Is diagnosis of type 2 diabetes a "teachable moment"? A qualitative study

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1   **Is diagnosis of type 2 diabetes a "teachable moment"? A qualitative study**

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11

12   **Abstract**
13   **Aims**
14   To explore the potential of a type 2 diabetes diagnosis to be a "teachable moment".

15   **Methods**
16   Semi-structured interviews were conducted with 23 participants (10 people with type 2 diabetes, 13
17   relatives of people with type 2 diabetes) in Scotland, UK. They explored cognitive, emotional and
18   behavioural changes following diagnosis of type 2 diabetes in oneself or in a relative. Data were
19   analysed using Framework approach.

20   **Results**
21   Strong emotional responses are not always related to the occurrence of a teachable moment. Risk
22   perception and outcome expectancy were found to be teachable moment factors for patients with
23   type 2 diabetes and their offspring, but not their partners. Change in self-concept increases the
24   likelihood of type 2 diabetes diagnosis to be a teachable moment for patients but not for relatives. In
25   some cases, type 2 diabetes is perceived as incompatible with current roles thus hindering diabetes
26   self-management. Relatives often engage in caring for patients and "policing" their behaviour but
27   did not report perceived changes in social roles.

28   **Conclusions**
29   The study suggests that diagnosis of type 2 diabetes is a teachable moment for some patients and
30   their relatives. These findings have implications for interventions to address diabetes self-
31   management in patients and primary prevention in their relatives.

32   **Keywords**
33   Type 2 diabetes; teachable moment; patients; relatives; interviews

Introduction

Diagnosis of illness can be a teachable moment when people adopt spontaneous behaviour change. The teachable moment construct is underpinned by existing conceptual models [1-3] and suggests that naturally occurring health events (e.g. illness diagnosis) increase people's motivation to respond positively to educational messages and adopt new behaviours. McBride et al. [4] propose a model suggesting for a health event to be a teachable moment it needs to i) increase peoples' perceptions of personal risk and outcome expectancy ii) prompt an emotional response and iii) produce a redefinition of social role or self-concept (although it may not have to fulfil all three conditions). However, this model was developed in cancer and smoking cessation and the majority of empirical work on teachable moments has been in cancer, a potentially terminal condition [5-7]. In addition, previous work in cancer suggests that illness diagnosis may also trigger behaviour change in the patient's relatives [8-11]. However, it remains unclear whether the teachable moment criteria suggested by McBride et al. [4] are applicable to other long-term health conditions.

The current study applies the concept of the teachable moment to type 2 diabetes. Previous research shows that people may perceive diabetes to be less serious than cancer [12]. Although some studies suggest that diagnosis of type 2 diabetes may prompt behaviour change [13-15], no previous studies have directly explored the potential of the diagnosis to be a teachable moment for patients or their relatives. The patients' relatives represent a group at increased risk of type 2 diabetes due to shared genetics in first-degree relatives [16] or shared lifestyle in partners [17]. One recent study applied the teachable moment construct to gestational diabetes, but perceived risk may be greater in this context, as it also relates to the baby's health and well-being [18]. This study explores the relevance of McBride et al.'s [4] model to people with type 2 diabetes and their relatives. More specifically, it aims to identify whether people experience increase in perceived risk and outcome expectancy, strong affective response and redefinition of social role or self-concept in response to diagnosis of type 2 diabetes in oneself or a relative.

Methods

Study design

Ethical approval for this study was granted by the University of Stirling, School of Health Sciences ethics committee (7th Oct. 2015, SREC 15/16, Paper No. 37, version 1).

This was a qualitative study, conducted in Scotland (UK) that explored people's cognitive, emotional and behavioural responses to diagnosis of type 2 diabetes.

Study information is reported according to COREQ guidelines [19].

Recruitment

67 This study used non-probability convenience sampling [20]. Recruitment was carried out through

68 community outreach in Forth Valley, Scotland. Posters and flyers explaining the study were placed in

69 109 community locations, such as community centres, libraries, charity shops, bowling and golf

70 clubs, post office branches and the University of Stirling. Diabetes UK advertised the study on their

71 website, newsletter and social media pages. The study was also advertised by word of mouth.

72 Interested participants were invited to contact the researcher. They were screened for eligibility

73 based on the following criteria: 1) over the age of 18 years; 2) able to speak and write in English; 3) a

74 recent diagnosis of type 2 diabetes in oneself or a relative. The word "relative(s)" in this article is

75 used to refer to any first-degree family member or partner (whether married or not) of someone

76 with type 2 diabetes. Time since diagnosis was not specified in the inclusion criteria as type 2

77 diabetes is a chronic condition and people's perception of what constitutes a recent diagnosis may

78 differ. If a participant was eligible to take part, they were asked to nominate one or more non-

79 diabetic relatives who might be willing to take part in the study (or nominate the relative with

80 diabetes if it was the relative who got in touch). The participant was then asked to provide their

81 family member with the study flyer and the researcher's contact details.

82 **Data collection**

83 Interviews were deemed to be the most appropriate data collection method to explore people's

84 experiences, views and motivations [21]. Semi-structured face to face or phone interviews were

85 conducted with people with type 2 diabetes and/or their relatives. Before the interview, participants

86 completed a demographic questionnaire. The interview schedule was developed based on previous

87 literature [4, 22]. The full interview schedule is displayed in Box 1.

88 *Insert Box 1 about here*

89 Members of the same family were not always interviewed together, due to participants' availability.

90 In some cases, only one member of a family was able/willing to take part. It was decided not to

91 exclude people whose family members were unable to take part because the study did not aim to

92 explore discrepancies in the views of people from the same family. Participants were given £10 as

93 reimbursement for their participation.The interviews were conducted by a female researcher (EDD)

94 with training and experience in collecting qualitative data. Data collection continued until data

95 saturation was reached in terms of sampling criteria and perceived depth and relevance of

96 information collected. In order to avoid data redundancy, saturation was deemed to have been

97 achieved when no new data emerged.

98 **Data analysis**

99   The interviews were audio-recorded, transcribed verbatim and checked against the recordings for

100   accuracy. Field notes were not used as part of data analysis. All information was anonymised and

101   participants were given study numbers. Data were analysed using Framework Approach, which

102   requires the researcher to stay close to the original data in order to "*capture, portray and explain the*

103   *social worlds of the people under study*" (p.279) [23]. This provides systematic and clear stages to the

104   analytic process [24]. Such transparency ensures trustworthiness of data as it allows others to see

105   how the final themes were developed and explore their relevance to other contexts. Analysis

106   followed Spencer et al.'s [23] steps, which include familiarisation, constructing an initial framework,

107   indexing and sorting, reviewing data extracts, data summaries, developing categories, mapping

108   linkages, and providing explanations and interpretations. The interview questions were initially used

109   to guide data analysis, after which data analysis adopted a more inductive approach. Data analysis

110   was conducted by using Microsoft Excel.

111   Analysis was conducted by the primary author. Another author with extensive experience in

112   qualitative research (VS) reviewed the data analysis stages to ensure that the final themes emerged

113   from the data.

114   In order to provide participants with feedback on the outcome of the study they have contributed

115   to, a lay summary of findings was disseminated to all people who took part in the interviews.

116   *Insert Table 1 about here*

117

118   Results

119   **Participants**

120   Forty two people showed interest in the study and 23 took part in 17 semi-structured interviews

121   (10 patients, 13 relatives: 7 offspring, 1 mother, 5 partners) between November 2015 and March

122   2016. Thirteen of the interviews were individual and four included the patient and their relative(s).

123   Relationships included two families (father, mother, two daughters; father, mother, daughter); a

124   mother-daughter dyad; and three couples. The remainder were either a patient or a relative whose

125   family member with diabetes was unable to take part. Interviews lasted between 25 and 85 minutes

126   and took place in participants' homes (N=6), private rooms at University of Stirling (N=6), a local

127   hotel (N=1), a local library (N=1), a private office at a participant's workplace (N=1), and over the

128   phone with the researcher in a private room (N=2).

129   The characteristics of participants are presented in Table 1.

130   **Interview findings**

131   During the developing categories stage of data analysis, two groups of patients emerged: patients

132   who adopted behaviour change immediately after the diagnosis of type 2 diabetes and patients who

133   took time to adjust to the diagnosis. People were placed in the first group if they talked about

134   specific changes in their behaviour. People were placed in the second group if they talked about

135   needing time to come to terms with the diagnosis, struggling to accept what it meant and relying on

136   others for diabetes management. We made the assumption that diagnosis was, by definition, a

137   teachable moment for those patients who attempted to change their behaviour immediately after

138   diagnosis but not for those who needed time to adjust. The comparison of perceptions and

139   behaviour changes between these two groups enabled the exploration of McBride et al.'s [4]

140   suggestion about necessary attributes of a teachable moment.

141   Two groups of relatives also emerged: people who adopted behaviours believed to prevent type 2

142   diabetes and people who did not adopt such behaviours. People were placed in the first group if

143   they reported specific changes they had made to their behaviour. Again, we made the assumption

144   that diagnosis was, by definition, a teachable moment for these relatives. People were placed in the

145   second group if theъ reported no change in behaviours, known to prevent type 2 diabetes, thus

146   suggesting the diagnosis was not a teachable moment for them. By comparing the perception and

147   behaviour changes between these two groups we were able to explore McBride et al.'s [4] teachable

148   moment factors.

149   Affective response

150   Diagnosis of type 2 diabetes often provoked an emotional response. All participants, both

151   patients and relatives, talked about experiencing strong emotions including shock, relief, anger,

152   sadness, disappointment or fear, although there were differences in the way people responded to

153   their emotions. In some patients the surprise at diagnosis receipt evoked fear:

154   *"In the first month of thinking I had this and then being diagnosed around that time, I did*

155   *struggle to sleep on three or four occasions, thinking about dying and having this kind of*

156   *strange intrusive thoughts, which is odd. I've never had that before in my life."* I3P2, patient

157   The surprise in other patients acted as a main motivator for behaviour:

158   *"A bit sort of shocked really, but surprised, you know, that was all really…and then to just find*

159   *out more about it. That was it…just to see what I could do and what I couldn't do"* I2P1, patient

160   Some patients, who had symptoms of type 2 diabetes, expected the diagnosis and felt relief because

161   the diagnosis provided an explanation for previous poor health and allowed them to *"know their*

162   *enemy"* and make changes to control their condition:

163   *"I suppose initially I actually felt quite relieved 'cause I thought: well, I've not been well and I*

164   *thought there is something I can do about this"* I13P7, patient

165 Some relatives also felt relieved because they did not perceive type 2 diabetes to be a very serious

166 condition:

167   *"I wasn't entirely surprised. I was relieved that it wasn't anything, and when I say more serious,*

168   *I mean that it's controllable and stuff like that."* I6R13, partner

169 It appeared that the people who adopted behaviour change immediately after the diagnosis and

170 those who needed time to adjust experienced similar emotions.

171 Perceived risk and outcome expectancy

172 Patients, who adopted behaviour change in response to diagnosis, said they had always been aware

173 of the potential complications that can result from type 2 diabetes. However, the diagnosis made

174 these complications personally relevant and increased their perception of diabetes severity:

175   *"I already knew about certain complications, but it brings it more home to you when you've*

176   *actually been diagnosed and you have to be wary of certain situations"* I14P8, patient

177 The increased perception of severity and relevance of complications prompted some people to

178 consider the worst possible outcome of the current situation and consider type 2 diabetes as a

179 potentially fatal condition. This increased motivation to change behaviour:

180   *"I guess I was a little bit frightened but it was more the idea that if I didn't sort it out then I*

181   *wouldn't get, I have a little boy who is 2 and a half now, and I wouldn't get to see him go to*

182   *school unless I did something."* I15P9, patient

183 These patients adopted behaviours they believed would reduce negative type 2 diabetes

184 consequences (i.e. outcome expectancy). They talked about increasing physical activity, reducing

185 carbohydrate and sugar intake, decreasing portion size and caring for their feet.

186 However, in the group of people who needed time to adjust and did not immediately make

187 behaviour changes, perception of risk was increased but it was often associated with a period of

188 denial and inability to make changes:

189   **"**And I presume it's fairly common if not, close to 100% common that there is any kind of*

190   *bereavement process, there is a period of denial in the beginning, isn't it? None of this can be*

191   *happening to me, not really being able to process what's going on…"* I3P2, patient

192

193   Some of these patients also talked about relying on their relatives for diabetes management:

194   *"...if I do something that's gonna make it worse, I'd hope somebody either the doctor or a*
195   *nurse or* [wife] *would point out that I was doing it..."* I6P4, patient

196   Similar to the patients, relatives considered the potential severity and impact of type 2 diabetes
197   after it became personally relevant to them. However, offspring of patients appeared more likely to
198   experience increase in perception of personal risk of type 2 diabetes and adopt risk-reducing
199   behaviours. The use of words, indicating necessity (e.g. need, made), was apparent in offspring's
200   accounts of behaviour change:

201   *"...before then* [diagnosis] *I was thinking: I'm fine, I don't need to worry about my life; but as*
202   *soon as that happened* [father got diagnosed] *it was like: wait, what about if I am gonna get*
203   *diagnosed, how's that gonna affect me in the future?; It's made me think sort of well ahead of*
204   *what I should be. It's made me think: right, I need to do this, I need to do all this to stop myself*
205   *from getting into that position. So it's kind of gave me a wake-up call as to stop myself from*
206   *ever reaching that position"* I5R6, offspring

207   *"...bloody hell, everything seems to be mounting up that I've got a good chance of getting*
208   *this..., so I need to make sure that I do as much as I can not to bring it on myself"* I12R11,
209   offspring

210   Some relatives whose parent had type 2 diabetes acknowledged the fact that they might not be able
211   to prevent type 2 diabetes. However, they chose to adopt protective behaviours to minimise the
212   potential impact diabetes could have on their lives:

213   *"There is a risk that no matter how healthy we are, we can get it later on in life maybe at the*
214   *same age dad got it so that, maybe you couldn't prevent it, but can certainly try and have a*
215   *healthy lifestyle so when it does happen you have already got better controls already in place*
216   *to deal with it if it does happen but if people are just unhealthy generally, I suppose you could*
217   *prevent it by being healthier and not getting it in the first place."* I2R2, offspring

218   Partners did not appear to have experienced increased perception of diabetes risk. Many of them
219   compared their behaviours to those of the patient and did not believe their own behaviour would
220   lead to type 2 diabetes:

221   *"Well, I watch what you eat, you know...there are so many things that I wouldn't do from, you*
222   *know, you put half an inch of what I think...and I can't eat, I couldn't eat a sandwich that you*
223   *made without you taking the butter off it because you put on...you put more butter on a*

224   *sandwich than I put cheese on it, you know…you have cream, custard and ice cream all*

225   *together on your pudding and I would never do…I would want to vomit before I do that, so I*

226   *think we are just brought up with very different attitudes to eating."* I3R5, partner

227   Self-concept and social role

228   Patients who adopted behaviour change immediately after diagnosis, talked about changes in the

229   way they perceive themselves (i.e. self-concept). They made a comparison between their behaviour

230   before and after the diagnosis and evaluated their self-concept based on that:

231   *"I am extremely tired all the time whereas I was a woman before who wouldn't think twice of,*

232   *just constantly being on the go, would never sit down. But now I am so tired, when I finish a*

233   *day's work I am exhausted which is not like me at all. I've become somebody else"* I14P8,

234   patient

235   Some of these people adopted specific behaviours they believed would help them maintain their

236   pre-diabetes identity. The person below described falling asleep on the sofa as a "diabetic"

237   behaviour, which they did not want to engage in:

238   *"I am having to go dog walking with my fantasy dog. To stop that falling asleep on the sofa*

239   *'cause I think that's diabetic as well. I don't know if it is, but in my head it is."* I10P6, patient

240   In other cases, type 2 diabetes was an opportunity to redefine one's identity. Below is a quote from

241   a patient who reported frequent overeating, which he believed contributed to the development of

242   type 2 diabetes:

243   *"…To what extent is eating, especially now that I know the consequences, to what extent is*

244   *that self-harm, you know…(…)it's deliberately destructive (…) there's a lot of questions like:*

245   *How do I see myself and what is it about? And I think the diet…working out my identity with*

246   *food, working out my relationship there, is part of a big thing for me in terms of how I see*

247   *myself and the diabetes has definitely changed and I might be opening myself up to some*

248   *unpleasant things about destructive behaviours and how I can duck relationships…"* I15P9,

249   patient

250   Patients, who adopted behaviour change, also constructed their new identity by differentiating

251   themselves from other people with type 2 diabetes. Some patients talked about the "*good*

252   *diabetic*" versus the "*bad diabetic*" where the "*bad diabetic*" is a person who is overweight and

253   who displays poor self-management:

254   *"But you see that with maybe some people with diabetes, when you look at it, it's a*

255   *stereotyping again, obviously quite fat and maybe they don't look after themselves right either*

256   *but they get the type 2 diabetes and I think maybe they're expecting some miracle medication*

257   *to cure it and then something will happen to their feet...."* I2P1, patient

258 In comparison, sometimes there was a struggle to accept the need to engage in diabetes-related

259 behaviours, such as checking insulin levels, in the group of patients who did not make immediate

260 changes:

261   *"I think I've been on a bit of an emotional rollercoaster as well in terms of…being numb,*

262   *avoiding it for a bit and trying to let it sink in and trying to work out how to manage the fact*

263   *that…I was used to feeling fine and now I prick myself…getting into some kind of a routine…"*

264   I3P2, patient

265 In some cases, diabetes was believed to be incompatible with patients' social roles, primarily due to

266 perceived stigma around type 2 diabetes:

267   *"I have a very high profile, high power job, leading people and…that stigma, I know, it will be*

268   *in their mind…so I need to carefully think about that and manage that in the appropriate time"*

269   I3P2, patient

270 This in turn presented difficulties in the management of the condition:

271   *"Can I do that* [check insulin level]] *in the car in the car park or to drive down the road, can I do*

272   *it in the gents' toilet, do I do it on my desk, all that kind of stuff"* I3P2, patient

273   *"If I went out for a meal with friends who don't really know I am diabetic then I will just eat*

274   *normally and adjust and take more insulin to cope with that"* I14P8, patient

275 With regard to relatives who adopted risk-reducing behaviours, there was no evidence that they

276 experienced changes in their self-concept or social role. However, all relatives talked about changes

277 in their responsibilities in terms of caring for the patient, cooking food that complies with the

278 diabetes regimen and policing the patient's behaviour. In spousal relationships, this sometimes led

279 to changes in relationship balance:

280   *"I think probably the balance in our relationship has changed. I would probably see me having*

281   *more of a caring role than I had before* [diagnosis]*"* I6R7, partner

282 In parent-offspring relationships, role reversal was observed where daughters adopted caring roles:

283   "He's [father with type 2 diabetes] *doing okay, he struggles from time to time, I think he eats*

284   *sweet packets so that gives me a reason to shout at him for it"* I5R6, offspring

285   However, there were partners, who did not believe to be at increased risk of type 2 diabetes, and

286   who made a clear distinction between themselves and the person with diabetes. These people's role

287   in the house did not appear to have changed:

288   "*I mean I understand that, you know, what* [wife]'*s got, you know, I am quite happy to go*

289   *along with it and if I need to pig out or something, I'm probably gonna do it."* I13R12, partner

Discussion

291

292   This study explored the relevance of McBride et al.'s [4] teachable moment model to type 2

293   diabetes. The study focused not only on people with type 2 diabetes but also on relatives of people

294   with type 2 diabetes. Given that first-degree relatives and partners of people with type 2 diabetes

295   may be at increased risk of developing the condition [16, 17], the study expands the teachable

296   moment construct into primary prevention. Each of McBride et al.'s [4] teachable moment factors is

297   discussed below in relation to the current study and previous research.

Affective response

299   The current study did not provide support for McBride et al.'s [4] suggestion that events that elicit

300   strong emotional responses increase the likelihood of illness diagnosis to be a teachable moment.

301   This is because almost every participant (patient or relative) reported experiencing strong emotions

302   but these emotions evoked different responses. In some people emotions, such as shock and

303   surprise, motivated them to adopt behaviour change. In others they led to denial and avoidance.

304   Negative emotions, such as fear, have been shown to discourage behaviour change, especially when

305   people are not convinced of their self-efficacy or the effectiveness of specific behaviours [25, 26].

306   However, this finding is promising because it shows that diagnosis of type 2 diabetes triggers an

307   emotional response and clinicians and researchers need to be aware of this when delivering

308   interventions.

Risk perception and outcome expectancies

310   Patients whose perception of diabetes severity and susceptibility to negative diabetes-related

311   consequences increased after diagnosis, were more likely to adopt behaviour change and were thus

312   assumed to have experienced a teachable moment. This provides support for McBride et al.'s [4]

313   model and previous models that suggest perceived risk increases the likelihood of adopting health-

314   related behaviours (Health Belief Model [1], Common-sense model [22]). Outcome expectancy was

315 also a facilitator for behaviour change as these patients adopted specific behaviours to offset

316 negative diabetes outcomes (e.g. reducing sugar intake and portion size). This supports McBride et

317 al.'s [4] model and previous research showing that beliefs that specific behaviours would lead to

318 specific illness-related outcomes are associated with changes in self-management [27-29].

319 With regard to relatives, diagnosis of type 2 diabetes appeared to increase risk perception mostly in

320 the offspring, rather than partners, of patients with this condition, suggesting that type 2 diabetes

321 diagnosis is more likely to be a teachable moment for this group. This supports previous research

322 showing that first-degree relatives of people with type 2 diabetes may believe they are at higher risk

323 of getting type 2 diabetes, compared to the general population [30, 31]. One explanation for this

324 could be that offspring are aware of their genetic predisposition to type 2 diabetes while partners

325 place greater emphasis on lifestyle factors and perceive their behaviour to be different from that of

326 the patient. Previous research in type 2 diabetes and heart attack shows that although some people

327 believe the illness runs in their family, they perceive their lifestyle to be different from that of the

328 affected relatives [32, 33]. Offspring reported a perceived need to change behaviour and adopted

329 specific behaviours to reduce their risk of type 2 diabetes (e.g. reducing sugar intake). This suggests

330 that outcome expectancy may be a teachable moment factor for the offspring of patients.

331 **Social role and self-concept**

332 This study provides mixed support for McBride et al. [4] who suggest that changes in self-concept or

333 social roles contribute to the potential of illness diagnosis to be a teachable moment. Patients, who

334 changed their behaviour in response to the diagnosis thus suggesting diagnosis was a teachable

335 moment for them, evaluated their self-concept and were either motivated to adopt strategies that

336 would allow them to keep their previous self-concept or they welcomed the identity changes as an

337 opportunity for the situation to improve. Disruption in identity and potential identity transformation

338 following a chronic illness diagnosis have been demonstrated before [34-36]. In type 2 diabetes,

339 Kneck et al. [37] found that newly diagnosed patients with type 2 diabetes evaluated their pre-

340 diagnosis behaviours in order to decide which behaviours could be continued and which had to be

341 changed. Many patients in the current study also wanted to avoid being perceived as a "bad

342 diabetic", which motivated them to adopt behaviour change and comply with diabetes management

343 guidelines. However, in some cases type 2 diabetes was perceived to be incompatible with current

344 social roles. McBride et al. [4] suggest that people with lung cancer who smoke may have a sense of

345 obligation to stop smoking to avoid stigma of non-compliance. However, in the case of type 2

346 diabetes, there is perceived stigma that people are to be "blamed" for their condition [38]. This was

347 a barrier for self-management for come patients in this sample as they were reluctant to disclose

348 their condition to friends.

349 Relatives in this study did not report changes in self-concept. Although many relatives supported the

350 patient by changing existing responsibilities or adopting new ones, change in social role did not

351 appear to be related to the experience of a teachable moment. Offspring talked about telling

352 parents what to do suggesting a potential role reversal while partners expressed a need to "police"

353 and care for the patient suggesting a shift in relationship balance. Similar changes in family roles

354 following diagnosis of diabetes have been observed before, showing that women are more likely to

355 adopt multi-caregiving roles [39].

356 **Implications**

357 The current findings have implications for management of type 2 diabetes in patients and

358 prevention in their relatives. The suggested teachable moment factors can be incorporated into a

359 brief diabetes intervention, delivered by healthcare professionals, such as diabetes nurse specialists

360 (DNS). Nurse-led brief interventions have been shown to be effective for smoking cessation [40] and

361 alcohol [41]. This could be facilitated by using the teachable moment communication process model

362 (TMCP), which teaches clinicians how to capitalise on teachable moments in practice [42]. Routine

363 diabetes appointments present an excellent opportunity for such interventions and also for

364 prompting family communication about diabetes. Family communication around the teachable

365 moments factors is key for optimising the potential of type 2 diabetes diagnosis to prompt behaviour

366 change. Research has already indicated that adult offspring of patients with diabetes generally seem

367 receptive to being informed via the family system about reducing their diabetes risk [43, 44].

368 Additionally, the majority of patients recognise the necessity of disseminating risk and preventive

369 messages in their family [30, 44, 45]. Whitford et al. [44] show that people who have spoken with

370 their relatives with diabetes about diabetes risk were more likely to see themselves at risk of type 2

371 diabetes, worry about diabetes and see diabetes as serious.Patients can be encouraged to bring a

372 relative to their appointment with the DNS. The DNS can prompt communication about emotions

373 and how they influence behaviour. In patients, particular focus should be placed on diabetes

374 severity, as this can be an important teachable moment factor. Relatives would benefit from

375 discussion around risk perception and this may be particularly important for partners who often do

376 not view themselves at increased risk of type 2 diabetes. Families can discuss behaviours they can

377 adopt together (e.g. changes in diet) in order to offset negative diabetes-related outcomes, thus

378 addressing outcome expectancy as a teachable moment factor. Social roles, especially where these

379 are incompatible with diabetes, need to be addressed so they do not present a barrier to self-

380 management. Similarly, discussion around adoping caring roles in relatives and the perceived need
381 to "police" the patient, could provide a platform for further family communication about the needs
382 of the patient and their relatives.

383 **Limitations**

384 The current study has several limitations. First, the convenience sampling did not allow for
385 strategic recruitment where there is a good variety and sample members differ in terms of key
386 characteristics [20]. Second, recruitment was carried out in one health board in Scotland. Regional
387 differences in healthcare experience may exist and can influence psychological outcomes [46, 47].
388 Finally, the study did not consider psychosocial characteristics and ethnic, racial and socioeconomic
389 background, which have been shown to affect behaviour change [6, 8, 48-50].

390 **Summary**

391 The current study provides support for the idea that diagnosis of type 2 diabetes is a teachable
392 moment. It shows that McBride et al.'s [4] factors (i.e. affective response, risk perception and
393 outcome expectancy, self-concept and social role) are relevant to patients with type 2 diabetes and
394 their relatives, thus expanding the teachable moment construct into primary prevention.
395 Interventions need to be tailored to address individualised experience of potential teachable
396 moment factors and encourage family communication around these factors.

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532   Box 1. Interview schedule

Setting the context

Explain aim of the study and my role as a primary researcher

To the patient: We can start with you telling me how you got diagnosed with type 2 diabetes?

(Prompts may include: How did you feel when you found out?; How long after that did you tell your family?;

What about your friends?)

To the relative: Do you remember how you found out? How did you feel?

To both: Do you openly talk about type 2 diabetes in your family?

Changes in perceptions

•   Cause: What do you think causes type 2 diabetes? (Explore any changes in knowledge of causes since diagnosis)

•   Identity: What do you think are the symptoms of type 2 diabetes? (Explore any changes in knowledge of sympotoms since diagnosis)

•   Severity: Tell me about what you think about the seriousness of type 2 diabetes? (Explore any changes in perceived diabetes severity since diagnosis)

•   Consequences: What do you think are the consequences of type 2 diabetes? (Explore whether the patient has experienced any consequences and whether there are changes in perceived diabetes consequences since diagnosis)

•   Timeline: How long do you think your type 2 diabetes will last? (Explore any changes in knowledge of diabetes duration since diagnosis)

- Control: To patient: What do you think about your ability to control type 2 diabetes? To relative: What do you think about prevention of type 2 diabetes? (Explore any changes in perceived diabetes control since diagnosis)

- Illness coherence: Do you feel like you understand type 2 diabetes? (Explore any changes in understanding since diagnosis)

To the relative: What do you think about your chances of developing type 2 diabetes? (Explore whether their perception of risk has changed since diagnosis in their relative); Are you worried about developing type 2 diabetes in the future?

Changes in behaviour

To the patient: Tell me more about your behaviour since diagnosis. Have you made any changes to your behaviour since you got diagnosed? (Prompt about specific changes in diet, exercise, lifestyle). Has it been easy? (Prompt around barriers to making changes)

To the relative: Have you made any changes to your own behaviour? (Prompt about specific changes in diet, exercise, lifestyle).Has it been easy? (Prompt around barriers to making changes)

To both: Can you tell me more about the ways the diagnosis has affected the way you see yourself and your social role? (Prompt around perceptions of oneself; accepted norms of behaviour; stigma; roles within the house and at work);How has T2D affected your relationship with your relatives?

To both: Do you think that diagnosis is a good time to speak with the patient's relatives and tell them more about their risk of type 2 diabetes and the ways it can be prevented? (Prompt about why they think it would be a good time, or not).

533

534   Table 1 Participant characteristics

	Patients (n=10)	Relatives (n=13)

Duration of type 2 diabetes	Range: 3 weeks – 18 months Mean: 7.9 months Median: 6.5 months	Duration of diabetes in their relative with the condition: Range: 6 weeks – 11 months Mean: 6.8 months Median: 8 months
Route to diagnosis	5 presenting GP with symptoms 3 periodic screening 1 visit GP for other reasons 1 after gestational diabetes	Route to diagnosis for their relative with type 2 diabetes: 2 presenting GP with symptoms 1 usual check up
Relationships with patient	Not applicable	6 daughters 3 wives 2 husbands 1 son 1 mother. 6 share genetics but live apart from patient 2 share genetics and live together 5 do not share genetics and live together
Gender	5 male 5 female	10 female 3 male
Age	Range: 37-71 years Mean: 53.6 years Median: 51 years	Range: 18-68 years Mean: 41.17 years Median: 45.5 years
SIMD (Scottish Index of Multiple Deprivation)[1]	Range: 2-10 Mean: 5.7 Median: 6	Range: 2-10 Mean: 6.92 Median: 6
Education	9 had education after high school (2 PhD[2], 1 MSc[3], 2 BAs/BSc[4], 1 one year at	9 had education after high school (3 PhD, 1 MSc, 2 BAs/BSc, 2 college, 1 HND[6], 3 current students)

	university, 1 Diploma, 1 Police promotion exam, 1 HNC[5], 2 current students) 1 – high school education	4 – high school education
Employment	4 full-time 3 retired 2 unemployed 1 part-time	4 full-time 4 part-time 2 unemployed 1 self-employed 1 retired 1 other
Relationship status	8 in a relationship 2 single	12 in a relationship 1 single
Family history of diabetes	5 yes 5 no Number of relatives with diabetes: 1-4	8 yes 5 no Number of relatives with diabetes: 1-4
How they heard about the study	5 word of mouth (relative who took part or someone who saw advert) 2 University of Stirling portal 1 Diabetes UK newsletter 1 Falkirk Sensory centre 1 West Lothian Diabetes support group social media page	7 word of mouth (through patient who took part or someone who saw advert) 2 University of Stirling email 2 University of Stirling portal 2 Stirling council intranet

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536 [1]Scottish Index of Multiple Deprivation (SIMD): SIMD is used to identify areas of multiple deprivation

537 in Scotland. It ranks small areas from most deprived (ranked 1) to least deprived (ranked 10)

538 (http://www.gov.scot/Topics/Statistics/SIMD).

539 [2] PhD – Doctor of Philosophy

540 [3] MSc – Master of Science

541 [4] BAs/BSc – Bachelor of Arts/Bachelor of Science

542   [5] HNC - Higher National Certificate

543   [6] HND - Higher National Diploma