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**Efficacy of the Best Possible Self protocol in diabetes self-management: A mixed-methods approach.**

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### Article

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# 1 **Efficacy of the Best Possible Selves Protocol in Diabetes Self-management:**

## 2 **A Mixed-Methods Approach**

3

### 4 **Abstract**

5 Recent research has demonstrated that positive affect may facilitate illness self-management.  
6 This study used a sequential exploratory mixed-methods typology to assess whether a task  
7 designed to boost positive affect (the Best Possible Self protocol; BPS) could improve  
8 aspects of diabetes self-management, specifically. A qualitative investigation explored people  
9 with diabetes' (n= 20) views regarding BPS feasibility and acceptability while a subsequent  
10 quantitative investigation assigned people with diabetes (n= 50) to a BPS or non-BPS  
11 condition and assessed affect and behaviours over a four-week period. Findings indicated that  
12 individuals were receptive to the BPS and that it provided benefits for diabetes self-  
13 management.

14

### 15 **INTRODUCTION**

16 Diabetes mellitus remains a major public health concern in countries across the world (Zhou  
17 et al., 2016). Following diagnosis, effective self-management of diabetes can be challenging  
18 (Teixeira, 2017; Fritz, 2017) due in part to the negative emotions associated with doing so  
19 (Strandberg et al., 2014; Camara et al., 2015). Diabetes self-management is an imperative, if  
20 difficult, skill that entails regular monitoring of glycaemic (blood glucose), blood pressure,  
21 and LDL-cholesterol levels (Rutter and Nesto, 2011) as well as considerable lifestyle  
22 modification (e.g., being active, healthy eating, adhering to medication) (Chen et al., 2013).  
23 Improving management strategies is key to decreasing the likelihood of diabetes-related  
24 morbidities such as cardiovascular problems, neuropathy, and kidney damage (Turner et al.,  
25 1998). However, elevated levels of depression, anxiety, and diabetes related-distress have

26 shown to disrupt lifestyle behaviours and are therefore associated with poorer clinical  
27 markers (such as HbA1c; an indicator of blood glucose levels over the previous 2-3 months),  
28 indicating an increased risk of morbidity and mortality (Strandberg et al., 2014). As such,  
29 psychology has an important role to play in addressing the emotional aspects of diabetes self-  
30 management.

31

32 However, though traditional psychological interventions such as Cognitive Behavioural  
33 Therapy (CBT) are routinely used to address issues associated with co-morbid mental health  
34 issues (Ismail et al., 2004), they have demonstrated mixed results in improving diabetes-  
35 related clinical markers, despite their connection to distress (Uchendu and Blake, 2017). It  
36 has been argued that CBT, by attempting to teach individuals to control diabetes-related  
37 thoughts and feelings in order to “eliminate” distress, may not be appropriate for this  
38 population as self-management behaviours, by their nature, evoke thoughts of diabetes and  
39 reactions to its dangers (Gregg et al., 2007). One alternative is to utilise psychosocial  
40 interventions that protect the individual against the damaging effects of distress (Pascoe et al.,  
41 2017). One way to do this is to facilitate positive affect, which has shown to counter against  
42 emotion dysfunctions (Garland et al., 2010). The broaden-and-build theory of positive  
43 emotions specifically suggests that positive affect helps to ‘broaden’ one’s behavioural  
44 repertoire by encouraging new ways of thinking and doing and, in turn, ‘building’ lasting  
45 resources that can be drawn on in times of crisis (Fredrickson, 2004). ‘Positive’ interventions  
46 built on these principles help to cultivate positive emotions (Sin and Lyubomirsky, 2009) and  
47 have seen widespread utility across a variety of health topics (Moskowitz et al., 2017; Peters  
48 et al., 2017). Early attempts to develop such positive interventions for a population with  
49 diabetes have shown to be equally promising (Cohn et al., 2014), though further investigation  
50 is required.

51

52 The aim of the present study, therefore, was to develop and subsequently assess a novel  
53 positive intervention for utilisation in the context of diabetes self-management. A decision  
54 was made to modify, rather than develop from scratch, an intervention that could be used by  
55 people with type 1 and type 2 diabetes. The Best Possible Self (BPS) exercise was deemed an  
56 ideal candidate for this context because it is a brief, self-administered task shown to help  
57 people better manage their emotions (Loveday et al., 2016). Furthermore, the BPS's  
58 underlying mechanisms of action have also been conceptualised in the context of a second  
59 theory: self-regulation theory (SRT) (Bak, 2015; Dark-Freudeman and West, 2016; Markus  
60 and Nurius, 1986; Vandellen and Hoyle, 2008) which denotes one's ability to alter and adjust  
61 their beliefs and actions, and typically involves goal-directed behaviour (Hagger, 2010).  
62 Fundamentally, the BPS is a writing procedure that requires people to imagine and write  
63 about an optimistic future in which they have accomplished their life goals (King, 2001: 801).  
64 This activity has shown to generate positive emotions (Meevissen et al., 2011), reduce  
65 negative affect (Yogo and Fujihara, 2008) and, importantly for this context, produce physical  
66 health benefits by notably alleviating illness symptoms (Maddalena et al., 2014) and reducing  
67 the number of medical visits (Austenfeld et al., 2006; Austenfeld and Stanton, 2008; King,  
68 2001).

69

70 To best evaluate the BPS in the context of diabetes self-management we employed a  
71 sequential, exploratory mixed-methods design, consisting of a qualitative phase followed by a  
72 quantitative investigation (Creswell and Plano Clark, 2007). This approach had the potential  
73 to offer greater breadth and depth of understanding regarding the utility of BPS in a diabetes  
74 context, specifically by allowing some degree of triangulation to corroborate findings  
75 (Bishop, 2015). The qualitative study used one-to-one interviews and a focus group to first

76 assess general acceptability and feasibility of the BPS amongst people with diabetes. Further  
77 modifications to the BPS would be implemented based on feedback from this phase, if  
78 necessary. The quantitative study then took the form of an exploratory study to analyse the  
79 BPS's actual influence on diabetes behaviours and emotional factors (i.e. affect and  
80 psychopathology). Consistent with results from previous research (Loveday et al., 2016;  
81 Maddalena et al., 2014; Austenfeld et al., 2006; Austenfeld and Stanton, 2008; King, 2001), it  
82 was expected that constructed themes and/or group differences would demonstrate the appeal  
83 of the BPS as well as its utility for generating positive affect and improving health and  
84 wellbeing in people with diabetes.

85

## 86 **METHODOLOGY**

87

### 88 **Study sample and Recruitment**

89 Given the paucity of research in this area, we felt it was essential to explore the utility of the  
90 BPS as broadly as possible. People with diabetes were recruited for both phases of the study,  
91 irrespective of their T1D and T2D status. Though each etiopathogenetic classification comes  
92 with obvious and markedly different biological and psychological profiles (American  
93 Diabetes Association, 2014; Shields et al., 2015; de Groot et al., 2016), there was no  
94 literature to justify excluding one form over the other, especially as the task is non-  
95 prescriptive in nature. In other words, an individual (regardless of diabetes status) could  
96 consider their 'Best Possible Self' and set their own individualised goals that accounted for  
97 their own experiences and self-management issues without being disadvantaged compared to  
98 someone with a different diagnosis, at least in theory. The study was advertised primarily by  
99 emailing multiple diabetes support groups whose contact details could be found online (or  
100 were available through prior contact), and also by attending routine monthly meetings of

101 three local diabetes support groups in the North West of England and making direct face-to-  
102 face appeals to the audience. The aforementioned local support groups were affiliated to  
103 Diabetes UK, a British-based charity that supports people with diabetes and health  
104 professionals across the country (Diabetes UK, 2009). The investigation was also advertised  
105 online on various forums and social media platforms. The qualitative study consisted of  
106 telephone interviews and a focus group session (November 2016 – March 2017), and  
107 involved 20 participants in total. The quantitative phase took the form of an exploratory study  
108 with a sample of 50 participants (March 2017 – January 2018). Ethical approval for the study  
109 was obtained from the Liverpool John Moores University Research Ethics Committee  
110 (UREC). All participants were presented with detailed information describing the nature of  
111 the study, and listing contact information for local counselling services. Participants were  
112 required to indicate consent, prior to participation. There was no monetary incentive for  
113 completing the study.

114

### 115 **Qualitative data collection**

116 Interviews. Performing both individual interviews and a focus group provided some data  
117 source triangulation within this phase of the study (Carter et al., 2014). After each  
118 interviewee (n= 12) agreed to take part, the lead researcher (BG) provided a copy of a one-  
119 page ‘tailored-for-diabetes’ version of the BPS (King, 2001) via email. This BPS variant  
120 began with a brief paragraph about the importance of blood glucose control (HbA1c),  
121 followed by an amended version of the standard BPS protocol whereby ‘best possible self’  
122 was replaced with ‘best possible HbA1c’ so that recipients could focus specifically on their  
123 self-management goals (Layous et al., 2013). All interviewees were then asked several open-  
124 ended questions (e.g., ‘Is it clear what you have to do?’, ‘Would you be happy to use this  
125 exercise?’, ‘Is there anything that might get in the way of you doing this?’). Participants were

126 encouraged to be honest and to talk freely about their experiences while the interviewer  
127 adopted the role of reflective listener. Interviews lasted 21 minutes on average. Saturation  
128 was achieved by reaching “sample adequacy” whereby the depth and breadth of the  
129 information gathered was deemed sufficient to be representative of participants’ views  
130 (Bowen, 2008). Common themes were discernible by the seventh interview and it was  
131 considered that full saturation had occurred by the twelfth.

132

133 Focus group. This event was conducted during a diabetes support group session within a  
134 hospital setting. Participants constituted a convenience sample (n= 8); anyone present at the  
135 meeting was eligible and invited to participate. The session began with a 10-15 minute  
136 PowerPoint presentation by two of the researchers (BG & KU) highlighting the importance of  
137 emotional factors in blood glucose testing and diabetes self-management. A copy of the  
138 tailored-for-diabetes BPS variant (as used for the interviews, described above) was then  
139 presented on the final slide of the presentation. The researchers gave a brief description of the  
140 nature and purpose of the intervention, after which group members were invited to share their  
141 thoughts about the exercise and its relevance in blood glucose testing and diabetes self-  
142 management. During these discussions, they were presented with a PowerPoint slide showing  
143 the same open-ended questions used during the interviews. The entire session lasted  
144 approximately 1 hour and 30 minutes and was recorded on a digital recorder.

145

#### 146 **Quantitative data collection**

147 The quantitative study was hosted on the online platform Qualtrics. Interested individuals  
148 were provided with a URL link, whereupon they viewed participant information, describing  
149 the nature of the study. They were informed their involvement in the study would last for four  
150 weeks. Consenting individuals were then randomly assigned to either a BPS or Waiting List

151 Control (non-BPS) condition using Qualtrics' inbuilt 'randomizer' function. The BPS group  
152 were subsequently presented with an amended version of the tailored-for-diabetes BPS, based  
153 on feedback from the qualitative phase (see below) while the control group were informed  
154 that they would receive the BPS at the end of the four-week study period.

155

### 156 **Amended Tailored-for-diabetes BPS**

157 "Take a moment to think about your best possible HbA1c level. Imagine that your  
158 blood sugar levels have been very well controlled and that you have resolved  
159 some of the issues currently concerning you. Imagine how it felt to achieve those  
160 levels and reflect on how positive it would feel to have more control. Then, tell  
161 yourself the important things you realised or the critical steps you took to get  
162 there. Think of this as the realisation of your best possible HbA1c level.

163 Now, please use the next 10 minutes to write continuously about what you  
164 imagined. Use the tips below to help guide you through this process:

165 1) Be as creative and imaginative as you want. Do not worry about perfect  
166 grammar and spelling as this is for your private use. No one has to know what  
167 you wrote down, though you may find it helpful to share and develop ideas with  
168 trusted friends, family, or even your health-care team. 2) Do not feel too  
169 pressured to write everything down on your first try. As you repeat this task, more  
170 ideas will come to you naturally. 3) Remember, steps are often small, even the  
171 critical ones. There likely won't be one big fix. You may find it easier to write  
172 about more achievable things to start with such as investing in a  
173 pedometer/walking app or making a decision to try different recipes more often.  
174 However, if you want to write about running a half-marathon, that's okay too! 4)  
175 If you find thinking about HbA1c too abstract, try focusing on another aspect of



176 your self-management. The important thing is to focus on something long-term so  
177 that you can make more noticeable improvements to your health.”

178

179 Both groups then immediately completed questionnaires (Time 1; T1) assessing emotion  
180 (frequency of positive and negative affect) and psychopathology (symptoms of depression  
181 and anxiety) using the Positive and Negative Affect Schedule (PANAS) (Crawford and  
182 Henry, 2004) and the Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith,  
183 1983), respectively. Participants were then told they would be contacted four weeks later  
184 (Time 2; T2) to repeat the questionnaires so that we could assess task effects. Those in the  
185 BPS condition were told to use the intervening time to use the writing exercise as much as  
186 they found helpful. Upon returning, they also completed the Diabetes Self-Management  
187 Questionnaire (DSMQ) (Schmitt et al., 2013). The DSMQ consists of four subscales;  
188 ‘Glucose Management’ (5 items), ‘Dietary Control’ (4 items), ‘Physical Activity’ (3 items),  
189 and ‘Health-Care Use’ (3 items). One additional item assessed the individual’s perceptions of  
190 their ‘Self-Care’ activity. Sub-scale scores were calculated individually and a total overall  
191 DSMQ score was also computed. Cronbach Alpha’s for the HADS were 0.87 (anxiety) and  
192 0.81 (depression) whilst they ranged from 0.69 (Glucose Management) to 0.91 (Health Care  
193 Use) for the DSMQ.

194

### 195 **Qualitative Analysis**

196 The primary researcher (BG) transcribed audio-recordings of the interviews and focus group  
197 session verbatim. The data were analysed using Thematic Analysis (Clarke and Braun, 2017).  
198 Transcripts were read and re-read by the same researcher (BG), in order to familiarise  
199 themselves with the breadth and depth of data. Initial codes were then generated  
200 systematically on a line-by-line basis. Codes were collated into a large number of candidate

201 themes. These initial themes were reworked and constantly checked against the data until  
202 only a smaller set of super-ordinate and master themes remained. The final themes were then  
203 written up as a series of draft result sections that were scrutinised and reworked by the  
204 research team. After key themes had been derived, the researchers met to discuss and reflect  
205 on the analytical process. Final results were also discussed amongst the research team.

206

### 207 **Quantitative analysis**

208 Given that the BPS is intended to work by facilitating positive affect and has shown to reduce mental  
209 health symptoms, the PROCESS SPSS dialogue (version 2.15) (Hayes, 2013) was used to assess  
210 direct and indirect BPS effects. This would allow us to understand the mechanisms by which the BPS  
211 was achieving its effects in this context. Specifically, the PROCESS dialogue was used to examine  
212 whether BPS exposure (at T1) improved diabetes self-management at follow-up (T2), and/or the  
213 aforementioned association was mediated by emotional factors (i.e. affect and psychopathology) (T1,  
214 T2). Thus, the BPS condition variable was entered into the equation as variable 'X' (i.e., Predictor),  
215 while each of the five diabetes self-management factors (DSMQ) were entered as variable 'Y' (i.e.,  
216 Outcome). Emotional factors (PANAS/HADS) were entered as the 'M' variables (i.e., the  
217 mediators), with T1 and T2 emotions evaluated as mediators in separate models. Overall, each  
218 mediation model assessed three regression pathways; the effect of X on M (*'path a'*); the effect of M  
219 on Y (*'path b'*), and the effect of X on Y (*'path c'*). Mediation was deemed to have occurred if paths  
220 'a' and 'b' (i.e., the *'indirect effect'*, or *'a\*b'*) emerged as statistically significant. The number of  
221 bootstrap samples (for bias-corrected bootstrap confidence intervals) was set at 1000 with an alpha of  
222  $p < 0.05$ . All analysis was performed using SPSS (version 23).

223

224

225

226 **RESULTS**

227

228 **Descriptive data**

229 Table 1 shows participant characteristic data for the interviews, focus group, and exploratory  
230 study. Most of the interviewees and focus group participants had T2D. The distribution of  
231 T1D/T2D cases was more even for the exploratory participants, with just over half diagnosed  
232 with T1D. In the combined (qualitative and quantitative) sample there was a 50-50 split  
233 between T1D and T2D cases. The average number of years since diagnosis for quantitative  
234 participants was just over 16 years, and a maximum value just exceeding 50 years. The  
235 sample was predominantly Caucasian (68%). At least 50% were UK nationals, with other  
236 nationalities stated as ‘Australian’, ‘Caribbean’, ‘German/Dutch’, and ‘Irish’.

237

.....

238

**Table 1** Participant characteristics by phase

239

.....

240 **Qualitative findings**

241 Thematic analysis produced four main themes: (1) Illness Ownership, (2) Advocating a  
242 Personal Approach, (3) Barriers & Facilitators, and (4) Real-world Context. The first main  
243 theme included two sub-themes (‘Control and the Diabetes Experience’ and ‘Taking a Pro-  
244 Active Approach’) (Table 2). The ‘Advocating a Personal Approach’ theme comprised two  
245 sub-themes (‘The Importance of Personalised Care’ and ‘The Importance of Support’) (Table  
246 3). The ‘Barriers and Facilitators’ theme contained three sub-themes (‘Individual Factors’,  
247 ‘Motivation’ and ‘Clarity and Promoting Awareness’) (Table 4). The ‘Real-world Context’  
248 theme consisted of the two sub-themes (‘Alternatives to Thinking about HbA1c’ and  
249 ‘Considerations for Implementation’). Details of the first three themes are illustrated in the

250 Tables below. The final ‘Context’ theme highlighted real-world challenges associated with  
251 using the BPS.

252 .....

253 **Table 2** The ‘illness ownership’ theme (comprising two sub-themes); illustrative quotes from  
254 interviewees and focus group participants

255 .....

256 .....

257 **Table 3** The ‘advocating a personal approach’ (comprising two subthemes); illustrative  
258 quotes from interviewees and focus group participants

259 .....

260 .....

261 **Table 4** The ‘barriers and facilitators’ theme (comprising three subthemes); illustrative  
262 quotes from interviewees and focus group participants

263 .....

264 **Quantitative findings**

265 The mediation analysis, in assessing the BPS effect (T1) on self-management variables (T2)  
266 with emotional factors (T2) as the mediating factors, revealed that there was a significant  
267 direct effect for the writing exercise, Effect = 0.62 (95% CI 0.02 to 1.21),  $p > 0.05$ ; the BPS  
268 group reported greater self-care activity approximately 4 weeks post-intervention compared  
269 with the control group. Emotional factors failed to mediate this relationship ( $p > 0.05$ ). The  
270 BPS had no other significant effects (direct or indirect) on the remaining four self-  
271 management variables (all  $p$ 's  $> 0.05$ ). The mediational analysis was then re-ran to control for  
272 diabetes type (T1D, T2D) to see if this affected the direct effect of the BPS on self-care  
273 activity. Results showed that accounting for this covariate slightly attenuated but did not

274 completely negate the significant BPS influence, Effect = 0.62 (95% CI 0.00 to 1.24), p =  
275 0.05.

276 .....

277 Figure 1 The direct effect of BPS exposure (T1) on self-care activity at the 4-week post-  
278 intervention follow-up (T2)

279 .....

280 **DISCUSSION**

281 In this mixed-methods study applying the BPS protocol within a diabetes context, the BPS  
282 was found to be a potentially useful tool in relation to diabetes self-management. Analysis of  
283 the qualitative data provided several key themes suggesting people with type 1 and type 2  
284 diabetes would find the BPS useful, but would like it to have a more personalised format, and  
285 perhaps refined further for a diabetes context. This supports previous academic suggestions  
286 that any version of the BPS should be especially tailored for its target population (Layous et  
287 al., 2013). Whilst the BPS received some initial modifications between qualitative and  
288 quantitative phases of this study, further development of a diabetes-specific BPS may still be  
289 required. Analysis of the quantitative data, meanwhile, indicated that the BPS improved  
290 perceptions of self-care though not the actual behaviours themselves. Importantly, the effect  
291 on self-care was only slightly attenuated after controlling for diabetes type, meaning that  
292 people with type 1 and type 2 diabetes were receiving the same effects from the BPS.

293

294 Interview and focus group feedback suggested most participants found the BPS to be a viable  
295 tool that could be incorporated into patient treatment plans to help promote person centred  
296 care (Coulter et al., 2013). Several participants suggested ‘sharing’ written ideas from the  
297 BPS with other individuals within their support networks. Indeed, the qualitative data  
298 suggested the BPS might help strengthen doctor-patient relationships if people with diabetes

299 share ideas with their health care team. This finding is important as previous research  
300 suggests doctor-patient rapport has a significant impact on clinical outcomes (Coulter et al.,  
301 2015; Coulter et al., 2013).

302

303 Other important things to note include the individual's need to understand the benefits of  
304 engaging with the BPS. There was frequent mention of a need to provide scientific evidence  
305 so that people felt the intervention was worthwhile and valid. This point relates specifically to  
306 the 'illness ownership' theme where participants emphasised that by 'taking ownership' they  
307 were constantly busy making decisions and managing their diabetes. Consequently, they did  
308 not necessarily want to spend more time and effort performing an exercise unless it was to be  
309 of some knowable benefit. It is essential to consider some of the salient facilitating and  
310 hindering factors involved with engagement with the exercise, especially at initial contact.  
311 Participants considered emotions and personality traits important, with feelings of "laziness"  
312 being a notable barrier for some. By contrast, resilience and will power were viewed as  
313 important characteristics to have by many individuals. Individual's perceptions of their  
314 agency were therefore important. Overall, the qualitative data revealed both favourable and  
315 challenging features of the BPS.

316

317 Evaluation of the quantitative data showed that exposure to the BPS can improve perceptions  
318 of self-care after approximately 4 weeks following initial exposure, albeit the underlying  
319 mechanism for this effect may not necessarily be emotional. In this case, the broaden-and-  
320 build theory (Fredrickson, 2004) may not have been an appropriate model to use. Previous  
321 research suggests the BPS is effective at improving positive affect, optimism, and mood  
322 (Layous et al., 2013; Huffman et al., 2014; Parks et al., 2012; Peters et al., 2010; King, 2001);  
323 nevertheless, the intervention appeared to have no impact on actual diabetes self-management

324 behaviours – blood glucose control, dietary control, physical activity, or health care use.

325 Rather, these findings suggest the efficacy of the BPS in a diabetes context may be

326 attributable to complex self-regulatory mechanisms (Vandellen and Hoyle, 2008).

327

328 According to self-regulation theorists, the BPS provides people with an image of a future self

329 (that is a self-standard) which they then compare to the present self (Vandellen and Hoyle,

330 2008) so any mismatch must motivate people to modify their behaviours in order to reduce

331 the disparity (Cross and Markus, 1991; Markus and Nurius, 1986). Indeed, previous research

332 has shown that the BPS increases motivation, which may be one possible mediator by which

333 it is positively influencing perceptions of self-care (Seear and Vella-Brodrick, 2013; Sheldon

334 and Lyubomirsky, 2006). In this scenario, positive perceptions would emerge as the result of

335 being motivated by the task. Indeed, this finding, combined with the absence of a BPS effect

336 on other aspects of diabetes self-management (blood glucose control, physical activity, diet,

337 health service use), seems to validate our qualitative data. Self-care suggests autonomous,

338 deliberate, and self-initiated activity; concepts that seem to resonate with the ‘Illness

339 Ownership’ and ‘Advocating a Personal Approach’ themes. In essence, the BPS may be

340 achieving its effects in this context because it makes people with diabetes feel ‘in control’ of

341 their illness. Given that people with diabetes generally receive extensive education about self-

342 management, it is plausible the BPS activates related cognitive appraisals (e.g., perceptions of

343 ‘control’ or ‘ownership’) that then mediate its effect on self-care activities. If so, it is

344 necessary for future research to demonstrate such mediator effects.

345

346 Curiously, the quantitative data revealed that the intervention failed to influence health

347 service use, conflicting with several previous studies that reported fewer health centre visits

348 in BPS users (King, 2001; Austenfeld et al., 2006; Austenfeld and Stanton, 2008; Maddalena

349 et al., 2014). There is a need for further research to explain this inconsistency. One important  
350 factor to consider here is that previous studies generally used non-clinical samples, whereas  
351 the present study examined people with diabetes (although recruited through community  
352 settings). Health care use in the latter group may be heavily dependent on various other  
353 factors (e.g., scheduled medical testing, treatment plans). It is also plausible that a longer  
354 follow-up period (i.e. greater than 4 weeks post intervention) was needed to detect whether  
355 any significant behaviour changes occur (not just health care use), given the discrepancy  
356 between individual's perceptions of care and their scores on actual self-management. There  
357 may be lag between people's improved attitudes towards their care and a statistically  
358 significant change in behaviour.

359

### 360 **Limitations**

361 The sample was arguably biased, as it consisted primarily of pro-active individuals  
362 sufficiently motivated to participate in an interview, attend group meetings and/or complete  
363 an online study. Future research should look at using larger scale trials to rigorously assess  
364 this intervention using a significantly larger sample size. Furthermore, the short follow-up  
365 period built into the quantitative study meant we were unable to assess long-term effects on  
366 not only behaviours but on emotions and perceptions. Long-term efficacy is particularly  
367 important in individuals living with a long-term condition (as opposed to short-lived illness),  
368 for obvious reasons. Additionally, the impact of the BPS on clinical markers is unclear.  
369 Finally, it is noteworthy that people living with diabetes in the UK receive free healthcare,  
370 which may present different emotional challenges in diabetes self-management, compared to  
371 those from countries without a universal health care system.

372

373



374

## 375 **Conclusion**

376 In conclusion, the BPS was found to have some utility within a diabetes context, but needs  
377 further refinement. The procedure improved perception of self-care up to four weeks after  
378 exposure but did not affect other self-management behaviours. However, behaviour change  
379 may occur over time. This investigation builds on previous studies, which have demonstrated  
380 the efficacy of the BPS for improving mood and general wellbeing, but not within a diabetes  
381 context. To the best of our knowledge, this is the first study to evaluate the BPS in  
382 individuals with diabetes. This research also highlighted the importance of personalising the  
383 BPS and tailoring language accordingly for this population (National Health Service, 2018).  
384 One important avenue for further research is evaluating the impact of this intervention on  
385 actual physical health. Given that the BPS facilitates self-care perceptions in people with  
386 diabetes, as observed here, there is a need to determine whether the protocol can help reduce  
387 actual diabetes-related symptoms and clinical outcomes – previous research suggests the  
388 intervention may improve health and well-being (Layous et al., 2013).

389

## 390 **REFERENCES**

- 391 American Diabetes Association. (2014) Diagnosis and Classification of Diabetes Mellitus.  
392 *Diabetes Care* 37: S81-S90.
- 393 Austenfeld JL, Paolo AM and Stanton AL. (2006) Effects of writing about emotions versus  
394 goals on psychological and physical health. *Journal of Personality* 74: 267-286.
- 395 Austenfeld JL and Stanton AL. (2008) Writing about emotions versus goals: Effects on  
396 hostility and medical care utilization moderated by emotional approach coping  
397 processes. *Br J Health Psychol* 13: 35-38.

398 Bak W. (2015) Possible Selves: Implications for Psychotherapy. *International Journal of*  
399 *Mental Health and Addiction* 13: 650-658.

400 Bargh JA, Gollwitzer PM, Lee-Chai A, et al. (2001) The automated will: Nonconscious  
401 activation and pursuit of behavioral goals. *J Pers Soc Psychol* 81: 1014-1027.

402 Bishop FL. (2015) Using mixed methods research designs in health psychology: An  
403 illustrated discussion from a pragmatist perspective. *Br J Health Psychol* 20: 5-20.

404 Bowen GA. (2008) Naturalistic inquiry and the saturation concept: a research note.  
405 *Qualitative Research* 8: 137-152.

406 Camara A, Balde NM, Enoru S, et al. (2015) Prevalence of anxiety and depression among  
407 diabetic African patients in Guinea: association with HbA1c levels. *Diabetes Metab*  
408 *41: 62-68.*

409 Carter N, Bryant-Lukosius D, DiCenso A, et al. (2014) The Use of Triangulation in  
410 *Qualitative Research. Oncology Nursing Forum* 41: 545-547.

411 Chen L, Chuang LM, Chang CH, et al. (2013) Evaluating self-management behaviors of  
412 diabetic patients in a telehealthcare program: longitudinal study over 18 months. *J*  
413 *Med Internet Res* 15: e266.

414 Clarke V and Braun V. (2017) Thematic analysis. *Journal of Positive Psychology* 12: 297-  
415 298.

416 Cohn MA, Pietrucha ME, Saslow LR, et al. (2014) An online positive affect skills  
417 intervention reduces depression in adults with type 2 diabetes. *Journal of Positive*  
418 *Psychology* 9: 523-534.

419 Coulter A, Entwistle VA, Eccles A, et al. (2015) Personalised care planning for adults with  
420 chronic or long-term health conditions. *Cochrane Database Syst Rev.*

421 Coulter A, Roberts S and Dixon A. (2013) *Delivering better services for people with long-*  
422 *term conditions: Building the house of care.* London.

423 Crawford JR and Henry JD. (2004) The positive and negative affect schedule (PANAS):  
424 Construct validity, measurement properties and normative data in a large non-clinical  
425 sample. *British Journal of Clinical Psychology* 43: 245-265.

426 Creswell JW and Plano Clark VL. (2007) *Designing and conducting mixed methods research*,  
427 Thousand Oaks, CA: Sage.

428 Cross S and Markus H. (1991) Possible Selves across the Life-Span. *Human Development*  
429 34: 230-255.

430 Dark-Freudeman A and West RL. (2016) Possible Selves and Self-Regulatory Beliefs:  
431 Exploring the Relationship Between Health Selves, Health Efficacy, and  
432 Psychological Well-Being. *International Journal of Aging & Human Development* 82:  
433 139-165.

434 de Groot M, Golden SH and Wagner J. (2016) Psychological Conditions in Adults With  
435 Diabetes. *American Psychologist* 71: 552-562.

436 Diabetes UK. (2009) *Diabetes care and you: what diabetes care you can expect*. Diabetes UK.  
437 London: Diabetes UK.

438 Fredrickson BL. (2004) The broaden-and-build theory of positive emotions. *Philos Trans R*  
439 *Soc Lond B Biol Sci* 359: 1367-1378.

440 Fritz HA. (2017) Challenges to developing diabetes self-management skills in a low-income  
441 sample in North Carolina, USA. *Health & Social Care in the Community* 25: 26-34.

442 Garland EL, Fredrickson B, Kring AM, et al. (2010) Upward spirals of positive emotions  
443 counter downward spirals of negativity: Insights from the broaden-and-build theory  
444 and affective neuroscience on the treatment of emotion dysfunctions and deficits in  
445 psychopathology. *Clinical Psychology Review* 30: 849-864.

446 Gregg JA, Callaghan GA, Hayes SC, et al. (2007) Improving diabetes self-management  
447 through acceptance, mindfulness, and values: A randomized controlled trial. *Journal*  
448 *of Consulting and Clinical Psychology* 75: 336-343.

449 Hagger MS. (2010) Self-regulation: an important construct in health psychology research and  
450 practice. *Health Psychology Review* 4: 57-65.

451 Hayes AF. (2013) *Introduction to Mediation, Moderation, and Conditional Process Analysis:*  
452 *A Regression-based Approach*, New York, NY: The Guilford Press.

453 Huffman JC, DuBois CM, Healy BC, et al. (2014) Feasibility and utility of positive  
454 psychology exercises for suicidal inpatients. *General Hospital Psychiatry* 36: 88-94.

455 Ismail K, Winkley K and Rabe-Hesketh S. (2004) Systematic review and meta-analysis of  
456 randomised controlled trials of psychological interventions to improve glycaemic  
457 control in patients with type 2 diabetes. *Lancet* 363: 1589-1597.

458 King LA. (2001) The health benefits of writing about life goals. *Personality and Social*  
459 *Psychology Bulletin* 27: 798-807.

460 Layous K, Nelson SK and Lyubomirsky S. (2013) What Is the Optimal Way to Deliver a  
461 Positive Activity Intervention? The Case of Writing About One's Best Possible  
462 Selves. *Journal of Happiness Studies* 14: 635-654.

463 Loveday PM, Lovell GP and Jones CM. (2016) The best possible selves intervention: A  
464 review of the literature to evaluate efficacy and guide future research. *Journal of*  
465 *Happiness Studies*: 1-22.

466 Maddalena CJ, Saxey-Reese R and Barnes EL. (2014) Targeting writing interventions to  
467 emotional processing level: a factorial experimental design. *Quality & Quantity* 48:  
468 2939-2962.

469 Markus H and Nurius P. (1986) Possible Selves. *American Psychologist* 41: 954-969.

470 Meevissen YMC, Peters ML and Alberts HJEM. (2011) Become more optimistic by  
471 imagining a best possible self: Effects of a two week intervention. *Journal of*  
472 *Behavior Therapy and Experimental Psychiatry* 42: 371-378.

473 Moskowitz JT, Carrico AW, Duncan LG, et al. (2017) Randomized Controlled Trial of a  
474 Positive Affect Intervention for People Newly Diagnosed With HIV. *Journal of*  
475 *Consulting and Clinical Psychology* 85: 409-423.

476 National Health Service. (2018) Language matters: language and diabetes. London: NHS  
477 England Gateway Number: 07922.

478 Parks AC, Della Porta MD, Pierce RS, et al. (2012) Pursuing Happiness in Everyday Life:  
479 The Characteristics and Behaviors of Online Happiness Seekers. *Emotion* 12: 1222-  
480 1234.

481 Pascoe MC, Thompson D, Castle D, et al. (2017) Psychosocial interventions decrease  
482 depression and anxiety in individuals with diabetes mellitus: a meta analysis.  
483 *European Journal of Cardiovascular Nursing* 16: S4-S5.

484 Peters ML, Flink IK, Boersma K, et al. (2010) Manipulating optimism: Can imagining a best  
485 possible self be used to increase positive future expectancies? *Journal of Positive*  
486 *Psychology* 5: 204-211.

487 Peters ML, Smeets E, Feijge M, et al. (2017) Happy Despite Pain A Randomized Controlled  
488 Trial of an 8-Week Internet-delivered Positive Psychology Intervention for Enhancing  
489 Well-being in Patients With Chronic Pain. *Clinical Journal of Pain* 33: 962-975.

490 Rutter MK and Nesto RW. (2011) Blood pressure, lipids and glucose in type 2 diabetes: how  
491 low should we go? Re-discovering personalized care. *European Heart Journal* 32:  
492 2247-U2132.

493 Schmitt A, Gahr A, Hermanns N, et al. (2013) The Diabetes Self-Management Questionnaire  
494 (DSMQ): development and evaluation of an instrument to assess diabetes self-care  
495 activities associated with glycaemic control. *Health and Quality of Life Outcomes* 11.  
496 Seear KH and Vella-Brodrick DA. (2013) Efficacy of Positive Psychology Interventions to  
497 Increase Well-Being: Examining the Role of Dispositional Mindfulness. *Social*  
498 *Indicators Research* 114: 1125-1141.

499 Sheldon KM and Lyubomirsky S. (2006) How to increase and sustain positive emotion: The  
500 effects of expressing gratitude and visualizing best possible selves. *The Journal of*  
501 *Positive Psychology* 1: 73-82.

502 Shields BM, Peters JL, Cooper C, et al. (2015) Can clinical features be used to differentiate  
503 type 1 from type 2 diabetes? A systematic review of the literature. *BMJ Open* 5.  
504 Sin NL and Lyubomirsky S. (2009) Enhancing Well-Being and Alleviating Depressive  
505 Symptoms With Positive Psychology Interventions: A Practice-Friendly Meta-  
506 Analysis. *Journal of Clinical Psychology* 65: 467-487.

507 Strandberg RB, Graue M, Wentzel-Larsen T, et al. (2014) Relationships of diabetes-specific  
508 emotional distress, depression, anxiety, and overall well-being with HbA1c in adult  
509 persons with type 1 diabetes. *J Psychosom Res* 77: 174-179.

510 Teixeira ME. (2017) Challenges to Effective Self-Management of Type 2 Diabetes (T2D) in  
511 Adults: Results of a Phenomenological Study. *Nursing Research* 66: E94-E94.

512 Turner RC, Holman RR, Cull CA, et al. (1998) Intensive blood-glucose control with  
513 sulphonylureas or insulin compared with conventional treatment and risk of  
514 complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 352: 837-853.

515 Uchendu C and Blake H. (2017) Effectiveness of cognitive-behavioural therapy on glycaemic  
516 control and psychological outcomes in adults with diabetes mellitus: a systematic

517 review and meta-analysis of randomized controlled trials. *Diabetic Medicine* 34: 328-  
518 339.

519 Vandellen MR and Hoyle RH. (2008) Possible selves as behavioral standards in self-  
520 regulation. *Self and Identity* 7: 295-304.

521 Yogo M and Fujihara S. (2008) Working memory capacity can be improved by expressive  
522 writing: A randomized experiment in a Japanese sample. *Br J Health Psychol* 13: 77-  
523 80.

524 Zhou B, Lu Y, Hajifathalian K, et al. (2016) Worldwide trends in diabetes since 1980: a  
525 pooled analysis of 751 population-based studies with 4.4 million participants. *Lancet*  
526 387: 1513-1530.

527 Zigmond AS and Snaith RP. (1983) The Hospital Anxiety and Depression Scale. *Acta*  
528 *Psychiatrica Scandinavica* 67: 361-370.

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542 **Table 1** Participant characteristics

Phase	Interviews	Focus group	RCT	Combined
<b>Age (Mean/SD)</b>	Aged 23 to 25 years (based on 6 participants – the remainder did not state their exact age) (Mean = 45.66, SD = 21.09).	Ages 40 to 70 years (Mean = 58.25, SD = 10.43).	Age 20 to 76 years (Mean = 48.66, SD = 16.99)	Aged 20 to 76 years (Mean = 49.58, SD = 17.10)
<b>No. recruited</b>	12	8	50	70
<b>Females/Males, N (%)</b>	8 Females (66.6%), and 4 Males (33.3%)	5 Females (62.5%) and 3 Males (37.5%)	38 Females (76%) and 12 Males (24%).	51 (72.85%) Females and 19 Males (27.14%)
<b>Type 1 diabetes, N (%)</b>	5 (41.66%)	2 (25%)	28 (56%)	35 (50%)
<b>Type 2 diabetes, N (%)</b>	7 (58.33%)	6 (75%)	22 (44%)	35 (50%)

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**Table 2 The ‘Illness Ownership’ theme (comprising two sub-themes); illustrative quotes from interviewees and focus group participants**

***‘Control and the Diabetes Experience’***

Control over one’s condition was seen to be very important to participants. Individuals expressed a desire to be “in charge”

- “If you sort of take responsibility for it and come out with a good result then you can feel like “oh I did that well this time... When you’ve got control you feel like you’re more... you know what you’re in for?” (K1)

One participant saw the intervention as a way of giving back control to the individual

- “What you’re doing now is putting it back in control of the person by giving them a tool that’s meaningful” (G8)

***‘Taking a Pro-Active Approach’***

Participants believe that taking control requires a pro-active approach

- “I think anyone who doesn’t use the available resources I think is just asking for trouble because, much as we like to say “oh yeah we can do it all, we’re fine, we’re fine”, half the time we’re not” (C7)

Becoming pro-active ultimately involves a decision to take responsibility

- “I think the doctor’s gone as far as he can go and I think it’s now completely down to me” (M3)

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**Table 3 The ‘Advocating a Personal Approach’ theme (comprising two sub-themes); illustrative quotes from interviewees and focus group participants**

***‘Importance of Personalised Care’***

Of significant importance to participants was the need for personalised care. They discussed a need to be recognised as individuals.

- “To make it feel more personal and to inspire confidence... I think there has to be a couple more strands to it. Okay? Like erm how, you know? Write down how you think you can accomplish it” (R2)

Some liked that the BPS was:

- “...an individualised erm bit of thinking which you can take reflective time on” (G8)

***‘The importance of Support’***

Multiple participants say the intervention as a way to open up a dialogue between patient and health care professional.

- “If you wish to share it with your diabetes team...” they have that option don’t they..? Because then that might open a further discussion with their team... because if they said something “I think I can achieve it by doing this...” I mean that’s an opening into the team to discuss what that is” (R2)
- “You’ve got, like, a sort of quick reference to say “well okay diabetic nurse/you know, dietician/whatever it is... this is what’s been going on” (C7)

Some acknowledged not every little detail needed to be shared with a professional.

- “You don’t necessarily always want to tell them EVERYTHING that’s going on... but, you know, if it’s there then they can go “oh well actually that would directly impact” (C7)

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**Table 4 The ‘Barriers and Facilitators’ theme (comprising three sub-themes); illustrative quotes from interviewees and focus group participants**

***‘Individual Factors’***

Personality frequently came up as a barrier/facilitator.

- “My personality dictates that I’m a fighter and I haven’t given up even though I’m doing the right things and not getting the results” (G11).

Some participants were concerned some would find it hard to articulate their thoughts.

- “My initial thought on looking at it was, this would not work for most people I know with diabetes because most of them would find it VERY hard to write. Most of them find it hard enough to talk” (G8)

***‘Motivation’***

Participants saw diabetes as a “challenge”, and the BPS was yet “another thing to do”:

- “I’m not prepared to spend that amount of time on my diabetes. I don’t live for my diabetes. I have... I have improved it once. Erm, for a fortnight...” (J10)

Therefore, the BPS needed to be quick and easy-to-use.

- “We have a lot to do anyway, we have to take our blood every day erm we have to take our medication... so having another thing to do is a bit... it is asking quite a lot of people... You need somebody who’s happy to do that and it’s not just putting something else on their plate that will stress them out further” (D9)

***‘Clarity and Promoting Awareness’***

The BPS may serve as a way for improving awareness.

- “I think I could get quite a lot out of it [the BPS] and a lot of, kind of, what’s the word where... self-realisation?... where you find out more about yourself” (M3)

Awareness did not always translate into action, however.

- “Has this motivated me to get myself into the gym? Erm to be honest, no not really... it’s made me... I guess it’s made me a bit more self-aware? Erm... I’m fully... I’m very aware that I need to get myself into the gym” (R6)

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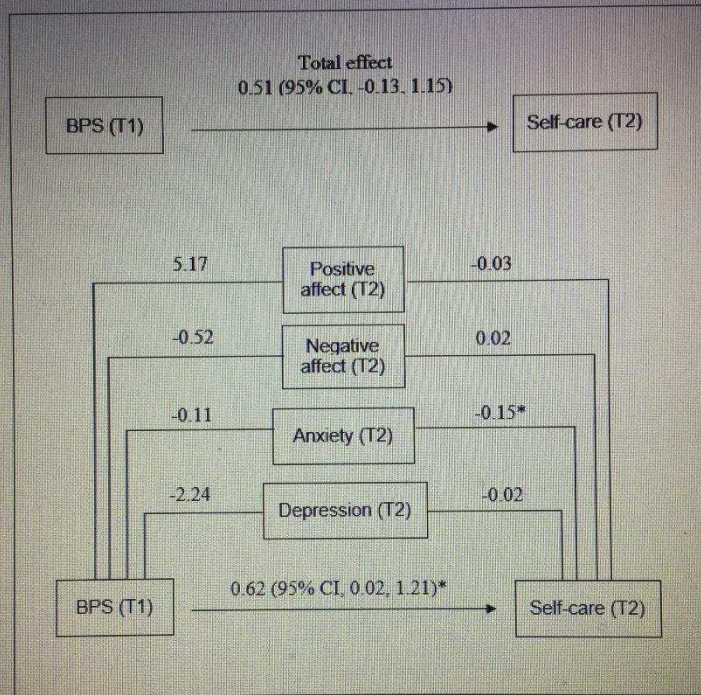


Fig 1 The direct effect of BPS exposure (T1) on self-care activity at the 4-week post-intervention follow-up (T2) (\* $p < 0.05$ )