How to get more people with diabetes cycling

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Abstract
Following on from the success of professional cyclists in the Tour de France and Olympics, there has been increased interest in cycling in the UK and worldwide. The diabetes world has also been affected by this increased interest and there is now a vast number of cycling events promoted through diabetes charities, in addition to professional and developmental cycling teams consisting entirely of individuals with diabetes.

This article focuses on the early stages of getting started with cycling participation; it also discusses the benefits to health and the environment, guidelines on how much physical activity to do, current participation levels, and strategies to get started with cycling and maintain this new behaviour over the longer term. Copyright © 2013 John Wiley & Sons.

Key words
Cycling; physical activity; diabetes; participation

Physical activity: the benefits
Physical activity includes all forms of activity, such as everyday walking or cycling, active play, work-related activity, active recreation (such as working out in a gym), dancing, gardening or playing active games, as well as organised and competitive sport. The importance of physical activity for health was identified over 50 years ago. During the 1950s, comparisons of bus drivers with more physically active bus conductors demonstrated lower rates of cardiovascular disease in the more physically active bus conductor occupations.1 This research led to growing investigation, and evidence now clearly shows the importance of physical activity in promoting health and preventing ill health. For adults, doing 30 minutes of at least moderate intensity physical activity on at least five days a week helps to prevent and manage over 20 chronic conditions, including cardiovascular disease, type 2 diabetes, obesity, cancer, mental health problems and musculoskeletal conditions.2

For someone who has diabetes, either type 1 or type 2 diabetes, the health benefits are no different in comparison to people who do not have diabetes. In fact there are potentially more health benefits because often people with diabetes have poorer health than individuals without diabetes (i.e. poorer glycaemic control and poorer cardiovascular health) and many of these poorer health outcomes can be improved through participation in regular physical activity. For an individual with type 2 diabetes, participation in physical activity can significantly improve glucose metabolism. A meta-analysis3 of controlled clinical trials investigating the effect of exercise on glycaemic control concluded that exercise significantly reduced HbA1c values by 0.66%. This reduction is clinically significant and only slightly less than the difference between conventional and intensive glucose lowering therapy in the UKPDS,4 which significantly reduced the development of diabetic complications.

This favourable effect of physical activity on glucose metabolism can also reduce the requirements for hypoglycaemic medication.5 The effect of exercise on glycaemic control in type 1 diabetes is less clear with one recent systematic review with meta-analyses reporting no significant effect on HbA1c,6 and another reporting a small but significant beneficial decrease of -0.27%.7 Limited reporting of diet and insulin in exercise studies has made concrete conclusions on the effects of exercise on HbA1c in people with type 1 diabetes challenging. Individuals with diabetes, compared to those without diabetes, have a higher risk for cardiovascular disease and often have several risk factors for the development of cardiovascular disease. Regular physical activity has the potential to improve these cardiovascular risk factors such as body composition, blood pressure, blood lipids, cardiorespiratory fitness, and fibrinolytic functioning.8 As with
people who do not have diabetes, physical activity also has an important role to play in promoting mental health and well-being by preventing mental health problems and improving the quality of life of those experiencing mental health problems and illnesses. Particularly for youth with type 1 diabetes, exercise may be important for fostering normality, by allowing the young person to show that they are as capable as youth without diabetes to exercise.

Cycling, as noted, is a form of physical activity and therefore participation in cycling can lead to substantial physical and mental health improvement for the individual involved. Cycling is largely an aerobic activity and specific physical health benefits reported include improved diabetes control, including reduced medication requirements, improved cardiovascular risk factors and improved body composition which in turn will further help diabetes and cardiovascular health. Being a low-impact type of exercise is a specific advantage of cycling, particularly if an individual is overweight. Low-impact activities mean there is less impact on the body’s joints than running or other high-impact aerobic activities and therefore less risk of injury or other bone or joint health complications. Cycling has considerable stress reducing effects which can counteract feelings of anxiety, depression or other mental health problems. Furthermore, cycling can also be a particularly sociable activity and one in which the whole family can participate. Toddlers, pensioners, the able-bodied or people with disabilities can all enjoy cycling. Cycling is also noted as being one of the easiest ways to fit physical activity into daily routines because it is also a form of transport. It can therefore also save money and is good for the environment.

How much physical activity should we do?

Table 1 documents the current physical activity guidelines for the UK published in 2011 by the four Chief Medical Officers. These guidelines are consistent with global guidelines and are the first physical activity guidelines published specifically for the UK and targeting all age groups. The topics of specific guidance on clinical management of the cyclist with diabetes, in addition to first-hand experience of managing diabetes while being a professional cyclist, are covered in further papers within this themed issue on cycling and diabetes.

Participation in physical activity and sedentary behaviour

Levels of physical activity in both adults and children are regularly measured throughout the UK and worldwide. Despite the multiple health gains associated with a physically active lifestyle, levels of inactivity remain high. Based on self-reported data, the percentages of adults in the UK who meet the physical activity recommendations are 38% and 28% for men and women respectively.

There is considerable variation in children’s participation in physical activity by age and sex. From Scottish Health Survey data, among boys in 2008/2009, activity levels were highest between the ages of 5 and 12, when around 8 in 10 meet recommended levels of participation. This falls to 70% of boys aged 13–15. Among girls, levels of participation drop off earlier and more sharply – from 79% of girls aged 8–10, to 67% aged 11–12, and 41% of girls aged 13–15. Data from objective methods of measuring physical activity, such as activity monitors (pedometers, accelerometers) suggest that the data from self-report methods may significantly overestimate participation levels.

According to self-reported measures of sedentary behaviour, approximately two-thirds of adults spend more than 2 hours per day watching TV and using the computer. Significant proportions of adults report spending between 3 and 4 hours sitting during their leisure time. These estimates highlight the pervasiveness of sedentary behaviours. The studies that have used objective measures to assess the time adults spend sitting or lying confirm the self-reported estimates, suggesting that the majority of adults and older adults spend substantial proportions of the day in sedentary pursuits.

It is currently unclear whether people with diabetes have lower levels of physical activity participation, compared to people who do not have diabetes. Using self-report data
Table 1. Physical activity guidelines. (Reproduced from: Department of Health, Physical Activity, Health Improvement and Protection. Start Active, Stay Healthy: A report on physical activity from the four home countries’ Chief Medical Officers. 2011.\textsuperscript{10} Crown copyright 2011)

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<th>Age group</th>
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| Early years (under 5 years) | • Children of pre-school age who are capable of walking unaided should be physically active daily for at least 180 minutes (3 hours), spread throughout the day.  
• All under 5s should minimise the amount of time spent being sedentary (being restrained or sitting) for extended periods (except time spent sleeping). |
| Children and young people (5–18 years) | • All children and young people should engage in moderate to vigorous intensity physical activity for at least 60 minutes and up to several hours every day.  
• Vigorous intensity activities, including those that strengthen muscle and bone, should be incorporated at least 3 days a week.  
• All children and young people should minimise the amount of time spent being sedentary (sitting) for extended periods. |
| Adults (19–64 years) | • Adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2.5 hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.  
• Alternatively, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous intensity activity.  
• Adults should also undertake physical activity to improve muscle strength on at least 2 days a week.  
• All adults should minimise the amount of time spent being sedentary (sitting) for extended periods. |
| Older adults (65+) | • Older adults who participate in any amount of physical activity gain some health benefits, including maintenance of good physical and cognitive function. Some physical activity is better than none, and more physical activity provides greater health benefits.  
• Older adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2.5 hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week.  
• For those who are already regularly active at moderate intensity, comparable benefits can be achieved through 75 minutes of vigorous intensity activity spread across the week or a combination of moderate and vigorous activity.  
• Older adults should also undertake physical activity to improve muscle strength on at least 2 days a week.  
• Older adults at risk of falls should incorporate physical activity to improve balance and coordination on at least 2 days a week.  
• All older adults should minimise the amount of time spent being sedentary (sitting) for extended periods. |

Morrato \textit{et al.} reported that people with type 2 diabetes are substantially less likely to meet physical activity guidelines compared with the general population.\textsuperscript{13} However, these data are subject to the inaccuracies of using self-reported data to measure physical activity participation. A recent review of objective and subjective physical activity and sedentary behaviour measurement studies in youth with type 1 and type 2 diabetes concluded that a large percentage of youth are not performing sufficient physical activity to meet the guidelines and that large proportions of time are spent watching television. Youth with type 2 diabetes compared to youth without diabetes were achieving lower amounts of physical activity; however, comparisons between youth with and without type 1 diabetes were not consistent.\textsuperscript{14}

The cycling revolution
In the past decade there has been an upsurge in participation in cycling as a form of physical activity and there is great potential for participation rates to increase further. Chronic congestion, high population densities, the cost of parking and the high cost of alternatives, in addition to the fact that nearly half of all trips people make are under 5km, all contribute to the potential for growth. The diabetes world has also been significantly affected by the cycling revolution. There are now a number of professional and developmental cycling teams comprised solely of people with diabetes. Team Novo Nordisk is a professional cycling team consisting entirely of athletes with type 1 diabetes\textsuperscript{15} and Team Type 2, a team of cyclists all with type 2 diabetes.\textsuperscript{16} These teams are highly inspirational and have a mission: to show that diabetes is a controllable illness and presents no barrier to sporting or life success. The teams compete in many high profile events worldwide to raise awareness, change perceptions and inspire the worldwide diabetes community to properly manage diabetes and live a healthier lifestyle. A number of diabetes charities also organise cycling events with associated fundraising towards diabetes research. The American Diabetes Association, for example, has the Tour de Cure\textsuperscript{17} which is a series of fundraising cycling events held in 44 states of America. Emphasis is placed on the Tour being a ride, and not a race, with routes designed for everyone from the occasional rider to the experienced cyclist. In 2011, more that 55 000 cyclists in 80 events raised more than $18 million to support the mission of the...
American Diabetes Association: to prevent and cure diabetes and to improve the lives of all people affected by diabetes. Riders who participate in the Tour de Cure and also have diabetes themselves are identified as Red Riders, giving extra recognition and motivation of their achievement in participating in the event. Diabetes UK organises similar cycling (and other sporting) events across the UK, again targeting all individuals of all abilities and ages.\textsuperscript{18}

Getting started with cycling

For someone who has diabetes or is affected in some way by diabetes there is currently great inspiration to make a change towards leading a more physically active lifestyle and, in particular, to participate in cycling as a form of physical activity. Leading a physically active lifestyle has substantial health benefits for someone who has diabetes; the diabetes cycling teams noted above should be highlighted as role models and inspiration to emphasise that diabetes is controllable and that the condition should not present a barrier to sport and physical activity participation. Behaviour change theories, in particular self-efficacy theory,\textsuperscript{19} identify that witnessing other people successfully completing a task is an important source of self-efficacy. According to Bandura: ‘Seeing people similar to oneself succeed by sustained effort raises observers’ beliefs that they too possess the capabilities to master comparable activities to succeed.’\textsuperscript{19}

In addition, as health care professionals often report, when someone is diagnosed with diabetes there is a belief that that person is overloaded with information and that it is inappropriate to also encourage them to consider participating in more physical activity. However, research has identified that point of diagnosis may catalyse a ‘teachable moment’ in which the individual is more motivated to change lifestyle behaviours.\textsuperscript{20} This suggests that early intervention to encourage a more physically active lifestyle may be more effective.

If an individual is new to cycling then the cost of buying a bike and associated equipment may act as a substantial barrier. There are a number of ways to reduce this cost such as buying a second-hand bike. In addition, a number of workplaces now run cycle to work schemes. In the UK this is a tax exempt scheme, based on salary sacrifice, which allows employees to hire a bike and cycle safety equipment and pay for this monthly through their salary.

Again, if an individual is new to cycling or has not cycled for some time then it is important that they start slowly and gradually build up the activity. In addition to slowly improving fitness levels the individual may lack confidence in their ability to cycle on roads. Encourage finding a traffic-free area to start off in, such as a local park or cycle path. Sustrans provides both online and paper versions of cycle paths throughout the UK.\textsuperscript{21} In addition, a number of training schemes are available, often free of charge, to encourage people of all ages to learn to cycle with confidence, for example CTC’s cycle training\textsuperscript{22} or Bikeability.\textsuperscript{23} If the individual intends to cycle on the roads, then encourage them to initially practise riding single-handed to allow them to be confident making hand signals, and to get comfortable looking over both shoulders to improve visual awareness on the roads. In addition, before starting to cycle in traffic it is advisable to check the Highway Code for up-to-date rules and regulations for cyclists.

Goal setting and self-monitoring of progress are important sources of self-motivation for physical activity participation.\textsuperscript{24} Advances in technology in recent years give increased opportunity for self-monitoring and goal setting of cycling (and other) activity in addition to diabetes health. In recent years there has been a large increase in the availability of smartphones and smartphone apps. In relation to physical activity monitoring these apps often provide GPS tracking combined with accelerometers, and allow you to record cycling activities and track variables such as distance and route covered and speed. There is potential for this information to be recorded alongside diabetes health; for example, glucose measurements allowing tracking of physical activity participation alongside diabetes health outcomes. Along with being a good communication device, smartphones also therefore have potential to act as excellent self-monitoring and goal setting devices.

Social support is a further important determinant of physical activity participation. As noted cycling can be a very social activity and this in turn will increase an individual’s motivation for participation. Establishing social support when starting to participate in cycling may therefore be very important for longer-term participation in this activity. Once again, advances in technology can provide an aid. There are now a number of websites and buddy-finder smartphone apps which allow you to search for individuals who are participating in cycling activity in your local area.

Keep on cycling!

As with all activities, the hardest part is maintaining the new behaviour. Unfortunately, the majority of the substantial health benefits of physical activity participation for individuals with diabetes will be lost if physical activity participation is not maintained. It is important to include strategies to increase motivation to maintain physical activity and cycling participation;\textsuperscript{19} for example, setting a challenge such as a charity cycling event with fundraising or trying a new cycling route. Also encourage rewarding of successes, giving recognition towards achievement of goals.

It is also important to recognise that often people have a relapse from regular physical activity participation. Relapse management strategies involve identifying situations that may have a negative impact on a
new behaviour, such as a busy work schedule or holidays, and developing ways to prevent or manage relapse during these high risk situations, such as time management or cues to get back to an activity plan after holidays.

Conclusions
Participation in physical activity is particularly beneficial for someone with diabetes. Cycling as a form of physical activity, in addition, offers a low impact and potentially very sociable activity which the whole family can enjoy. The current increased focus on specific diabetes cycling teams and events provides individuals with inspiration and gives health professionals working with people with diabetes the opportunity for increased focus towards encouraging participation in this activity.

Declaration of interests
There are no conflicts of interest declared.

References