

Barriers to Exercise: Type 2 Diabetes

SHSS 5070

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Illness and death

- Diabetes increases the risk of ill health and shortens the life expectancy of the people of Wales (Morgan et al., 2000).
- Major causes of death include heart disease, stroke and kidney failure (Stephenson et al., 1995).
- One review which cites a number of studies, estimates that people with diabetes are 2 to 4 times more likely to die of heart disease and have similarly increased risk of dying of stroke (Morgan et al., 2000).
- In fact, according to this source Type 2 diabetes doubles or trebles the risk of dying prematurely.

Diabetes Prevalence - 2018

Prevalence refers to the number of people currently diagnosed with diabetes.

There are 3.8 million people who have been diagnosed with diabetes in the UK.

Diabetes UK (2019)

Prevalence	2017-18
England	3,222,559
Northern Ireland	96,114
Scotland	295,753
Wales	195,693
UK	3,809,119

Diabetes UK (2019)

- About 90% of people with diabetes have Type 2.
- About 8% of people with diabetes have Type 1.
- About 2% of people have rarer types of diabetes.

Type 1: Diabetes Complications

- Heart Disease
- Kidney Disease / kidney Transplantation
- Eye Complications
- Neuropathy and Nerve Damage
- Foot Complications
- Skin Complications

Type II – Non-insulin-dependent-diabetes-mellitus (NIDDM)

- Formerly called maturity-onset diabetes.
- Tends to occur in older individuals
 - Increase in children as young as 10 diagnosed – severity.
- It is related to the body's resistance to insulin's actions, an abnormal but relatively well maintained insulin secretion and a normal to elevated plasma insulin level.
- In NIDDM diabetes, the body fails to properly use insulin, which is needed to take sugar from the blood to the cells.
- Adequate amounts of glucose fail to enter the cells - causes blood glucose levels to increase to abnormally high levels.
- Glucose is passed to the kidney tubules and voided in the urine.

Diabetes and Exercise

- In Type I diabetes, hypoglycemia is the most common disturbance of glucose homeostasis during exercise.
- Particularly severe in patients who undergo intensive insulin therapy to normalise plasma glucose levels throughout the day.
- Patients with NIDDM often demonstrate a reduction in exercise tolerance that is independent of glycemic control. Genetics, lifestyle habits and excessive fatness may be responsible.

Benefits of Exercise

Regular physical activity plays an important role in the management of diabetes.

(Hu et al., 2004; Nakanishi et al., 2004)

Physiological benefits:

(Wallberg-Henriksson et al., 1998).

- pronounced effects on insulin sensitivity
- potentially lowers blood glucose and lipid levels.
- lowering body fat
- reducing blood pressure
- Prevention of cardiovascular disease (ADA, 2006)

Psychological Benefits: Exercise and Depression:

- **Links exercise and depression**

Mental health benefits from regular PA include enhanced self-esteem, vitality, and satisfaction with life (Fox et al., 2006), and reductions in levels of psychological aspects such as **depression**, anxiety, and chronic stress (Acevedo & Ekkekakis, 2006).

- **Relevance? Cycle of inactivity and depression...**

- Emotional stress and depression have negative impact on diabetes management. Overwhelmed patients may neglect self-care behaviours and, in doing so, adversely affect their blood pressure, lipid, and glycemia levels.
- Inactive adults (Type 2 diabetes) 1.72 to 1.75 times more likely to be depressed than the more active (Lysy, et al., 2008).
- Depressed are 1.22 to 1.9 times more likely to be physically inactive than non-depressed.

References: (Katon et al., 1990; Lustman et al., 2000; Ciechanowski et al., 2000; DiMatteo MR et al., 2000; Lustman et al., 2002; Brosse et al., 2002; Zacker, 2004)

Diabetes patients generally do not meet the requirements of regular PA.

United states: nationally representative sample adults type 2 diabetes,

- 31% reported no regular PA
- 38% reported less than recommended levels of PA.
- 36% of the sample were overweight and another 46% were obese (Nelson, et al., 2002)

Supported statement that US adults with diabetes not reaching recommended levels of PA. (Resnick et al., 2006)

Compliance with physical activity recommendations 1996–2005 (Zhao et al., 2008)

- People with diabetes were less likely to meet either national or ADA recommendations for PA than people without diabetes.

Scotland (Thomas et al., 2004)

- Levels of PA for patients with type 1 and type 2 diabetes showed 67% of the study population was considered inactive (did not participate in exercise, sport or physically active hobbies across a 2-week period).

Wales???? – Research suggested not meeting requirements.

Barriers Research: General Population...

Range of studies e.g.

- Perceived barriers to walking in neighbourhood environment: middle aged and older adults.
- Population based study of barriers enjoyment and preference.
- Barriers to exercise on-site corporate fitness centre.
- Psychosocial Factors Related to PA and Weight Loss in Overweight Women

Plus many others...

Several sections of population / environment specific barriers and suggested interventions...

References:

Dewson et al. (2007) Salmon et al (2003) Schwetschenau et al. (2008) Gallagher et al. (2006)

What are the barriers
identified....

Barriers Research: Diabetes

Type 1 & 2

Exercise Perceptions - Turkish Participants

(Polat et al., 2006)

- Interview based questionnaires face to face to consecutive patients.
- 90.0% educated (n=87) and 88.2% of non-educated (n=152) believe exercise useful.
- Barriers:
 - *difficulty taking part in exercise*
 - *lack of adequate time*
 - *fear of shoes lesion??? Damage to feet?!*
 - *negative conditions of weather*
 - *fear of deterioration of their health*
- Non educated rated barriers higher than educated.

Scotland (Thomas et al., 2004)

What are the perceived factors that prevent patients from doing more physical activity?
Interview based questionnaires (n=406) over five months

Barriers:

- *perceived difficulty taking part in exercise*
- *feelings of tiredness*
- *being distracted by something good on television*
- *lack of time*
- *lack of local facilities*

Impact of Arthritis (CDCP, 2008)

Presence of arthritis is an additional barrier to PA among patients with diabetes.
Half of adults diagnosed with diabetes have arthritis (American study).

Disease self-management classes including exercise programs, may help those patients having the conditions.

- **Arthritis research on barriers to exercise?**
- **Levels of diabetes and arthritis in the UK?**

Barriers Research: Diabetes Type 1

Questionnaire Based

- Barriers to PA Among Patients With Type 1 Diabetes.
(Brazeau, et al., 2008)
 - 100 adults completed the Barriers to PA in Diabetes [type 1] BAPAD1 scale
 - Fear of hypoglycemia - strongest perceived barrier to PA.
 - Greater knowledge about insulin pharmacokinetics / being able to avoid exercise-induced hypoglycemia associated with fewer perceived barriers.
 - Greater barriers were negatively correlated with well-being ($r = -0.45$; $P < 0.001$).

Barriers Research: Diabetes Type 2: Focus Groups

Populations: Mexican Americans / Older American Adults

Barriers Identified:

lack of time, physical pain*, depression, being overweight, unsafe neighbourhoods*, lack of facilities, swelling, fear of chest pain, no energy, fear of shortness of breath, lack of or uneven sidewalks, poor weather, getting out and having no place to sit down, not enough will power, lack of interest.*

***Denotes both studies.**

Key Findings:

- Considered PA to be related to occupational and home activities.
- Walking: preferred type of activity
- Motivators included family support, sense of well-being derived from PA.
- Participants suggested the ideal intervention would be low cost, family-based, close to home, led by bilingual instructors.

References: Hays & Clark (1999); Mier et al., (2007)

Qualitative: Interviews

Barriers to physical activity amongst people of Pakistani and Indian origin with Type 2 diabetes (Lawton et al., 2006)

- Type 2 diabetes is 4 times more common among British South Asians than in the general population.
- 23 Pakistani and 9 Indian patients interviewed.
- They had awareness of the need to undertake PA, few had put this into practice.
- Practical considerations (lack of time) were interwoven with cultural norms / social expectations.
- **Barriers:**
 - health problems make physical activity difficult,
- Health promoters need to work with cultural norms and individual perceptions.
- Lifestyle activities recommended.

Surveys and Questionnaires

(Dutton et al., 2005; O'Callaghan et al., 2008)

Perceived barriers in patients with type 2 diabetes.

- Questionnaire comprising of 35 perceived barriers taken from surveys
 - Diabetes Care Profile; Barriers to regimen adherence; Environmental barriers to diabetes regimen adherence.
- Self Designed Questionnaire

Participants: Males and Females mean ages 56 / not identified.

Barriers:

- Health problems
- I do not have anyone to exercise with
- I have trouble getting back to exercise after a break in my routine
- I have joint pain that keeps me from exercising
- My leg pain is too bad to exercise
- Exercise is physically painful
- Not enough time at home to exercise
- I do not have the right equipment to exercise
- Not enough time during or after work to exercise
- Not enough time in my schedule to exercise

Individual Differences

- Patients reporting time as a barrier to exercise were more obese and younger
- More males report time as a barrier (23% vs 10%, $p=0.06$).
- Single patients more likely to report embarrassment about appearance (15% v 1% of married patients, $p=0.016$).
- Those with no exercise companion were more obese (BMI 46 vs 33 kg/m², $p=0.004$).
- Rural dwellers: unsafe roads as a barrier (14% vs 1.2% of urban dwellers, $p=0.009$).

Animals again!!!

- Patients with pets less likely to report preference for sedentary activities as a barrier to exercise (0 vs 17% of patients without pets, $p=0.002$).

Barriers to Exercise Scale - General

Exercise Benefits/Barriers Scale

- Determine perceptions of individuals concerning benefits of and barriers to participating in exercise.
- Items for the scale were obtained inductively from interviews (Pender & Pender, 1983) and from the literature.
- The 29-item Benefits Scale / 14-item Barriers Scale
- four-response Likert format 4 (strongly agree) to 1 (strongly disagree).

Reference: Sechrist et al., (1987)

Complete the Exercise

Benefits/Barriers Scale

- Sechrist et al., (1987)

Task: Critique this as a measure of barriers...

Critique:

- *Not specific - lacks detail / subscales.*
- *Good starting point for consultation.*
- *Examines general barriers and benefits.*
- *Exercise tires me? Good / Bad thing?*

Barriers to Exercise: Diabetes Specific Measures (Type 1)

- **Development of (BAPAD1):**
- 15 women & 21 men with diabetes open ended questionnaire to identify factors likely to impede upon PA in the forthcoming 6 months.
- Resulted in a preliminary 12- item questionnaire Likert Scale: (1, extremely unlikely to 7, extremely likely).
- 74 patients (35 men & 39 women) rated the likelihood that each barrier preventing PA during the next 6 months.
- Patients responded highest to question 12. work schedule may impede upon physical activity.
- Patients responded lowest to question 5, they demonstrated that the fear of suffering a heart attack.
- **Reference: Dube (2006)**

Diabetes Specific Measures (Type 2)

Strategies to enhance and maintain exercise behaviour incorporated within other scales such as:

- *Irvine et al. (1990) Environmental barriers to diabetes-regimen adherence.*
- *Anderson et al. (1998) Diabetes attitude scale.*
- *Anderson et al. (2000) Diabetes empowerment scale.*
- *Toobert et al. (2000). Diabetes self-care activities measure.*

Range of other non-specific scales available – further investigation?

Evaluation Scale for Self Management Behavior Related to Physical Activity of Type 2 Diabetes Patients (ES-SMBPA-2D)

Yuri et al., (2007)

- **21 Semistructured interviews to establish**
 - 1. what do you do to enhance physical activity?
 - 2. what do you do to maintain level of physical activity? Formation of questionnaire from these...

Critique:

- Assumption that they are attempting to be / are active?
- Useful and practical lifestyle modifications to promote activity.
- 10 would not join study – lack of time / poor health. Barriers ...
- Assuming already exercising – at least preparation stage TM
- Lifestyle modifications
- Japanese study – cultural differences

Intervention Programmes: Lifestyle Interventions

Mediterranean Lifestyle Programme (Barrera et al., 2008)

Social-ecological resources can contribute to improvements in healthful lifestyles for women with type 2 diabetes. Diet, PA, Stress.

3 year lifestyle intervention (SLIM) study (Polat et al., 2008)

Two-hour glucose concentrations improved in the INT group, difference most pronounced after 1 year.

12 weeks graded and balanced exercise intervention (Shahar et al., 2008)

Multidisciplinary weight loss program reduces exercise barriers and improve exercise capacity. Reduces body weight and improves diabetes control in obese individuals with diabetes.

DPP Research Group: 2002

150 minutes per week of moderate exercise as part of a lifestyle intervention significantly decreased the progression of type 2 diabetes in patients.

Main point:

- lifestyle interventions are effective, more information needed about factors influencing adherence.
- Need for specific interventions based on barriers research.

Consultation / Counselling:

Effect of exercise consultation on PA / physiological and biochemical variables at 6 months (pilot and further study).

Increased participation in sport or leisure activity by 55% in intervention group and decreased. by 6% in controls.

Positive changes - quality of life questionnaires.

Exercise consultation - more effective than a standard exercise leaflet.

Exercise consultation increased PA and improved glycemic control and cardiovascular risk factors in people with type 2 diabetes.

References: (Kirk et al., 2001; 2003; 2004; 2009)

Consultation / Counselling:

12-month physical activity counselling intervention

PA counselling effective in promoting PA in people with Type 2 diabetes.

Counselling improved glycaemic control as well as the status of cardiovascular risk factors in these patients.

12 month changes in PA and health outcomes following a PA consultation. Neither a PA consultation delivered by a person or in written form was better than standard care at increasing PA levels or improving health outcomes in the full study cohort.

References: (Kirk et al., 2001; 2003; 2004; 2009)

Peer Led Programme:

Swansea based research - Choudhury (2008)

- Peer-led education programme for Type 2 diabetes and cardiovascular disease in a Bangladeshi population – overall management and self care.
- Participants requested a *home-based* exercise guide.
- Time to attend the course appeared to be a barrier to participants.
- Registration good – attendance (42/72) despite being phoned / visited day before course.

Areas for Future Research Identified so Far...

- Large scale qualitative research (Type 2) – population to be determined... age group / males / females?
- Methods? Focus groups / individual interviews?
 - SDT basis – basic needs / Comp / Aut / Rel
- Development and validation of a Type 2 measure.
 - Follow rigorous procedures
- Barrier specific interventions.

Intervention Research Ideas

- More research to identify most economical and effective methods to promote PA.
- Links with Exercise Referral Scheme (WAG, 2008) – diabetes patients referred to ERS no real evaluation of rates of adherence as yet.
- Need to identify best setting to conduct PA consultations / participant factors affecting uptake of ERS.
- Use of outdoors / natural environment as part of interventions (WAG, 2009) agenda for walking and cycling.
- Other potential groups of participants: Participants at risk for diabetes (Wallberg-Henriksson et al., 1998).
Early intervention programmes beneficial, cost-benefit perspective.
- Diabetes patients who have taken up exercise – identify what enabled them make the changes.

Task: Article – Easton et al. (2017)

- 1. What was the purpose of the study?
- 2. What was their rationale (justification) for the study?
- 3. What did they do?
- 4. What did they find?
- 5. What are the practical implications of this study?

How does exercise affect your brain?

- <https://www.youtube.com/watch?v=BHY0FxzoKZE>

<https://www.bbc.co.uk/programmes/m0009kt4>

- **Born in Bradford** is one of the world's largest longitudinal studies, involving 14,000 babies and their families and reaping data on all aspects of health as the children grow. Winifred Robinson has been alongside the research from the start. With the 14,000 youngsters now entering their teenage years the researchers are tracking a wide range of data, from mental illness through to what might determine whether they need to wear braces. In this programme Winifred follows researchers trying to determine why the city is seeing an increase in type 2 diabetes in youngsters. When Consultant Paediatrician Matthew Mathai first started work in the city eleven years ago it was rare to see children with type 2 diabetes and yet, today, he and his team are facing rising numbers of cases and have fears that there are many more that are in a pre-diabetic state and not receiving the interventions that might help them. Winifred meets 14-year-old Zaira, who was diagnosed two weeks ago and has been plucking up the courage to tell her best friend that she has diabetes. She fears people will jump to the conclusion that it's because she's overweight and says there is a stigma to getting it so young. Dietician Alison Woodhead is working with Zaira to look at how she can exercise more and eat a more balanced diet. A fortnight in and Zaira says that she is definitely trying hard to turn things around: she has largely given up chocolate and fizzy drinks. She is also going to the park with her dad and using gym equipment at home to work out. For Alison it is good news, but she worries about how easy it will be to continue the changes once winter sets in. The other big problem is that Bradford is home to a vast number of takeaway outlets, many of which are placed around schools in the city. Winifred will also be investigating the high levels of tooth decay amongst youngsters in Bradford, with 40 per cent of five-year-olds having decay and a child a week needing to have all of their baby teeth extracted. This compares to the national average of 25 per cent, which in itself is quite high. Dr Peter Day is following a thousand of the youngsters in Born in Bradford to see whether this early tooth extraction has an impact on the need for braces in adolescents.

Task:

- Find two examples of case studies of people with diabetes who exercise.
- At least one should be type II diabetes.
- What do they have to do to manage their condition?
- How does this impact on their exercising?

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