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Biomedical, lifestyle and psychosocial characteristics of people newly diagnosed with Type 2 diabetes: baseline data from the DESMOND randomized controlled trial

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Abstract

Aims To describe the characteristics of newly diagnosed people with Type 2 diabetes (T2DM) and compare these with published studies.

Methods Baseline data of participants recruited to the DESMOND randomized controlled trial conducted in 13 sites across England and Scotland were used. Biomedical measures and questionnaires on psychological characteristics were collected within 4 weeks of diagnosis.

Results Of 1109 participants referred, 824 consented to participate (74.3%). Mean (± SD) age was 59.5 ± 12 years and 54.9% were male. Mean HbA_{1c} was 8.1 ± 2.1% and did not differ by gender. Mean body mass index (BMI) was significantly higher in women (33.7 vs. 31.3 kg/m^2; $P < 0.001$); 69% of women and 54% of men were obese (BMI > 30 kg/m^2). Total cholesterol was significantly higher in women (5.6 vs. 5.2 mmol/l; $P < 0.001$). Overall, 14.7% reported smoking. Percentages reporting recommended levels of vigorous activity (≥ 3 times/week) and moderate activity (≥ 5 times/week) were 10.6 and 16.0%, respectively, and were lower in women. Specific illness beliefs included 73% being unclear about symptoms and only 54% believing diabetes is a serious condition. Symptoms indicative of depression were reported by significantly more women than men (16.1% vs. 8.2%; $P = 0.001$).

Conclusion Data from this large and representative cohort of newly diagnosed people with T2DM show that many have modifiable cardiovascular risk factors. Comparison with the literature suggests that the profile of the newly diagnosed may be changing, with lower HbA_{1c} and higher prevalence of obesity. Many expressed beliefs about and poor understanding of their diabetes that need to be addressed in order for them to engage in effective self-management.

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Keywords newly diagnosed, primary care, randomized controlled trial, Type 2 diabetes mellitus

Abbreviations BMI, body mass index; DESMOND, Diabetes Education and Self Management for Ongoing and Newly Diagnosed; HADS, Hospital Anxiety and Depression Scale; HDL, high-density lipoprotein; LDL, low-density lipoprotein; RCT, randomized controlled trial; T2DM, Type 2 diabetes mellitus; UKPDS, United Kingdom Prospective Diabetes Study

Introduction

Type 2 diabetes mellitus (T2DM) is a chronic condition leading to long-term, serious complications [1] and associated with increased morbidity and premature death from cardiovascular disease. T2DM is managed primarily by the patient, and therefore acquisition of appropriate skills for successful self-management plays a major role in addressing health beliefs and optimizing glycaemic control, as well as addressing cardiovascular risk factors and maintaining quality of life [2–4]. In routine clinical practice, patients often find it difficult to follow the treatment and lifestyle advice given by healthcare professionals, and many fail to achieve optimal metabolic control [5]. Supporting and encouraging people to take day-to-day control of their

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condition is essential in both the delivery of care and diabetes education programmes [6–8].

The results of the Diabetes Education and Self Management of Ongoing and Newly Diagnosed (DESMOND) trial have been recently published [9]. This paper describes the characteristics of those enrolled in the trial. The clinical characteristics of this large, representative primary care cohort of newly diagnosed people will be compared with those reported by the United Kingdom Prospective Diabetes Study (UKPDS) [10] and other studies in the literature. Comparison of the present data with earlier studies will provide information on whether and how the profile of the newly diagnosed is changing. This will be valuable to healthcare professionals in the delivery of care as well as in the identification of educational needs at diagnosis in order to ensure that self-management interventions are fit for purpose.

Methods

The development, piloting and randomized controlled trial (RCT) of the DESMOND structured education programme adopted the Medical Research Council framework for the development of complex interventions [11], which comprises five phases: theory, modelling and exploratory trial, followed by an RCT and long-term implementation. Details of the DESMOND programme [12] and the results of the RCT have been published [9].

The trial was a multisite cluster RCT conducted in 13 sites in primary care, involving 17 primary care organizations in England and Scotland. The study was approved by a national Multi-centre Research Ethics Committee and the local Research and Development Management Committees of the participating organizations. Participants gave informed consent in accordance with International Conference on Harmonization Good Clinical Practice Guidelines.

Referral and eligibility

Patients were referred within 4 weeks of diagnosis by their general practitioner or practice nurse. All patients aged ≥ 18 years were eligible unless they had severe and enduring mental health problems, were not primarily responsible for their own care or were unable to participate in a group programme.

Outcome measures

Biomedical data were collected at practice level and sent to a site coordinator, who forwarded the data to the DESMOND Central Office. Participants were asked to complete a questionnaire before they attended the DESMOND programme.

HbA_{1c}, blood pressure, blood lipids [total, high-density lipoprotein (HDL)- and low-density lipoprotein (LDL)-cholesterol and triglycerides], body weight and waist circumference were measured. Practices were issued with standard operating procedures for collection of data. Fasting venous blood samples were assayed locally in accredited laboratories that are part of the National External Quality Assurance Programme, with HbA_{1c} measured using a Diabetes Control and Complications Trial-aligned method. Blood pressure was measured with the patient in a sitting position. The average of two readings, after 10 min rest, was recorded. Height and weight were measured using calibrated scales, without shoes. Waist circumference was measured with the patient standing, using a soft tape at the mid-axillary line, halfway between the lowest rib and iliac crest.

The questionnaire completed by participants included lifestyle questions on smoking from the Summary of Diabetes Self-Care Activities Questionnaire [13] and physical activity from the International Physical Activity Questionnaire [14], which has been validated in a large 12-country study. Questions on five categories of illness beliefs were included in the questionnaire. The individual's perception that they understand their diabetes (illness coherence score), perception of the duration of their illness (timeline score) and perception of their ability to affect the course of their diabetes (personal responsibility score) were assessed using the Illness Perceptions Questionnaire–Revised [15]. This is a generic illness representations questionnaire, which was validated in people with T2DM as part of its development [15]. Perceived seriousness and perceived impact of diabetes were assessed using the Diabetes Illness Representations Questionnaire [16]. The scales were developed from work on illness beliefs in adults with diabetes [17], refined in studies with young adults with Type 1 diabetes [18] and subsequently validated in adults withT2DM [12]. The seven questions on depression from the Hospital Anxiety and Depression Scale (HADS) [19] were used to determine a score for depression.

To compare the biomedical results of this study with previous studies, we conducted a Medline and Embase search for papers reporting data on people newly diagnosed with T2DM.

Statistics

Statistical analyses were conducted using the SPSS statistical package (SPSS Inc., Chicago, IL, USA). We used χ^2 to compare proportions and *t*-tests to compare means. The Pearson's correlation coefficient was used to look at associations with age.

Results

Two hundred and seven practices in the 13 sites were recruited to the trial, of which 67% (139 practices) had General Medical Service contracts and 34% (70 practices) were involved with general practice vocational training. Referral took place between October 2004 and January 2006, with 162 (78%) practices actively referring patients. One thousand one hundred and nine patients (577 men, 532 women) were referred and 824 (452 men, 372 women) consented to take part and were recruited. Consent rate was higher in the men (78.3% vs. 70%). The mean (SD) age was significantly higher in the consenting group [59.5 ± 12.1 vs. 56.5 ± 13.0 years (range 28–87); $P < 0.001$], but there was no statistically significant difference in gender between consenters and non-consenters. Of those recruited to the trial, 762 (92.5%) agreed to complete the questionnaire.

Demographic and biomedical characteristics

The demographic and biomedical characteristics of participants are shown in Table 1. Figure 1 shows the mean HbA_{1c} by age

Table 1 Demographic and biomedical characteristics (mean ± SD)

	Male	Female	*P*
N	452	372	
Age (years)	59.0 ± 11.6	60.1 ± 12.6	0.178
Age group, *N* (%)			
< 50 years	82 (22.0%)	94 (20.8%)	0.071
50–69 years	191 (51.3%)	265 (58.6%)	
≥ 70 years	99 (26.6%)	93 (20.6%)	
White, *N* (%)	389 (97.3%)	336 (96.0%)	0.416
HbA_{1c} (%)	8.1 ± 2.1	8.0 ± 2.1	0.457
Total cholesterol (mmol/l)	5.2 ± 1.25	5.6 ± 1.35	< 0.001
HDL-cholesterol (mmol/l)	1.1 ± 0.35	1.3 ± 0.47	< 0.001
LDL-cholesterol (mmol/l)	3.0 ± 0.96	3.5 ± 1.22	< 0.001
Triglycerides (mmol/l)	2.7 ± 2.33	2.4 ± 1.75	0.028
Systolic BP (mmHg)	140 ± 18	141 ± 17	0.569
Diastolic BP (mmHg)	82 ± 11	82 ± 10	0.768
Waist circumference (cm)	108 ± 13.6	104 ± 14.5	< 0.001
Body mass index (kg/m^2)	31.3 ± 5.40	33.7 ± 6.9	< 0.001

HDL, high-density lipoprotein; LDL, low-density lipoprotein; BP, blood pressure.

and sex and Figure 2 the distribution of HbA_{1c}. HbA_{1c} did not differ between men and women (8.1 ± 2.1 and 8.0 ± 2.1%, respectively) and decreased with age ($r = -0.0125$; $P < 0.001$). HbA_{1c} was 8.4 ± 2.1% in those aged ≤ 60 years with 7.8 ± 2.1% in those aged > 60 years ($P < 0.001$). Total, HDL- and LDL-cholesterol levels, as well as body mass index (BMI) and waist circumference were all significantly higher in women (Table 1).

Table 2 shows the percentage of participants outside recommended targets for HbA_{1c}, total and LDL-cholesterol, blood pressure, BMI and waist circumference. The percentage of women outside target was significantly higher for total cholesterol and LDL-cholesterol. The percentage who were overweight or obese (BMI > 25 kg/m^2) was the same in men and women (92%), but more women were obese (BMI > 30 kg/m^2) than men (69% and 54%; $P < 0.001$).

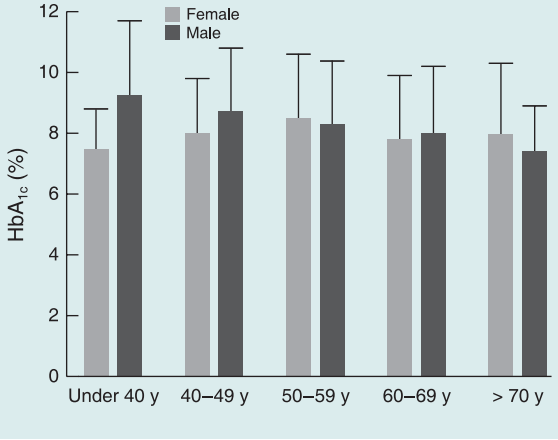

FIGURE 1 Mean (SD) HbA_{1c} by sex age and group.

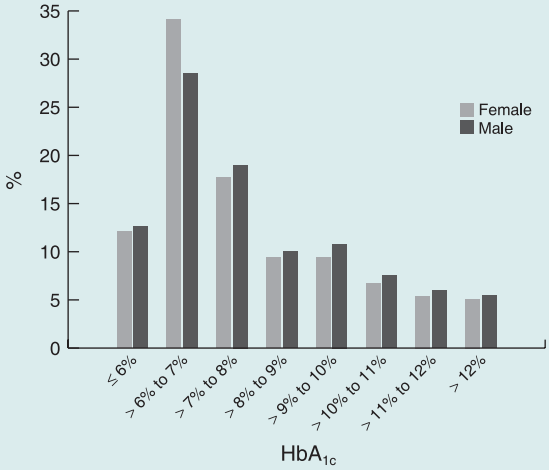

FIGURE 2 Distribution of HbA_{1c} (%).

Table 2 Participants outside accepted biomedical targets (*N* and %)

	Men	Women	*P*
HbA_{1c}			
> 7.5% [28]	215 (48.2%)	153 (42.3%)	0.092
> 7% [37]	266 (59.6%)	200 (55.2%)	0.209
> 6.5% [38]	263 (72.0%)	321 (72.7%)	0.830
Total cholesterol			
> 5.0 mmol/l	213 (47.5%)	226 (61.6%)	< 0.001
> 4.0 mmol/l	367 (81.9%)	325 (88.6%)	0.008
Low-density lipoprotein cholesterol			
> 3.0 mmol/l	150 (47%)	157 (60.6%)	0.001
> 2.0 mmol/l	271 (85.0%)	229 (88.4%)	0.225
Blood pressure			
> 130/80 mmHg	339 (75.2%)	285 (76.8%)	0.581
> 140/90 mmHg	193 (42.8%)	177 (47.7%)	0.159
Body mass index			
< 25 kg/m^2	33 (8.4%)	31 (7.4%)	< 0.001
25–30 kg/m^2	171 (38.6%)	83 (22.6%)	
> 30 kg/m^2	239 (54.0%)	254 (69.0%)	
Waist circumference			
> 88 cm (women), > 102 cm (men)	271 (64.1%)	301 (87.8%)	< 0.001

Cardiovascular risk estimates

The UKPDS Cardiovascular Disease Risk Estimate [20] was calculated for participants with complete data for the required variables. The median (interquartile range) 10-year risk estimate of coronary heart disease or stroke at baseline was 17.7% (95% confidence interval 11.6, 29.1). This was higher in men and increased with age (Figure 3). Of men 72.2% and of women 39.8% had a 10-year UKPDS risk estimate > 15%.

Lifestyle characteristics

Table 3 gives figures for smoking status and frequency of participation in physical activity. There was a small but not

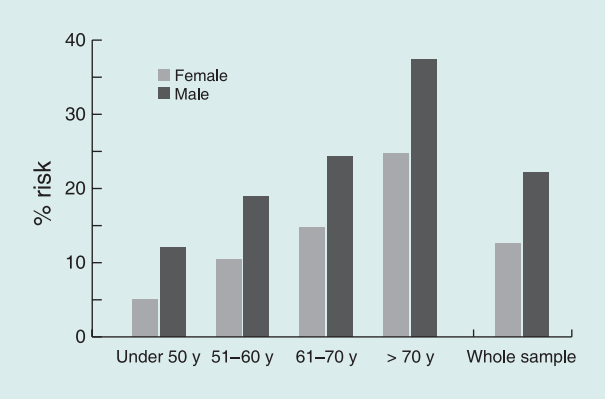

FIGURE 3 Median 10-year risk estimate (%) of coronary heart disease or stroke.

Table 3 Smoking status and participation in physical activity (*N* and %)

	Men	Women	*P*
Smoking status*	55 (13.7%)	55 (15.9%)	0.411
Vigorous activity			
None	266 (68.0%)	245 (77.3%)	0.024
1–2 times/week	53 (13.6%)	29 (9.1%)	
> 3 times/week	72 (18.4%)	43 (13.6%)	
Moderate activity			
None	188 (51.8%)	182 (61.7%)	0.032
1–4 times/week	108 (29.8%)	74 (25.1%)	
≥ 5 times/week	67 (18.5%)	39 (13.2%)	
Walking			
None	41 (10.5%)	38 (11.6%)	0.190
1–4 times/week	108 (27.7%)	109 (33.2%)	
≥ 5 times/week	241 (61.8%)	181 (55.2%)	

*Reported smoking during previous week.

significant difference ($P = 0.411$) in smoking status between men and women (13.7 and 15.9%, respectively), and the percentage smoking decreased markedly with age ($P = 0.001$); 25.5% of those aged ≤ 50 years reported smoking in the previous week, compared with only 5.6% in those aged > 70 years. Reported frequencies of participation in vigorous and moderate activities at least once in the previous 7 days were 27.8 and 43.8%, respectively. The percentages reporting the recommended amounts [21] of vigorous activity (≥ 3 times a week) and moderate activity (≥ 5 times a week) were only 11.4 and 16.1%, respectively. These were significantly higher in men (Table 3). Overall, 58.8% reported walking at least five times during the previous week and this did not differ by gender.

Depression and illness beliefs

The mean (SD) HADS depression score was higher in women than in men (3.89 ± 3.64 and 3.24 ± 3.20, respectively; $t = 2.58$, $P = 0.01$). Symptoms indicative of depression (HADS ≥ 8) were reported by significantly more women than men (16.1 and 8.2%, respectively; $\chi^2 = 13.7$, $P < 0.001$). These levels compare with UK normative data [22], which show a HADS score ≥ 8 in 13% of women and 8% of men. However, depression was associated with comorbidity, in that individuals taking both lipid-lowering and antihypertensive medication reported more depressive symptoms [mean (SD) score = 4.34 ± 4.0] than individuals on treatment for one condition [mean (SD) score = 3.78 ± 3.6] or on no concurrent medication [mean (SD) score = 3.25 ± 3.2; $F = 3.51$; $P < 0.05$].

In terms of illness beliefs, 33% reported that they did not understand their diabetes and 46% were uncertain or disagreed that their diabetes was a serious threat to their health (see Table 4 for full details of responses). By way of validation, individuals who felt they understood their diabetes tended to report diabetes as being more serious ($r = 0.14$; $P < 0.001$) and were more likely to agree it was a chronic illness ($r = 0.30$; $P < 0.001$), that they could affect its course ($r = 0.30$; $P < 0.001$) and that it would not have a major impact on their day to day life ($r = –0.16$; $P < 0.001$).

Depressive symptomatology was associated with more negative illness beliefs, so that more depressed individuals were more likely to report that diabetes would have a major impact on their life ($r = 0.42$; $P < 0.001$), were less likely to believe they could affect the course of their diabetes ($r = –0.22$; $P < 0.001$), believed their diabetes to be more serious ($r = 0.15$; $P < 0.001$), and at the same time that they did not have a coherent understanding of their diabetes ($r = 0.18$; $P < 0.001$). Age was also associated with illness beliefs, with younger participants reporting more understanding ($r = 0.20$; $P < 0.001$), being more likely to agree it is a chronic illness ($r = –0.22$; $P < 0.001$), as more serious ($r = 0.24$; $P < 0.001$) and that it would have a greater impact on their lives ($r = 0.19$; $P < 0.001$). The only gender difference in beliefs was that women were less likely than men to think they could affect the course of their diabetes [mean (SD) scores = 23.8 ± 3.4 and 24.7 ± 3.3, respectively; $t = 3.31$; $P < 0.001$]. There were no differences between smokers and non-smokers, or between those taking and not taking lipid-lowering or antihypertensive medications.

Comparison with other published studies

Table 5 compares the baseline data from the DESMOND trial with the UKPDS and other published studies on people newly diagnosed with T2DM. Comparisons of the data need to be made with caution because of differences in eligibility criteria and in procedures used for data collection. The largest study conducted on the newly diagnosed is the UKPDS [10], a multisite study in which 5102 participants were referred over the period 1977–1991. The median HbA_{1c} (9.1%) was higher than in the present study (7.3%) and the median BMI was lower (28.0 in UKPDS compared with 31.4 kg/m^2 in DESMOND). A single-site study conducted in the south of England [23,24] reported a mean BMI at referral of 30.7 kg/m^2, but baseline HbA_{1c} values are not available for comparison. During a single-site incidence study conducted in the UK, Gatling *et al.* [25] collected data from all new cases ($n = 706$) diagnosed at

Table 4 Response (%) to individual illness belief statements

	Strongly agree/agree, %	Uncertain, %	Strongly disagree/ disagree, %
Coherence			
The symptoms of my diabetes are puzzling to me	40.1	33.0	27.0
My diabetes is a mystery to me	40.3	22.7	37.0
I don't understand my diabetes	32.6	29.4	38.0
My diabetes doesn't make any sense to me	32.0	27.2	40.8
I have a clear picture or understanding of my diabetes	33.7	38.0	28.3
Timeline			
My diabetes will last a short time	5.0	26.5	68.5
My diabetes is likely to be permanent rather than temporary	71.8	23.4	4.8
My diabetes will last for a long time	69.6	24.9	5.5
My diabetes will pass quickly	1.9	24.8	73.3
I will have diabetes for the rest of my life	68.4	27.0	4.5
My diabetes will improve in time	24.8	46.9	28.3
Personal responsibility			
There is a lot which I can do to control my symptoms	88.7	10.2	1.1
What I do can determine whether my diabetes gets better or worse	82.8	15.8	1.5
The course of my diabetes depends on me	81.1	16.3	2.5
Nothing I do will affect my diabetes	5.4	18.0	76.7
I have the power to influence my diabetes	81.3	16.7	2.0
My actions will have no effect on the outcome of my diabetes	5.9	16.9	77.2
Seriousness			
My life will be shorter because I have diabetes	7.1	56.1	36.8
My diabetes is a serious threat to my health	54.2	31.6	14.2
If I don't control my diabetes I will probably get diabetes complications	87.3	11.1	1.6
I have only got a mild form of diabetes	40.1	38.9	20.9
Having diabetes does not have much effect on my life	15.8	34.7	49.5
I worry about getting the complications of diabetes	59.7	22.5	17.7
Impact			
My diabetes strongly affects the way other people see me as a person	6.1	24.8	69.1
My diabetes has serious economic and financial consequences	7.6	31.2	61.2
My diabetes changes my daily activities (friends, work, school)	8.4	16.4	75.2
My diabetes does not have much effect on my life	38.1	33.0	28.9
My diabetes strongly affects the way I see myself as a person	18.1	20.5	61.4
I worry about going hypo (having a low blood sugar reaction)	25.8	38.8	35.4
My diabetes causes difficulties for those who are close to me	13.8	22.5	63.7

practice level during 1996–1998. The mean HbA_{1c} (10.8%) was high, and the authors use this information to emphasize the importance of early diagnosis. The mean BMI (31.5 kg/m^2) was lower than in the present study. Hillier *et al.* [26] present a large dataset of patients diagnosed between 1996 and 1998 in the USA. The mean HbA_{1c} (7.5%) was the lowest of the studies and the BMI (33.3 kg/m^2) was the highest. However, the data were collected retrospectively from health insurance records and may not closely represent the local population.

Discussion

In addition to providing baseline data for the DESMOND RCT, the data provide an up-to-date profile of people newly diagnosed with T2DM in the UK. The strengths of the database are its size, the fact that the study was conducted in 13 sites across the country and the wide eligibility criteria for entry into the study. The referral rate (calculated using practice list sizes to be equivalent to 0.96 per 1000 patient-years) suggests that about half of predicted incident cases [27] were referred to the study. As referral took place between 2004 and 2005, the data are up-to-date. The participants are therefore reasonably representative of a typical newly diagnosed White European population in the UK.

The results show that a high proportion of participants demonstrated evidence of modifiable cardiovascular risk factors at diagnosis. Overall, 54% had total cholesterol > 5 mmol/l, 76% had blood pressure > 130/80 mmHg and 91% were overweight or obese. The prevalence of all these cardiovascular risk factors was higher in women. This is important information that needs to be considered in the clinical management of newly diagnosed patients. Lifestyle is a key factor in the pathogenesis of cardiovascular disease and T2DM. Although the overall level of smoking was low, it was higher in women and in the younger age groups. Levels of physical activity were low with < 20% reporting the recommended

Table 5 Baseline data from studies on newly diagnosed; values are means (SD) unless otherwise stated

	UKPDS [10,39,40]	South of England Study [23,24]	Hillier *et al.* [26]	Poole Study [25]	DESMOND [9]
Location	Multisite in UK	Single site in England	Single site in USA	Single site in England	Multi-site in UK
Study type	RCT, new cases diagnosed at practice level (15 centres)	RCT, new cases diagnosed at practice level (41 practices)	Retrospective data from Health Insurance records	Incidence study, new cases diagnosed at practice level (24 practices)	RCT, new cases diagnosed at practice level (162 practices)
Referral period	1977–1991	1994–1995	1996–1998	1996–1998	2004–2005
Age eligibility (years)	25–65	40–64	45–70	All new cases	> 18 years
N	5102	197	2160	706	824
% male	59	57.9	56	54	55
Mean age (years)	53*	55.8 ± 6.8	—	64.3 ± 13.2	59.5 ± 12.1
HbA_{1c} (%)	9.1*		7.5 ± 1.6	10.8 ± 2.9	8.1 ± 2.1†
Body mass index (kg/m^2)	28*	30.7 ± 5.8	33.3 ± 27	31.5 ± 7.0‡	32.4 ± 6.2
Total cholesterol (mmol/l)	5.6§		5.3 ± 1.26	5.9 ± 1.1‡	5.4 ± 1.31
HDL-cholesterol (mmol/l)	1.04§		1.0 ± 0.4		1.2 ± 0.42
LDL-cholesterol (mmol/l)	3.7§		2.3 ± 1.33		3.1 (1.11)
Systolic BP (mmHg)	143¶	144 (80–190)**	135 ± 18	142 ± 21‡	141 ± 18
Diastolic BP (mmHg)	87¶	86 (60–118)**	79 ± 10	81 ± 12‡	82 ± 11

*Median.
†Median (IQR) HbA_{1c} from DESMOND study = 7.3 (6.5–9.4).
‡Data from subgroup (n = 428) aged 35–74 years and free of existing cardiovascular symptoms.
§n = 1226.
¶n = 2906.
**Mean (range) from intervention arm, which did not differ from control arm.
HDL, high-density lipoprotein; LDL, low-density lipoprotein; BP, blood pressure.

weekly levels of moderate and vigorous activity. Women reported significantly lower levels of physical activity, which adds to the evidence that in the present cohort there was a higher level of cardiovascular risk factors in this group. Lifestyle is clearly an important issue that needs to be addressed in education programmes, and is focused on in the DESMOND programme [12].

Very few large studies have been conducted on the newly diagnosed. The largest study for comparison was the UKPDS, which was commenced nearly 30 years ago. The lower mean age of the participants in the UKPDS study may be due to the maximum age of referral being 65 years and the exclusion criteria applied [10]. The lower HbA_{1c} in the DESMOND cohort compared with the earlier UK studies may be a result of earlier diagnosis and proactive case finding in primary care, resulting from the introduction of national guidelines for diabetes care [6] and the Quality and Outcome Framework of the new General Medical Services contracts held by general practices [28]. The higher BMI is indicative of the increase in prevalence of obesity over the past 20 years [29].

The data show that many people newly diagnosed with T2DM hold strong beliefs about their diabetes that are not commensurate with our current medical understanding, including that diabetes is not a permanent, serious and chronic condition. Furthermore, nearly half reported they did not understand their condition. Given the evidence that across a range of chronic conditions [30], including diabetes [12], these beliefs are strong predictors of an individual's subsequent self-care, psychological well-being and metabolic control, these are clearly important areas to discuss with patients. Just telling people the correct information has been repeatedly demonstrated [31–33] to be insufficient to change people's beliefs, and this is why the DESMOND programme has focused on engaging participants in systematic, rather than heuristic processing [12] of information to facilitate changes in these beliefs.

The HADS data on depressive symptoms are the first available on individuals newly diagnosed with T2DM and suggest that depression is not significantly more common among people with diabetes compared with the general population rates in the UK [22]. This is surprising given the relationship between increased BMI and depression, and meta-analysis indicating depression is elevated in established T2DM and a risk factor for the development of T2DM [34]. This could be a function of selection bias in sampling and recruitment into the study. However, this result is compatible with recent research from the Netherlands [35] indicating that increased rates of depression in people with T2DM are only seen in individuals with complications or comorbidities, and from the USA [36] indicating that untreated T2DM is not associated with an increase in rates of depression. These results suggest that it is not diabetes *per se* that is responsible for the increase in depression, but rather the psychological burden of diabetes in combination with other heath problems. However, as comorbidity and complications are heavily associated with illness duration and glycaemic control, it is not possible to rule out the possibility that extended exposure to glucose dysregulation

leads to vascular changes in the brain, producing the increased rates of depression. It is hoped that longer term follow-up of the DESMOND cohort will provide some answers to these questions.

In conclusion, the results show that the demographics of T2DM at diagnosis are changing, with patients having a lower HbA_{1c} but much higher BMI compared with those referred to the landmark UKPDS. These recent data will be valuable for those delivering care in a primary care setting and also for researchers designing studies for people newly diagnosed with T2DM. The study has also shown that newly diagnosed patients have strong illness beliefs and poor understanding of their diabetes that need to be considered by healthcare professionals delivering care and also addressed in the design and delivery of structured education programmes in primary care.

Competing interests

Nothing to declare.

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South Leicestershire: M. Mays, G. Gray, S. Fenn.
West Cumbria: C. Taylor, K. Rogers.
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