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Title: A theoretical model of contraceptive decision making and behavior in diabetes: A qualitative application of the Health Belief Model

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Novelty Statement:

- Diabetes has become increasingly common among reproductive-aged women, and their contraceptive needs have been inadequately addressed.
- The unique contribution of this qualitative study is a novel adaptation of the Health Belief Model to contraceptive decision making and behavior in the setting of diabetes.
- We identified the need for person-centered counseling that promotes the contraceptive autonomy of individuals with type 1 diabetes and type 2 diabetes.
- These findings can inform the development of contraceptive interventions that reflect condition-specific concerns and priorities of people with diabetes.

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1 **Abstract:**

2 **Aim:** People with diabetes have contraceptive needs that have been inadequately addressed. The
3 aim of this qualitative study was to develop a theoretical model that reflects contraceptive
4 decision making and behavior in the setting of diabetes mellitus.

5 **Methods:** We conducted semi-structured, qualitative interviews of 17 women with type 1 or type
6 2 diabetes from Michigan, USA. Participants were recruited from a diabetes registry and local
7 clinics. We adapted domains from the Health Belief Model and applied reproductive justice
8 principles to inform the qualitative data collection and analysis. Using an iterative coding
9 template, we advanced from descriptive to theoretical codes, compared codes across
10 characteristics of interest (e.g., diabetes type), and synthesized the theoretical codes and their
11 relationships in an explanatory model.

12 **Results:** The final model included the following constructs and themes: *perceived barriers and*
13 *benefits to contraceptive use* (effects on blood sugar, risk of diabetes-related complications,
14 improved quality of life); *perceived seriousness of pregnancy* (harm to self, harm to fetus or
15 baby); *perceived susceptibility to pregnancy risks* (diabetes is a “high risk” state); *external cues*
16 *to action* (one-size-fits-all/anxiety-provoking counseling versus personalized/trust-based
17 counseling); *internal cues to action* (self-perceived “sickness”); *self-efficacy* (reproductive self-
18 efficacy, contraceptive self-efficacy); and *modifying factors* (perceptions of biased counseling
19 based upon one’s age, race, or severity of disease)

20 **Conclusions:** This novel adaptation of the Health Belief Model highlights the need for
21 condition-specific and person-centered contraceptive counseling for those with diabetes.

22
23 **Introduction:**

24 In the United States, 3.8% of reproductive-aged women* have diabetes mellitus (DM).
25 Diabetes and high glycaemic levels increase the risk of pregnancy-related complications,
26 including preeclampsia, caesarean delivery, macrosomia, stillbirth [1] and maternal deaths [2].
27 People with diabetes often use medications that can cause birth defects, such as angiotensin
28 converting enzyme (ACE) inhibitors [3] or statins [4]. Those who do not desire pregnancy or

*We refer to “women” when citing other studies. Otherwise, we will use the gender-neutral terms “person” or “people” to avoid exclusion of those who identify as transgender or non-binary.

29 want to delay pregnancy and optimize their pre-pregnancy health should receive contraceptive
30 counseling.

31 Despite increased attention to pre-pregnancy care for people with diabetes [5-8], there
32 has been less focus on their contraceptive decision making and behavior. Recent literature,
33 primarily quantitative studies [9, 10], raise concerns that people with type 1 or type 2 diabetes
34 may not be routinely counseled about contraception or informed about the full range of
35 contraceptive options [9-13]. For example, women with diabetes have a higher odds of not using
36 any contraception than women with normoglycemia [9] (OR 1.9, 95% CI 1.25-2.87). Among
37 women with diabetes who do use contraception, they are less likely to use the intrauterine device
38 (IUD) and more likely to undergo tubal sterilization than their peers without diabetes [11].

39 What remains relatively unexplored are the psychosocial and cognitive factors that drive
40 such contraceptive decisions. There is also a need to evaluate these factors within the context of
41 behavioral health theory. Contraceptive interventions are more likely to be effective if they are
42 informed by the theoretical underpinnings of modifiable beliefs and behaviors[14]. In a 2012
43 concept paper, Hall proposed that the Health Belief Model (HBM), an extensively tested social-
44 cognitive theory [15], can guide understanding of contraceptive behavior among adults. She
45 posited that contraceptive use is predicated on sufficient motivation to prevent pregnancy [16].
46 Factors that drive this motivation include perceived threat of pregnancy, perceived barriers and
47 benefits to contraception, “cues” that drive these perceptions, and personal characteristics (e.g.,
48 age, race/ethnicity)[16]. To date, no prior investigators have operationalized these constructs at
49 the intersection of contraception and diabetes. To address this gap, we conducted this qualitative
50 study to adapt constructs of the Health Belief Model and develop a theoretical model regarding
51 contraceptive decisions and behavior in the setting of diabetes.

52 **Methods:**

53 This study was part of a larger mixed methods study to assess the contraceptive
54 experiences of people with chronic medical conditions [17]. Eligible participants included those
55 who were assigned female sex at birth, aged 18-50 years, able to speak English, premenopausal,
56 and diagnosed with diabetes. Pregnant individuals were excluded. We recruited participants
57 from a diabetes registry and local hospital- and community-based clinics (primary care,
58 nephrology, and endocrinology) in southeast Michigan, USA. Because this study was focused
59 on theory generation rather than hypothesis testing, we sought to include people with a broad

60 range of diabetes and health experiences. We conducted maximum variation sampling, described
61 by Palinkas and colleagues as a method to “identify and expand the range of differences and
62 variations” and “important shared patterns that cut across cases [18].” Thus, we purposefully
63 sampled approximately equal numbers of those with type 1 diabetes and type 2 diabetes, as well
64 as those who use and do not use insulin [19]. We sought to oversample racial and ethnic
65 minorities and participants across a range of self-reported health scores per the National Health
66 and Nutrition Examination Survey (NHANES)[20] item “Would you say your health is
67 excellent, very good, good, fair, or poor?[21]” The study was approved by the University of
68 Michigan Institutional Review Board (HUM00128060). We conducted interviews from April
69 2018 to January 2020.

70 Trained research assistants (EJ, KB) conducted semi-structured, qualitative interviews of
71 eligible and consented participants [22]. Interviews lasted about 30 minutes to one hour and
72 were conducted face-to-face in a private room at their health care professional’s (HCP) office or
73 other setting (e.g., library). Two interviews were conducted by phone to accommodate
74 participants’ scheduling constraints. The interviews were audio-recorded with the participant’s
75 permission and professionally transcribed with removal of personal identifiers. The interview
76 transcripts were managed with MAXQDA software (version 12.3.6)[23]. Participants received
77 \$25 for completion of the interview.

78 The qualitative interview guide had open-ended questions to elicit experiences regarding
79 diabetes, pregnancy, and contraception. In our analysis, we sought to explore the HBM domains
80 as operationalized by Hall [16]: 1) *cost-benefit analysis* (perceived benefits and barriers related
81 to contraceptive use); 2) *perceived threat* (perceived susceptibility to pregnancy risks and
82 perceived seriousness of pregnancy risks); 3) *cues to action* (internal or external stimuli that
83 trigger perceptions and facilitate actions to mitigate threats); 4) *modifying and enabling factors*
84 (personal factors that alter one’s experience of the other constructs, e.g., race/ethnicity). In
85 addition, we explored *self-efficacy*, a construct that has been included in more recent versions of
86 the HBM, which we operationalized as an individual’s confidence in carrying out a reproductive
87 health behavior [5].

88 Two team members conducted the qualitative analysis (EJ, JPW) using an iterative
89 template coding method as described by Crabtree and Miller [24]. We independently read the
90 first few transcripts and assigned codes to text passages that captured underlying concepts [25].

91 We created a final coding template and applied codes to the remainder of the transcripts. We
92 then examined our codes in relation to the HBM domains and considered how each code
93 contributed to our understanding of each domain. Using a matrix worksheet in Excel (Version
94 16.36), we compared and contrasted codes to explore patterns of experiences across diabetes
95 type (type 1 vs. type 2), insulin treatment, self-reported health, and race/ethnicity. To challenge
96 our underlying assumptions, we actively sought alternative explanations and periodically
97 reviewed the emerging analysis with the rest of the research team (MD, AO, KB, MVS). We
98 stopped interviews once theoretical efficiency was achieved [26], the point at which we saturated
99 understanding of the theoretical domains. In the final analytic phase, we synthesized the
100 domains, themes, and their relationships in a graphic model.

101 **Results**

102 There were 17 participants, 10 (59%) with type 1 diabetes and 7 (41%) with type 2
103 diabetes (Table 1). The largest ethnic/racial group was non-Hispanic Black (n=7), followed by
104 non-Hispanic White (n=6), Latina/Hispanic (n=3), and other (n=1). Tables 2-4 summarize the
105 HBM domains and related qualitative themes. Illustrative quotations from participants are
106 provided throughout the manuscript and Tables; all participants are represented at least once.
107 Figure 1 depicts the fully conceptualized theoretical model.

108 **1. Cost benefit analysis: Perceived barriers and benefits to contraceptive use (Table 2)**

109 Participants identified diabetes-specific barriers and benefits to contraception, and how
110 they weighed these factors when selecting a contraceptive method (referred to hereinafter as
111 “method”). A prominent concern was that contraception, often referred to simply as ‘hormones’,
112 could affect glucose levels. Participants were unsure about the impact of hormones. Some
113 vaguely recalled warnings from their HCPs (“I’ve been told that [birth control] can affect blood
114 sugar, but they never really said exactly what kind,” White, parous, type 1 diabetes, 36-40 years).
115 Participants generally prioritized glycaemic management over hormonal contraception use;

116 When I was using the birth control pill, it was causing complications with my
117 diabetes. I mean, diabetes is hard enough to manage on its own, to not have to try
118 and juggle that plus a contraceptive. So, then we just went to using condoms
119 instead. (Hispanic, White, parous, type 1 diabetes, >40 years)

120 Participants had different opinions about the pros and cons of oral contraceptive pills.
121 Some felt that taking oral contraceptive pills would be easy because they already take daily
122 diabetes medications. Others felt that adding another pill would be burdensome:

123 I didn't wanna have to remember to take the pill at the same time, all the time.
124 Because at that time, I wasn't on a lot of meds, and I didn't wanna have to
125 remember to take it the same time. (White, nulliparous, type 2 diabetes, 36-40
126 years)

127 A significant concern among participants was that a method may exacerbate their co-
128 morbidities or increase their risk of diabetes-related complications. Many worried about
129 hormonal contraception causing weight gain, especially the injectable progestin (hereinafter
130 referred to as "the shot"). Weight gain could, in turn, worsen their diabetes ("[the shot] also
131 made me gain a lot of weight. So then when I gained weight, that made my diabetes worse."
132 White, parous, type 1 diabetes, 36-40 years). Another fear was that placement of intrauterine
133 devices (IUDs) or the subdermal arm implant may increase the risk of infection ("bein' diabetic,
134 anything you open up can become infected" White, nulliparous, type 2 diabetes, 36-40 years).

135 Others acknowledged that some methods have non-contraceptive health benefits. This
136 participant with polycystic ovarian syndrome described using oral contraceptive pills to lower
137 her risk of endometrial cancer (I started birth control because I was havin' issues with the cycle
138 not stopping, and the OB/GYN especially was worried about causin' maybe uterine cancer.
139 (Black, parous, type 2 diabetes, >40 years).

140 This participant highlighted the "no hassle" benefit of the IUD, which did not add to the
141 stress of diabetes management ("I mean diabetes is hard enough to manage on its own, to not
142 have to try and juggle that plus a contraceptive was important" Hispanic, White, parous, type 1
143 diabetes, >40 years).

144 **2. Perceived threat: Perceived seriousness and susceptibility related to pregnancy (Table 3)**

145 *Perceived seriousness to self*

146 Women who had never experienced childbirth spoke little about their perceived risks of
147 pregnancy. Few had received education about this topic. Parous women had greater
148 understanding of diabetes-related pregnancy risks, such as preeclampsia, premature labor, and
149 cesarean delivery. Those who had suffered serious pregnancy events and subsequently
150 underwent tubal ligation were strongly motivated by fears of problems in a subsequent

151 pregnancy. This participant’s childbirth was complicated by a stroke, premature delivery, and
152 preeclampsia:

153 After I had my son, I just felt like I think my health would be a little bit more
154 important than having another child, and either the baby, or me, would lose its
155 life, you know. So I just wanted my tubes tied.. I just wanted to be more proactive
156 than, you know reactive. (Asian, parous, type 1 diabetes, 31-35 years)

157 *Perceived seriousness to the fetus/baby*

158 Participants articulated threats to the fetus and baby as distinct from threats to
159 themselves. Most participants were able to identify macrosomia as a risk of gestational diabetes
160 either from personal experience (“my daughter was huge...so I ended up being induced with her”
161 Black, parous, type 2 diabetes, 31-35 years) or from knowledge gained elsewhere. Others
162 worried about serious “deformity” of the baby as a result of diabetes: I watched a talk show
163 where this girl was pregnant with type one diabetes and she wasn’t controlled, and her baby was
164 not growing one of its limbs (White, nulliparous, type 1 diabetes, 26-30 years).

165 *Perceived susceptibility: “I am high risk”*

166 The perception of “being high risk” was common among participants, even among those
167 who never had pregnancy complications or been told they are high risk by their HCPs. Some
168 referred to “high risk” as a generic label assigned to pregnant women with diabetes (“Basically
169 the second I conceive I feel like I’m a high-risk pregnancy. I’m identified as such because of the
170 diabetes,” White, nulliparous, type 1 diabetes, 26-30 years).

171 **Cues to Action: External and internal stimuli (Table 4)**

172 **External stimuli**

173 *Absence of provider counseling:*

174 Most participants reported that they had not received contraceptive counseling during
175 routine office visits. When HCPs did provide counseling, it strongly informed their contraceptive
176 decisions. There were examples of positive and negative counseling interactions with HCPs.

177 *Negative provider interactions (one-size-fits-all, anxiety-provoking)*

178 Several participants described impersonal, “one-size-fits-all” approaches to contraceptive
179 counseling. This participant recalled being repeatedly admonished by her HCP to “get on birth
180 control” based upon assumptions about her sexual behavior rather than her actual contraceptive
181 needs:

182 ..they automatically assume you're sexually active. And so they're like you need
183 to get on birth control, and I'm like I'm not doin' that 'cause we're not active ...It
184 was upsetting because I already said no. ...They asked me so many times that I
185 eventually, bef—like the year before we got married, I got on it [birth control].
186 But, um... which was a bad experience, so. (Black, nulliparous, type 1 diabetes,
187 20-25 years)

188 Others described HCPs who catastrophized pregnancy, which triggered anxiety and
189 distress. This participant recalls a “traumatic” encounter with a diabetes nutritionist:

190 ..she's like on the verge of 'you're gonna die.' Cause my A1C's weren't good.
191 And so she did say don't get pregnant, which again, I was a teen, so wasn't
192 considering it anyway. ..Those are like the few times I cried. 'Cause that
193 traumatized me.” (White, nulliparous, type 1 diabetes, 20-25 years)

194 *Positive provider counseling (personalized, trust-based counseling)*

195 There were examples of those who trusted their providers and would seek out their family
196 planning advice. This participant spoke appreciatively about how her endocrinologist gave
197 personalized advice that considered her current health, diabetes management, and partner
198 relationship:

199 Actually we just talked about this with my endocrinologist. I just got married last
200 year, so he's like if you're planning for a baby, like now would be the time, like
201 height of your health. Like you've been doin' really well. He's like you're okay
202 to have a baby now. And I'm just like a couple years ago that wasn't even a
203 thought. One, because, I wasn't married, and two was 'cause my health was
204 terrible. (Black, nulliparous, type 1 diabetes, 20-25 years)

205 *Stories and advice from others*

206 Family members and friends shared contraceptive stories that greatly influenced
207 participants' attitudes and decisions. Those who experienced side effects or complications they
208 attributed to a method shared the most compelling anecdotes. Often, these narratives influenced
209 participants to decide against a method:

210 'Cause my best friend had it, and she had a lot of complications. And she told me,
211 because they were gonna give me the IUD at one point in time. And because of all

212 the complications and the pain that she was in, I chose not to, to get it. (Hispanic,
213 White, parous, type 1 diabetes, >40 years)

214 **Internal stimuli**

215 *Self-perceived “sickness”*

216 Self-perceptions of illness shaped the strength of one’s motivations to avoid pregnancy.
217 Women who identified as having poor health or who had previously struggled with poor health
218 worried they would “not be in good shape to sustain a pregnancy” (White, nulliparous, type 1
219 diabetes, 20-25 years). This participant rationalized pregnancy avoidance was necessary to
220 protect herself and a potential baby due to the severity of her illness:

221 Along with the diabetes and the kidney disease, the chances would be high risk
222 for the baby. I’m so sick I can’t, honestly I, I, if I was able to get pregnant, I
223 shouldn’t be pregnant. Because, I can be so, really sick and so can the baby.
224 (Hispanic, White, parous, type 1 diabetes, >40 years)

225 This nulliparous participant felt that people with “too many health problems” would not
226 make suitable parents and may pass on genetic problems to their offspring. She cites this
227 concern as a rationale for adopting children:

228 ...certain humans wouldn’t be allowed to have kids because they’ve had too many
229 health problems. I always thought about if I ever felt healthy enough to take care
230 of a child, it would be one I would adopt, because I wouldn’t want to risk giving
231 ‘em my health conditions. (White, nulliparous, type 2 diabetes, asthma, CKD, >40
232 years)

233 **3. Self-efficacy (Table 4)**

234 *Reproductive self-efficacy: “You need to plan and prepare”*

235 Participants varied in their confidence regarding pre-pregnancy preparation and ability to
236 maintain a healthy pregnancy. “Being prepared” for pregnancy was a key strategy to mitigate
237 risk. This participant advocated for battle-readiness attention to combat an evolving threat:

238 You have to be prepared for everything. You gonna have to modify because...
239 day one week one, may not be the same as week 37 or 38 or 39 or 40 tryin’ to
240 deliver. So, like I tell people, nowhere in the rulebook does it say you can’t cry, it
241 just says you can’t quit. That’s, you have to be in control. ‘Cause I tell diabetes

242 every day, you will not beat me. We can fight all day, but you will not beat me.
243 (Black, parous, type 2 diabetes, >40 years).

244 Other participants expressed a sense of powerlessness to achieve the recommended
245 glycaemic levels: “there’s a chance that you know my blood sugar might go crazy if I’m
246 pregnant. And I don’t know if, that I can control it or not.” (White, nulliparous, type 1 diabetes,
247 26-30 years). Even for those with well controlled diabetes, the anticipation of maintaining “tight”
248 control throughout the pregnancy was anxiety-provoking:

249 I feel like if I got pregnant, my diabetes probably go out of control, I feel. I’m
250 really afraid of that prospect. I think my control is pretty tight. I can’t imagine
251 what else I need to do to keep it even tighter. That really stresses me out..
252 (Hispanic, White, nulliparous, type 1 diabetes, 26-30 years)

253 *Contraceptive self-efficacy*

254 Self-efficacy also manifested in participants’ ability to advocate for their contraceptive
255 preferences, including when to start or stop a method. One participant sought multiple providers
256 to find one who agreed to remove her IUD (“I literally went in there and said I don’t wanna talk
257 to you about anything; I wanna have this taken out”, Black, nulliparous, type 1 diabetes, 20-25
258 years). This participant described an earlier pattern of contraceptive use that appeared to driven
259 by her providers’ recommendations rather than her preferences:

260 I started with, with Depo... And, then they moved me into the birth control
261 pills... from there I wish they would of given me the IUD because I ended up
262 with a lot a facial hair growth... I would have been a much happier person.
263 (White, parous, type 2 diabetes, 36-40 years)

264 **4. Modifying and enabling factors: Age and race (Table 4)**

265 A reproductive justice theme emerged that highlighted the intersectional impact of age, race, and
266 disease severity on contraceptive counseling. Some reported that their tubal ligation requests
267 were denied because they were “too young” at the time of the request. In contrast, this
268 participant does not recall substantive counseling prior to undergoing tubal ligation at 24 years
269 old:

270 It was somethin’ I didn’t discuss with really nobody, I just did it. And that’s why I
271 said it was just a rash decision I jumped into, and to this day regret it. (Black,
272 parous, type 1 diabetes, 36-40 years)

273 A Latina participant believed that her tubal ligation request was approved - despite her
274 young age- because of her “high risk” state:

275 I was really sick with my third pregnancy. They knew I was high risk, and that
276 why they let me do it. They said normally, if I was healthy, they wouldn’t do it at
277 the age I was. (Hispanic White, parous, type 1 diabetes, >40 years).

278 In the most extreme cases, participants felt coerced into using a method. One participant
279 felt “80% pressured into using” an IUD and believed this reflected her provider’s racist
280 stereotypes about Black women:

281 I don’t make every issue a race issue. But a lot of times, even me workin’ in the
282 clinic, and seein’ how some doctors respond to certain different races, and, um,
283 genders as well, I felt disrespected. And I felt like she looked at me as if like you
284 know, I’m just gonna be out here havin’ babies, and not bein’ able to take care... I
285 felt slighted in a way. (Black, nulliparous, type 1 diabetes, 20-25 years)

286 **5. Exploration of contraceptive experiences by subgroups**

287 Compared to those with type 2 diabetes, those with type 1 diabetes provided more
288 detailed descriptions of how diabetes affects their daily lives since youth, particularly the daily
289 demands of glycemic management. With respect to reproductive health and contraceptive
290 experiences, we did not identify any salient thematic differences based upon diabetes type or
291 insulin treatment, or self-reported health. Rather, we noted shared experiences across these
292 groups, particularly a strong preference for tubal ligation among those who had had difficult
293 pregnancies and childbirth. Participants had mixed feelings about the IUD; some had positive
294 experiences, while others had concerns about IUD complications based upon stories from friends
295 and family members.

296 **Theoretical model of contraceptive decision making and behavior (Figure 1)**

297 The final model proposes that the perceived threat of pregnancy-which applies to both the
298 individual and the fetus/baby- and the perceived pros/cons of contraceptive use drive two
299 behavioral antecedents: the motivation to avoid pregnancy and the motivation to use
300 contraception. These motivations, in turn, drive contraceptive decisions and behavior. External
301 or internal cues to action magnify or mitigate fears of pregnancy complications or the pros/cons
302 of contraception use. An illness-focused paradigm of diabetes (“I am high risk”) or prior
303 pregnancy complications can strongly motivate one to avoid pregnancy and select a highly

304 effective reversible method or tubal ligation. A positive cue to action is person-centered
305 counseling that balances the relative benefits and risks of pregnancy and contraception in an
306 individualized manner. Self-efficacy shapes one's perceived ability to meet the challenges of
307 glycaemic management during pregnancy, which in turn influence one's motivation to pursue
308 pregnancy or contraception. Self-efficacy also manifests as the confidence to advocate for one's
309 reproductive or contraceptive priorities, even if the action goes against HCPs' recommendations.
310 An individual's age, race, or severity of diabetes may affect HCPs' counseling based upon
311 conscious or unconscious biases. In the worst-case scenario, contraceptive coercion- such that a
312 person feels pressured to use a particular method- can drive contraceptive decisions and
313 behavior.

314
315

316 **Discussion:**

317 This study and the proposed theoretical model advances the fields of diabetes and
318 reproductive health research in several ways. First, our application of the HBM construct of
319 "perceived threat" is novel. The traditional HBM model conceptualizes the condition of interest
320 and the risks associated with it as outcomes to be avoided indefinitely [15]. Our application of
321 "perceived threat" to pregnancy acknowledges that pregnancy can be a desired state. Second, our
322 model operationalizes "perceived threat" as a dual-pronged threat to self *and* to the fetus/baby.

323 Second, we oversampled for Black participants and brought their perspectives into
324 sharper focus through a reproductive justice lens. Rooted in Black feminist scholarship, the
325 premise of reproductive justice rests upon the right to choose if and when to become pregnant
326 and parent [27]. Our findings underscore the need to challenge assumptions about pregnancy
327 desires based upon one's ethnic/racial background, age, and disease status. Participants wanted
328 their HCPs to actively elicit their pregnancy desires and engage in shared decision making based
329 upon these values [28].

330 Our analysis identified knowledge gaps that should be targets for contraceptive
331 education. Participants were generally not counseled about the bi-directional impact of diabetes
332 on contraception and vice versa. Across diabetes type and self-reported health status, people
333 reported strong fears of diabetes-related complications from hormonal contraception. Yet
334 according to evidence-based guidelines, it is reasonable for people with uncomplicated diabetes

335 to use estrogen-containing contraceptives [29]. Those who have evidence or suspicion of end-
336 organ disease should be advised to use estrogen-free methods [29]. HCPs can dispel myths about
337 IUDs and counsel that the majority of people with diabetes are candidates for these highly
338 efficacious and reversible alternatives to permanent contraception.

339 We identified similarities rather than appreciable differences across people with a range
340 of diabetes-related experiences (diabetes type, insulin treatment) and self-reported health status.
341 Previous contraceptive and pregnancy experiences were more closely aligned with contraceptive
342 decisions than diabetes-related experiences. This finding supports the application of this model
343 for people along a continuum of diabetes-related experiences.

344 This study had limitations. All participants were from Michigan, USA. Most were
345 insured and had some college education. Our findings may not reflect the experiences of those
346 who are uninsured, less educated, or live in other regions. While we did not identify themes that
347 varied by diabetes type, it is possible we may have found differences in a larger sample.

348 This qualitative study generated new knowledge regarding perceptions and motivations
349 relevant to contraceptive decisions in the setting of diabetes. This novel adaptation of the Health
350 Belief Model, guided by reproductive justice principles, can inform future interventions designed
351 to address diabetes-, age-, and race/ethnicity-related reproductive health disparities.

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437

Table 1: Participant Characteristics (N=17)

Characteristic	N
Age	
18-25	2
26-30	4
31-35	2
36-40	4
>40	5
Race/Ethnicity	
Non-Hispanic White	6
Non-Hispanic Black	7
Hispanic	3
Asian	1
Education	
High school/GED	1
Some college	8
College degree or higher	8
Insurance*	
Private	8
Medicaid	8
Medicare	2
Other	1
Self-reported health status	
Poor	1
Fair	7
Good	8
Very Good	1
Parity	
Nulliparous	7
Prior birth control*	
Estradiol/Progestin containing contraception (ring, patch, pills)	13

Progestin shot, Depo-Provera®	8
Long-acting reversible contraception (IUD, Implant)	8
Female Sterilization	3
Current birth control*	
Estradiol/Progestin containing contraception (ring, patch, pills)	1
Progestin shot, Depo-Provera®	2
Long-acting reversible contraception (IUD, Implant)	6
Female Sterilization	3
Male Condoms	6
Withdrawal	2
Diabetes Mellitus Status	
Insulin dependent type 1 diabetes	10
Not insulin treated, type 2 diabetes	4
Insulin treated, type 2 diabetes	3
DM = Diabetes Mellitus, GED = General Educational Development test, IUD = Intrauterine Device	
*May not add up to 100% because these categories are not mutually exclusive	

Table 2. Cost-Benefit Analysis: Perceived Barriers and Benefits of Contraceptive Use

Themes and subthemes	Quotations
'Hormones' may affect blood sugar	
	And I don't know if that was because I had an extra hormone, rummaging through my body or whatnot. But I noticed that my blood sugars were tremendously high. (black, nulliparous, T1DM, 20-25 years)
Daily oral contraceptive pills	
Advantage	I chose the pill because I thought it might be a little easier for me because I'm already takin' meds. (black, parous, T2DM, >40 years)
Disadvantage	I already take a lot of medication. And it would be another thing to have to remember. (Hispanic, white, nulliparous, T1DM, 26-30 years)
Birth control and comorbidities	
Worsen comorbidities or diabetes-related complications	I've actually done a lot a research into that, 'cause I, I didn't wanna take a birth control that would make my weight increase. I think that would really bother me. And it would impact my diabetes too. (Hispanic, white, nulliparous, T1DM, 26-30 years)
	I'm a little bit concerned about getting on a birth control, just because of like the stroke risk, and given the fact that I have high cholesterol. Combined with diabetes, the stroke risk is like a concern of mine. (white, nulliparous, T1DM, 26-30 years)
Improve co-conditions or quality of life	The IUD came after the tubal ligation. Not as a birth control method, but because I was having heavy bleeding with my periods. My iron level was really, really low. So that's when my doctor did the IUD. (Hispanic, white, parous, T1DM, >40 years).
	With the IUD I don't have to worry about being consistent because I was still workin' on bein' consistent with my insulin. I didn't want to be distracted (black, nulliparous, T1DM, 20-25 years).

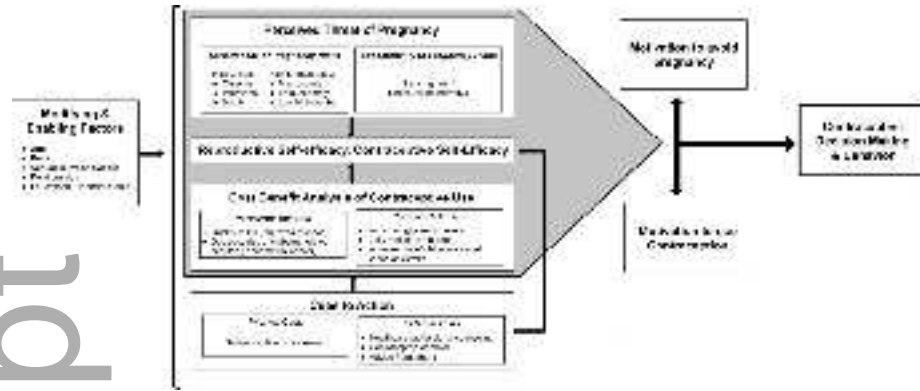
Table 3. Perceived Threat of Pregnancy: Perceived seriousness and perceived susceptibility

Themes and subthemes	Quotations
Perceived seriousness	
Harm to pregnancy, fetus, baby (macrosomia, fetal deformities)	My mom told me that she didn't even think I should get pregnant because of my diabetes. I think she just thought, what if this baby comes out and is deformed, or has something wrong? Are you gonna be okay with that?" (white, nulliparous, T1DM, 26-30 years)
Harm to self (stroke, premature labor, preeclampsia, C-section, delayed healing)	My physical wellbeing is not where I would want it to be when I'm pregnant. I don't wanna cause a high risk when I know better, and I know that my body is not ready for that. Mainly 'cause of the diabetes and the blood pressure. (black, nulliparous, T2DM, 26-30 years)
Perceived susceptibility	
<i>"I am high risk"</i>	Since I have diabetes and I had my stroke in the past, it would be at high risk, just because you have to watch your sugars, you have to watch really everything.... I just know that since I had diabetes I was a high risk (asian, parous, T1DM, 31-35 years)

Table 4. Cues to Action, Modifying Factors, and Self-efficacy

Themes and subthemes	Quotations
External Stimuli	
Absence of provider counseling	Just things that I've read and I've heard. But these things haven't come from my doctors. (Hispanic, white, nulliparous, T1DM, 26-30 years)
Negative provider interactions	I kinda wish he never put it in my head. You know. It, it made me feel a little scared. And I remember him talkin' to me about it. So I'm thinkin' like let me do this. (Black, parous, T1DM, 36-40 years)
Positive provider interactions	He's nice. And, if I wanted pills he would probably just prescribe me pills without asking. Um, or whatever is best for me, without asking. So, I would just ask him (Black, nulliparous, T1DM, 20-25 years)
Stories and advice from others	Um, my ex's... last ex. Had the implant in her arm and she bled for like 6 months straight. But my sister has it and she says it's fine. But I don't know. (White, parous, T2DM, 36-40 year)
Internal Stimuli	
Self-perceived "sickness"	So... if I was healthy and didn't have any health issues, I would be excited. But because I'm so sick, that's why I'm unsure about it. I, right now is not the time, because of how sick I am. But if I was able to and was healthy, I would you know, be excited about it. (Hispanic, white, parous, T1DM, >40 years)
Self-efficacy	
Reproductive self-efficacy ("You need to plan and prepare" for pregnancy)	Basically, what I've been told is you can get pregnant if you have diabetes, but you need to plan your pregnancy. You should have a game plan going into it. You shouldn't just, oh oops, I accidentally had got pregnant. (White, nulliparous, T1DM, 26-30 years)

<p>Contraceptive self-efficacy (confidence to advocate for one's contraceptive preferences)</p>	<p>I feel like it was the fastest, easiest way that I could control it. With any other birth control, like an implant, like somebody has to cut your arm open and put it in, and then it's in there, and then if you wanted to take it out, it's not like you could take it out yourself (Black, parous, T2DM, >40 years)</p>
<p>Modifying factors</p>	
<p>Age</p>	<p>Well the people at the hospital were like "Are you sure?" [about decision to undergo tubal ligation]. I'm like yeah, I'm sure. And I was only 23 at the time, that's why they were questioning it; "are you sure? are you sure?" (Asian, parous, T1DM, 31-35 years)</p>
<p>Race</p>	<p>Because I've seen friends of, that are not the same color as me, they've gone into situations like that, and, easily taken their birth control out. Didn't have to argue with them, they didn't have to, you know. They didn't get referred to family planning or anything like that, I felt like she felt like I was makin' a irresponsible decision [to request to have IUD removed]. (Black, nulliparous, T1DM, 20-25 years)</p>



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