelihood of breathholding and straining. Thus, a comprehensive RT program of 8 to 10 exercises can be accomplished in 15 to 20 minutes and should be performed after the aerobic component, which will ensure an adequate warm-up. Multiple-set regimens at a greater training frequency (>2 times/wk) may provide greater benefits for healthy, younger individuals whose goals include maximum gains in strength, lean body mass, and athletic performance. Many men can safely perform static-dynamic activity equivalent to carrying up to 30 pounds by 3 weeks after an acute myocardial infarction. Conversely, patients with recent coronary artery bypass

					surgery should avoid traditional upper-body RT exercises, that is, lifting weights greater or equal to 50% of MVC, for up to 8 to 12 weeks to allow for proper healing of the sternum.
(World Health Organisation, 2004)	Global strategy on diet, physical activity and health	Global	Global strategy	Adults	Different types and amounts of physical activity are required for different health outcomes: at least 30 minutes of regular, moderate-intensity physical activity on most days reduces the risk of cardiovascular disease and diabetes, colon cancer and breast cancer. Muscle strengthening and balance training can reduce falls and increase functional status among older adults. More activity may be required for weight control. National strategies describe the measures to promote physical activity that are essential to prevent disease and promote health. National strategies should include specific goals, objectives, and actions, similar to those outlined in the Strategy. Of particular importance are the elements needed to implement the plan of action, including identification of necessary resources and national focal points (key national institutes); collaboration between the health sector and other key sectors such as agriculture, education, urban planning, transportation and communication; and monitoring and follow-up.
(World Health Organisation, 2007)	Implementation of the who global strategy on diet, physical activity and health	Global	Global	Whole population	This guide confirms the recommendations of types and amounts of physical activity needed for heatlh as stated in the 2004 Global strategy from WHO. It provide a plan for creating, implementing and evaluationg a national strategy. In summary, it suggests that 'A national action plan on physical activity should include specific goals, objectives, and actions.' It also states that it the elements of particular importance needed to implement a plan of action include:' identification of necessary resources and national focal points (i.e. key national institutes); collaboration between the health sector and other key sectors such as education, urban planning, transportation and communication; and monitoring, evaluation and follow-up'.

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