

**RESEARCH: EDUCATIONAL AND
PSYCHOLOGICAL ASPECTS**

What people with diabetes in Denmark worry about during the COVID-19 pandemic: A longitudinal study of the first 3 months of the COVID-19 pandemic

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Abstract

To investigate and characterise general and diabetes-specific worries related to COVID-19 among people with diabetes in Denmark during the first 3 months of the pandemic.

In a longitudinal study from March to June 2020, six online questionnaires (Q1–Q6) were distributed to 2430 adult members of two diabetes panels. Worries related to COVID-19 were measured with closed- and open-ended items. Data from closed-ended items were analysed descriptively. Open-ended responses were analysed with systematic text condensation. Using chi-squared tests, changes in proportions of worries over time were analysed, and differences in diabetes-specific worries by gender and diabetes diagnosis were explored.

At Q1, 1366 individuals returned a response (Q2: 1082, Q3: 992, Q4: 977, Q5: 901, Q6: 816). In the beginning of the pandemic, 2 weeks after the first lockdown in Denmark, the most frequently reported general worries related to someone close becoming seriously ill, changes in daily life such as limitations on social interactions and uncertainty about the duration of those changes. The most frequently reported diabetes-specific worries were about severity of illness with COVID-19 due to diabetes, being identified as a member of a group at risk for COVID-19 and being unable to manage diabetes if ill with COVID-19. All concerns decreased over 3 months, as the society gradually reopened, except for persistent worries about being able to manage diabetes if ill with COVID-19. More women and people with type 1 diabetes reported worries, compared with men and people with type 2 diabetes.

Our study highlights the diversity of worries related to the COVID-19 pandemic among people with diabetes and changing patterns of worry over time and across subgroups as the society reopened in Denmark. These insights can be helpful when providing support for people with diabetes during health crises.

1 | INTRODUCTION

The novel coronavirus (COVID-19) outbreak was declared a global pandemic on 11 March, 2020; measures to control spread of the virus have since been a central part of daily life around the world.¹ Throughout 2020, COVID-19 transmission rates, admissions to hospitals and deaths fluctuated in Denmark, followed by varying restrictions and two societal lockdowns for several months.

People with diabetes are identified as a risk group for COVID-19; they have a twofold higher mortality rate and a threefold higher risk of more severe illness than those without diabetes.^{2,3} Even in the absence of a pandemic, diabetes is often associated with significant negative effects on quality of life. For example, people with diabetes commonly experience diabetes distress and, compared with the general population, more often experience a range of psychosocial problems, including depression, anxiety, eating disorders and general stress.^{4,5}

Several studies have shown the negative impact of the COVID-19 pandemic on psychosocial health in the general population.^{6–8} In an early study from China, 54% of surveyed individuals in the general population experienced moderate-to-severe psychological impacts of the pandemic; in particular, those with chronic illness experienced negative mental health impacts.⁹ Other studies have focused on psychological impacts of the pandemic among people with diabetes that include heightened anxiety related to the risk of infection, increases in general distress and diabetes-related stress and severely negative influences on mental health.^{10,11}

In March–June 2020, we conducted a study using qualitative individual interviews and a longitudinal questionnaire-based survey to explore the psychosocial health of people with diabetes during the first lockdown in Denmark.^{11,12} The situation in Denmark at the time was characterised by constantly changing guidelines and regulations from authorities. The country went into lockdown on 11 March, closing schools, child services and liberal professions, and requiring publicly employed individuals with a non-critical function to work from home. Specialist diabetes clinics almost from day to day transformed all services to virtual or telephone consultations to the extent possible. Lockdown was intensified on 18 March with restrictions to social gatherings. Reopening of society began 15 April and was split into three (15 April, 7 May and 8 June) continuously less restrictive phases (see Figure 1 and a previously published paper¹² for more details). Most people with diabetes who were surveyed experienced a variety of worries related to COVID-19 and life with diabetes in the beginning of the pandemic (baseline findings).¹¹ More than half of respondents were worried about severe COVID-19 illness due to diabetes, and about a third

Novelty statement

- Previous studies have shown psychological impacts of the pandemic among people with diabetes.
- Our study highlights the diversity of worries related to the COVID-19 pandemic, including general worries such as someone close becoming seriously ill and diabetes-specific worries such as the inability to manage diabetes if ill. All worries decreased over 3 months as society reopened, except for being unable to manage diabetes.
- Informing people with diabetes about common concerns and providing support in early phases of pandemics and containment measures may prevent and reduce worry, enhancing quality of life.

worried about being identified as a member of a high-risk group or about being unable to manage diabetes if ill with the novel coronavirus. Women and people with type 1 diabetes were more likely to experience these specific types of worry.¹¹ Individual interviews indicated that belonging to a group labelled as high-risk disrupted participants' identities as healthy people with type 1 diabetes.¹³

More detailed information on the nature and variety of worries among people with diabetes during the COVID-19 pandemic may help improve existing support modalities and develop new ones for people with diabetes during the current pandemic and future health crises. Therefore, the study aim was to investigate worries related to COVID-19 among people with diabetes during the first 3 months of the pandemic, including changes in types of worries over time and differences related to gender and diabetes type.

2 | METHODS

2.1 | Design and study participants

A longitudinal survey was conducted by distributing links to online questionnaires to 2430 adult members (aged >18 years) of two user panels at Steno Diabetes Center Copenhagen, a specialist diabetes clinic, and the Danish Diabetes Association. The panels comprised people with diabetes from across Denmark. Data were collected in 2020 at six time points during the first 3 months of the pandemic: March 19 (Q1), March 26 (Q2), April 3 (Q3), April 16 (Q4), May 20 (Q5) and June 10 (Q6). Figure 1 shows the timeline of the questionnaire distribution

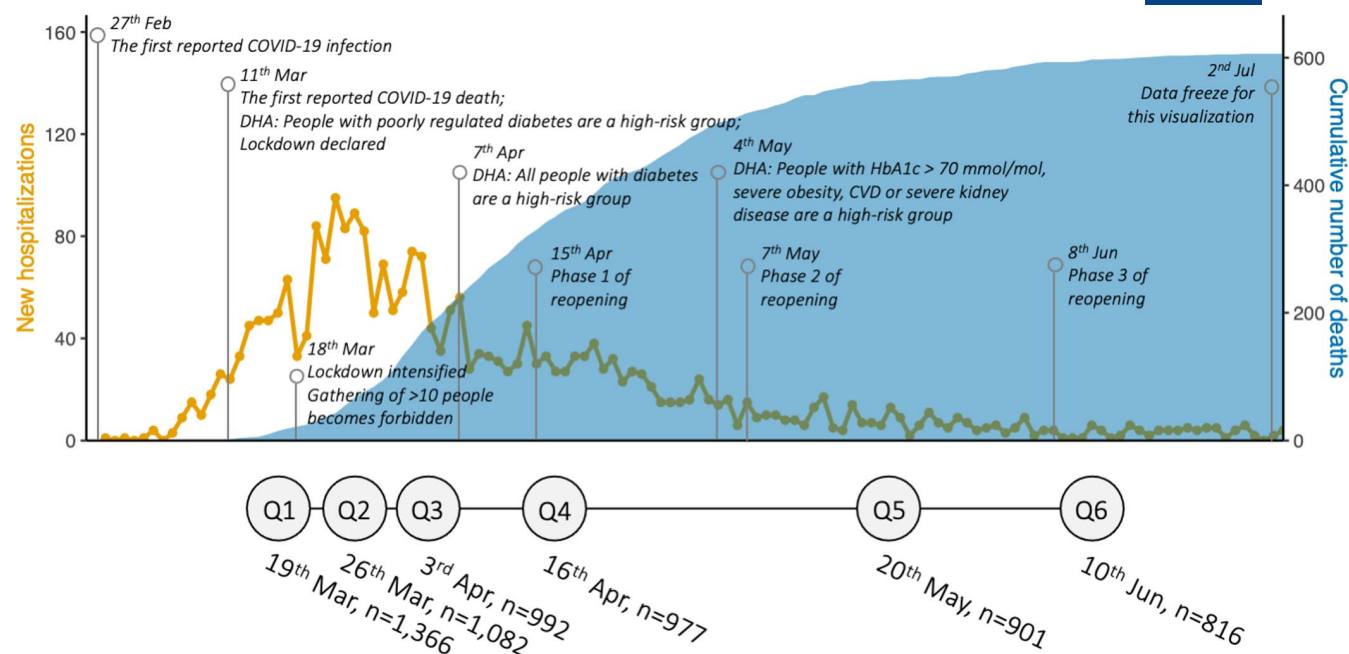


FIGURE 1 Timeline of questionnaire distribution and pivotal events during the COVID-19 pandemic in Denmark in 2020. Abbreviations: DHA, Danish Health Authority; Q, questionnaire. Q1 and Q2 were each open 1 week from the opening date and Q3–Q6 were each open two weeks from the opening date. Phase 1 of reopening included reopening of elementary schools from grade 0–5, child services and liberal professions (i.e. hairdressers, dentists etc.). Phase 2 of reopening included reopening of elementary schools from grade 6–10, high schools and universities, malls and retailers, restaurants, zoos, libraries, churches, museums, cinemas, theatres, etc. Nightlife remained closed. Phase 3 involved increasing the ban of >10 people gatherings to 50 and the reopening of public swimming pools, gyms, casinos and nightlife (partly). This figure and accompanying legend have previously been published in Madsen et al.¹²

together with pivotal events during the COVID-19 pandemic in Denmark in 2020.¹² Written informed consent was obtained from participants as part of responding to the survey. Further details of recruitment methods, survey content and baseline characteristics of respondents have been previously reported.¹¹ The study was approved by the Danish Data Protection Agency (P-2020-271).

2.2 | Data sources

Data on sociodemographics and health status were obtained by questionnaire and included age, gender, education, employment status, cohabitation status, type of diabetes, diabetes duration, diabetes complications, most recent HbA_{1c}, treatment regimen and other chronic physical and/or mental health conditions.

Worries specific to COVID-19 were measured in the questionnaire with two sets of items addressing predetermined general and diabetes-specific worries about the pandemic. Participants indicated whether they experienced each worry with yes/no response options, and both lists included a free-text option to describe other worries. In addition, two open-ended items about precautions to avoid infection and additional remarks allowed

respondents to elaborate on their experiences with various aspects of the COVID-19 pandemic. Responses to these items also included statements about worries and were included in the analysis. Table S1 contains survey items used in the analysis.

2.3 | Data analysis

Differences in characteristics between respondents who responded to all six questionnaires versus those who did not, and those who did and did not respond to open-ended items were explored using chi-squared tests for categorical variables and unpaired two-sided Student's *t* tests for continuous variables. Chi-squared tests were used to analyse changes in proportions of worries assessed by closed-ended items over time. *P*-values ≤ 0.05 were considered statistically significant. To avoid selection bias, only data from respondents who answered all six questionnaires were analysed to explore changes; however, sensitivity analyses using the entire eligible sample were also conducted.

Responses to open-ended items were analysed with systematic text condensation by sorting them into meaning units and combining related units into themes¹⁴:

- All responses for each item at each time period were thematised.
- All identified themes were combined across items for each time period, resulting in overall themes for each time period.
- Overlapping themes from the six time periods were compared and adjusted.
- Combined themes of worries spanning the 3-month observation period were established.

To avoid researcher bias, three research assistants who had not taken part in the quantitative part of the study, independently conducted the first coding and identified themes. Two authors (LJ and JLS) went through all levels of coding. Subsequently, authors IW and KPM reviewed the codes, and consensus was reached. The analysis was systematized in Microsoft Word tables and Excel spreadsheets. The prevalence of worries within themes for each time period was explored with descriptive statistics. Potential differences in prevalence related to diabetes type and gender were explored with chi-squared tests.

3 | RESULTS

3.1 | Respondent characteristics

Table 1 displays sociodemographic and health status characteristics of the study population. At Q1, 1366 individuals returned a response (Q2: 1082, Q3: 992, Q4: 977, Q5: 901, Q6: 816); 517 individuals responded to all six questionnaires. Among the 1366 respondents at Q1, mean age was 62 years (range, 18–94). Most respondents had medium to higher tertiary education (735, 60.8%), were retired (669, 55.3%) and were living with a partner, children or both (887, 73.9%). Nearly two-thirds (822, 61.4%) had type 2 diabetes, with a mean duration of 19.5 years; 980 (73.4%) had no complications of diabetes. Mean HbA_{1c} was 56.6 mmol/mol, and treatment with insulin was most common (341, 42.1%). Chronic comorbid conditions were common (727, 56.5%), but mental illness was not (150, 11.7%). Statistically significant differences between participants completing all six questionnaires versus those who did not were observed for mean age, employment status and mental illness (Table 1).

Participants using open-ended items to indicate worry differed in several ways from those who did not use open-ended items. Those responding to open-ended items were younger, had higher educational attainment and more likely to have type 1 diabetes and longer disease duration. They were more likely to use insulin and report comorbid chronic physical health conditions and less likely to use

oral antihyperglycemics or combination therapy and report mental illness.

3.2 | Worries during the first 3 months of the pandemic

3.2.1 | Responses to closed-ended items

Figures 2 and 3 show proportions of general and diabetes-specific worries over time among 517 respondents who completed all six questionnaires. Between Q1 and Q6, statistically significant decreases occurred in worries about the length of time until resuming normal daily life (51% vs. 28%, $p < 0.001$) and being unable to see family and friends (56% vs. 34%, $p < 0.001$). No statistically significant changes were observed in worries related to someone close becoming seriously ill (69% vs. 65%, $p = 0.11$) or experiencing serious financial problems (20% vs. 16%, $p = 0.10$). Sensitivity analyses including respondents who answered Q1 and at least one other questionnaire showed similar tendencies (see Table S2).

Statistically significant decreases from Q1 to Q6 were also observed in 7 of 10 diabetes-specific worries: becoming severely ill with COVID-19 due to diabetes (61% vs. 51%, $p = 0.001$), being labelled as a member of a risk group (43% vs. 35%, $p = 0.009$), shortage of diabetes medications (25% vs. 11%, $p < 0.001$), shortage of diabetes equipment (16% vs. 7%, $p < 0.001$), being unable to access health care professionals when needed (16% vs. 9%, $p = 0.003$), being unable to manage how changes in life affect blood glucose (11% vs. 6%, $p = 0.011$) and shortage of food needed to manage diabetes (9% vs. 4%, $p < 0.001$). No statistically significant differences were seen over time in worries about being unable to manage diabetes if ill with COVID-19 (29% vs. 27%, $p = 0.405$) and decreased quality of diabetes care during the pandemic (16% vs. 13%, $p = 0.160$). Sensitivity analyses showed similar tendencies (Table S2).

3.2.2 | Responses to open-ended items

Analysis of responses to open-ended items yielded 11 themes about worries related to the COVID-19 pandemic (Table 2). Several themes were partially addressed by or added a new perspective to predetermined closed-ended items. They included worries related to becoming infected with COVID-19, social life and social relations, changes in daily life, being a member of a risk group, future consequences and being isolated for a longer period of time.

Open-ended item responses also revealed worries beyond those in predefined categories that related to others

TABLE 1 Study population characteristics

	Full sample at Q1 (n = 1366) ^g	Number of completed questionnaires			Used open-ended items at any questionnaire wave to indicate worry		
		All 6 (n = 517)	<6 (n = 849)	p all vs <6	Yes (n = 550)	No (n = 816)	p
Age in years (SD, range)	62 (13,18-94)	63 (11, 19-90)	61 (14, 18-94)	<0.001	61 (13, 18-92)	62 (13, 18-94)	0.048
Gender							
Female	580 (44.5)	222 (42.9)	358 (45.5)	0.365	278 (51.4)	302 (39.6)	<0.001
Male	724 (55.5)	295 (57.1)	429 (54.5)		263 (48.6)	461 (60.4)	
Education							
9th/10th grade or high/vocational school	475 (39.2)	193 (37.4)	281 (40.5)	0.423	182 (34.9)	241 (42.5)	0.013
Short-, medium- or long-cycle education	735 (60.8)	323 (62.6)	412 (59.5)		341 (65.1)	394 (57.5)	
Employment status							
Employed	429 (35.5)	175 (33.9)	254 (36.7)	0.036	189 (36.1)	240 (35.0)	0.709
Retired	669 (55.3)	304 (58.9)	365 (52.7)		283 (54.1)	386 (56.3)	
Sick leave/unemployed	111 (9.2)	37 (7.2)	74 (10.7)		51 (9.8)	60 (8.8)	
Cohabitation status							
Alone	314 (26.1)	139 (27.2)	175 (25.4)	0.473	138 (26.6)	176 (25.8)	0.760
With partner/child(ren)	887 (73.9)	372 (82.8)	515 (74.6)		381 (73.4)	506 (74.2)	
Diabetes type							
Type 1	461 (34.4)	176 (34.0)	285 (34.7)	0.257	237 (43.4)	224 (28.3)	<0.001
Type 2	822 (61.4)	325 (62.9)	497 (60.5)		294 (53.9)	528 (66.6)	
Other types	56 (4.2)	16 (3.1)	40 (4.9)		15 (2.8)	41 (5.2)	
Diabetes duration in years (SD, range)	20 (15, 0-85)	20 (15, 0-66)	19 (15, 0-85)	0.820	22 (16, 1-76)	17 (14, 0-85)	<0.001
Diabetes complications ^a							
0	980 (73.4)	379 (73.3)	601 (73.4)	0.894	384 (70.6)	596 (75.6)	0.136
1	266 (19.9)	105 (20.3)	161 (19.7)		117 (21.5)	149 (18.8)	
≥2	90 (6.7)	33 (6.4)	57 (6.9)		43 (7.9)	47 (5.9)	
HbA _{1c}							
mmol/mol (SD) ^b	56.6 (14.5)	56.2 (13.1)	56.9 (15.4)	0.463	56.9 (13.8)	56.4 (15.0)	0.635
% (SD) ^c	7.3 (3.5)	7.3 (3.5)	7.4 (3.6)		7.4 (3.4)	7.3 (3.2)	
Treatment regimen							
No medication	22 (2.7)	13 (2.5)	9 (3.1)	0.167	7 (1.8)	15 (3.6)	0.002
Insulin	341 (42.1)	201 (39.0)	140 (47.5)		186 (47.9)	155 (36.6)	
Oral antihyperglycemic	270 (33.3)	181 (35.1)	89 (30.2)		109 (28.1)	161 (38.1)	
Combination therapy	143 (17.6)	96 (18.6)	47 (15.9)		65 (16.8)	78 (18.4)	
Other medication ^d	35 (4.3)	25 (4.8)	10 (3.4)		21 (5.4)	14 (3.3)	
Other chronic illness ^e							
0	560 (43.5)	215 (42.6)	345 (44.1)	0.586	209 (40.0)	351 (45.9)	0.038
≥1	727 (56.5)	290 (57.4)	437 (55.9)		313 (60.0)	414 (54.1)	

(Continues)

TABLE 1 (Continued)

	Full sample at Q1 (n = 1366) ^g	Number of completed questionnaires			Used open-ended items at any questionnaire wave to indicate worry		
		All 6 (n = 517)	<6 (n = 849)	p all vs <6	Yes (n = 550)	No (n = 816)	p
Mental illness ^f							
0	1137 (88.3)	461 (91.3)	676 (86.5)	0.008	448 (85.8)	689 (90.1)	0.020
≥1	150 (11.7)	44 (8.7)	106 (13.5)		74 (14.2)	76 (9.9)	

Values are given as frequency (%) unless otherwise noted.

Abbreviations: SD, standard deviation.

^aIncludes retinopathy, nephropathy, neuropathy, foot ulcer and cardiovascular disease.

^b25th percentile, 48; median, 54; 75th percentile, 61.8.

^c25th percentile, 6.5; median, 7.1; 75th percentile, 7.5.

^dIncludes other hormones than insulin and being prescribed 'lifestyle changes'.

^eIncludes asthma, atherosclerosis, arthritis, back disease, cancer, chronic obstructive pulmonary disease, impaired hearing, migraine and stroke.

^fIncludes anxiety and depression or having been diagnosed with any other psychiatric disorder by a psychiatrist.

^gMissing values ranged from 27 to 555 with highest missing values on HbA_{1c} and treatment regimen (554 and 555, respectively). Gender and diabetes type had 62 and 27 missing values, respectively.

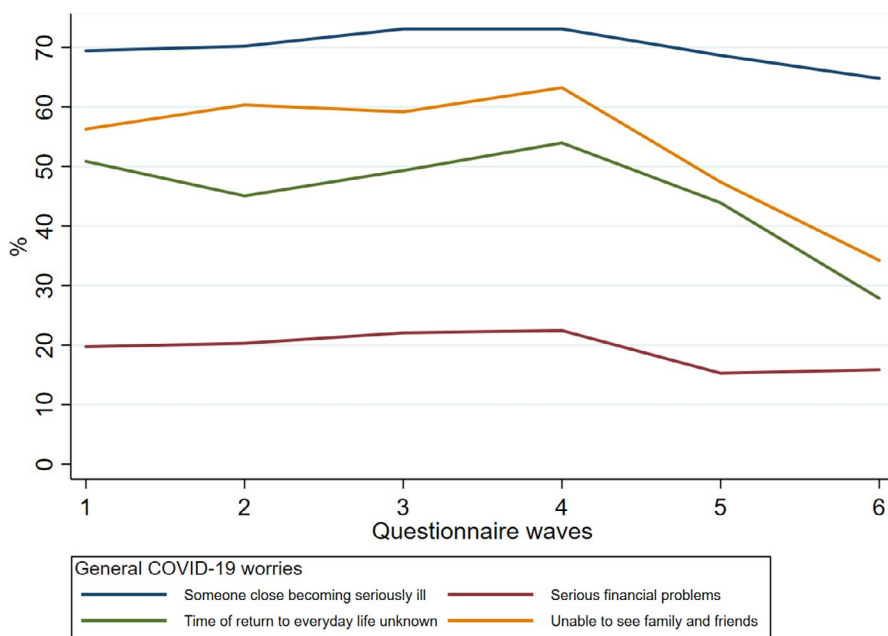


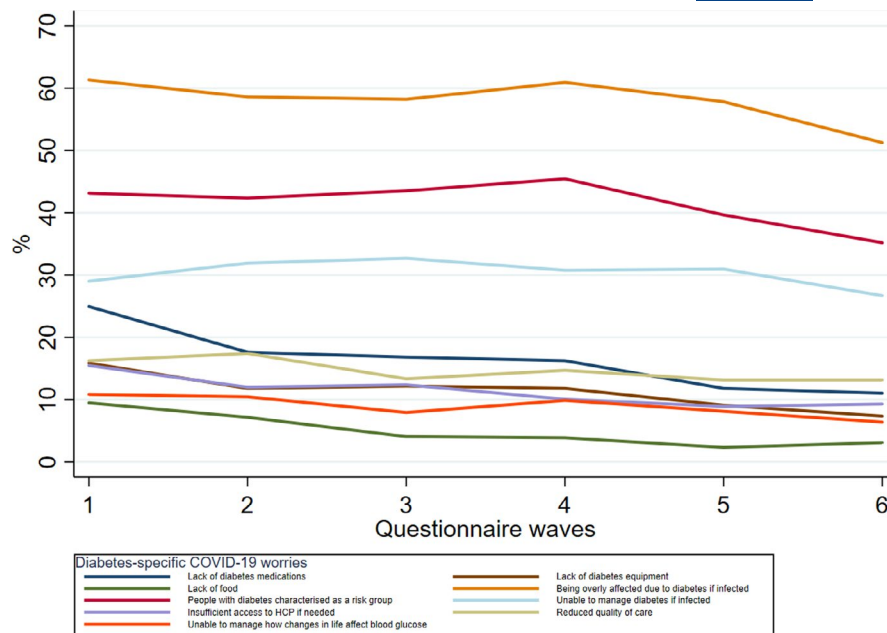
FIGURE 2 General worries related to COVID-19 during the study period among 517 respondents completing all surveys

being infected or infecting others, the pandemic in general, the Danish system, society reopening and personal health. Table 2 provides details for each category. Table 3 shows the proportions of each theme for all respondents over all time periods and the number of responses per time period. Consistent with responses to closed-ended items, worries were more prevalent at the beginning of the pandemic and decreased with time. However, worries related to social life persisted over time, worries about reopening increased in the final time periods, and fear of prolonged isolation was only observed in Q4 and Q5.

3.2.3 | Gender differences

Figure 4 shows diabetes-specific worries stratified by gender and diabetes type. Compared with men, women more frequently worried at both Q1 and Q6 about being severely affected by COVID-19 (56% vs. 67%, $p = 0.002$ and 44% vs. 61%, $p < 0.001$, respectively) and being unable to manage diabetes if ill with COVID-19 (24% vs. 37%, $p = 0.001$ and 19% vs. 37%, $p < 0.001$). Statistically significant differences in the proportion of worried women and men decreased from Q1 to Q6 for lack of diabetes equipment (21% vs.

FIGURE 3 Diabetes-specific worries related to COVID-19 during the study period among 517 respondents completing all surveys



12%, respectively, [$p = 0.009$] to 7% for both women and men), shortages of medication (33% vs. 19% [$p < 0.001$] to 11% for both) and being unable to access health care professionals if needed (21% vs. 12% [$p = 0.004$] to 9% for both). Women worried more frequently than men about decreased quality of care at Q6 (17% vs. 10%, $p = 0.021$) but not at Q1. No gender differences were found related to worries about being labelled as at risk, being unable to manage how changes in life affect blood glucose or shortages of food needed to manage diabetes. With a single exception (women being more worried about shortage of food at Q1), sensitivity analyses showed similar tendencies (Table S3). With regard to open-ended items, more women than men reported worries about becoming infected with COVID-19 and risks of reopening society and worries in general (Table 3). No other gender differences were observed in responses to open-ended items.

3.2.4 | Differences between people with type 1 and type 2 diabetes

Patterns of worry also differed by diabetes type (Figure 4). Comparing respondents with type 1 and type 2 diabetes, differences existed at both Q1 and Q6 for worries about being unable to manage diabetes if ill with COVID-19 (43% vs. 21%, $p < 0.001$ and 47% vs. 17%, $p < 0.001$, respectively), being unable to access health care professionals if needed (22% vs. 11%, $p = 0.002$ and 14% vs. 7%, $p = 0.006$) and shortages of equipment (31% vs. 8%, $p < 0.001$ and 13% vs. 5%, $p = 0.001$). Two additional between-group differences were found only at the end of the study period. Compared with respondents with type 2 diabetes, a greater proportion of respondents with type 1 diabetes

were worried at Q6 but not at Q1 about becoming severely ill with COVID-19 (63% vs. 54%, $p < 0.001$) and decreased quality of care (19% vs. 10%, $p = 0.003$). No other between-group differences were found. Sensitivity analyses showed the same tendency that people with type 2 diabetes less often worried compared with people with type 1 diabetes (Table S4). In responses to open-ended questionnaire items, respondents with type 1 diabetes also more frequently reported distrust of the Danish system and worries about reopening society and future consequences, compared with respondents with type 2 diabetes.

4 | DISCUSSION

We found a wide range of worries among people with diabetes that were most pronounced at the beginning of the pandemic. Previous studies have found that the COVID-19 pandemic has negatively influenced the psychosocial health of people with diabetes and that people with diabetes are more worried about being infected than are those without diabetes.^{11,15-19} Our findings highlight the diverse nature of worries related to the COVID-19 pandemic among people with diabetes and changes in patterns of worry over time. At the beginning of the pandemic, respondents most frequently reported general worries about someone close to them becoming seriously ill, changes in daily life and the length of time until resuming normal daily life, including social interactions, and diabetes-specific worries about becoming severely ill with COVID-19, being part of an identified risk group and being unable to manage diabetes if ill with COVID-19. These worries decreased over the 3-month study period as society reopened, except for persistent worry about being

TABLE 2 Themes, description and examples of worries from responses to open-ended items

Theme	Description	Example (sex, age, diabetes type, questionnaire wave)
Becoming infected with COVID-19	Being sick with and the health consequences of COVID-19	'That I will get infected and become seriously ill' (woman, 75 years, Type-1, Q6)
	The body's reaction to COVID-19 and the fear of dying	'That I will become so ill that it will require treatment and that I will suffer from possible long-term complications or die' (woman, 42 years, Type-1, Q2)
	Being infected at work	'I'm worried about going back to work because management doesn't seem to take the Corona crisis seriously but are instead busy trying to get everyone back and therefore "overlooks" important risks and precautions in relation to the disease' (woman, 45 years, Type-1, Q6)
	Being unable to recognise symptoms of COVID-19	'That I will be unable to differentiate between my body's diabetes-related symptoms and Corona symptoms' (woman, 43 years, Type-1, Q5)
Personal health	Limitations in physical activity and changes in diet/eating habits	'I cannot exercise as much as I usually do and will become overweight' (man, 70 years, Type-1, T4)
	Limited access to medicines and equipment, changes in treatment and generally being unable to manage diabetes and diabetes-related side effects	'That I cannot get a new pump' (woman, 67 years, Type-1, Q1) 'That I will not be able to get the amount of insulin issued that I am used to' (woman, 66 years, Type-2, Q3)
	Effects of health of diseases other than diabetes	'I am worried about my other illnesses' (man, 70 years, Type-1, Q2)
Social life and social relations	Lack of physical and social interaction with family and friends	'Miss family, friends and social life' (woman, 65 years, Type-2, Q1)
	Being unable to take care of family if becoming ill or dying	'That I will be unable to take care of my family if I become sick and die' (man, 69 years, Type-2, Q2)
	Family worrying about respondent	'That my daughters are scared for me' (woman, 77 years, Type-2, Q4)
	Stigma related to having diabetes and being at increased risk of COVID-19	'Family and friends think I have one foot in the grave since I am T1 and "vulnerable" so I get a lot of unwanted advice on how I should act' (man, 56 years, Type-2, Q1)
Other people's risk of being infected with COVID-19	Family members or vulnerable people being infected with COVID-19	'That my daughter-in-law, grandchildren and son will not be infected. Their health could be better' (man, 59 years, Type-2, Q4)
	Risk of infecting others	'That I am more susceptible to Corona with my own diabetes and thereby risk infecting my husband, who has incurable cancer' (woman, 52 years, Type-2, T1)
General worry	The COVID-19 pandemic in general	'The immensity of the crisis – can it be controlled?' (man, 71 years, Type 1 diabetes, T1)
The Danish system	Distrust of the political system and the reliability of politicians	'Distrust of the politics of the people in charge' (man, 77 years, Type-2, Q1) 'Mass hysteria and inefficient initiatives' (man, 51 years, Type-1, Q1)
	The capacity of the healthcare system and healthcare professionals being unable to manage diabetes care during potential hospitalisations	'If there is room for me at the hospital if I become sick from Corona or ketoacidosis' (man, 44 years, Type-1, Q1) 'I'm worried that I, in case of hospitalization with Corona, will be met with health care workers who are not familiar with diabetes treatment with an insulin pump and think, mistakenly, that they can easily control it in some other way if I am put in a ventilator' (man, 76 years, Type-1, Q4)
	Being misinformed by Danish health authorities	'I think it is very problematic that the recommendations in relation to diabetes and risk are constantly changed' (woman, 27 years, Type-1, Q4)

TABLE 2 (Continued)

Theme	Description	Example (sex, age, diabetes type, questionnaire wave)
The risk of reopening society	Reopening too early and the risk it creates for chronically ill people	'I'm worried about the reopening of the country' (man, 62 years, Type-2, Q6)
	Lack of solidarity and lack of respect for other people	'Mad about other people's disrespectful behaviour' (woman, 51 years, Type-1, Q4)
	Going to work or sending family members out among others, e.g., in institutions	'That I am forced to return to work which is in a nursery' (woman, 54 years, Type-1, Q4)
Future consequences	The COVID-19 crisis becoming more critical	'That we do not know about the full extent yet and everything might get even worse' (woman, 52 years, Type-2, Q1)
	The duration and progression of the crisis, e.g., persistent infection risks and precautions or more waves of COVID-19	'That it will take much longer before it is over and that it will come back quickly' (man, 69 years, Type-2, Q3)
	Others' compliance with precautions and policy	'Worried about other Danes not complying with guidelines' (woman, 59 years, Type-2, Q5)
	Social and economic consequences of the crisis for Denmark and the rest of the world, especially developing countries	'The damage it might cause to all of society and especially in the less developed countries' (man, 80 years, Type-2, Q1) 'The economic situation in general and the costs to society, which in the future must necessarily be imposed upon us all' (woman, 67 years, Type-1, Q1)
	Personal consequences related to loss of work, finances and education	'That I will be unable to finish my studies' (man, 23 years, Type-1, Q1) 'I have lost my job on account of Corona so I am nervous about being able to get a new one' (woman, 49 years, diabetes type unknown, Q2)
Fear of longer isolation period	Duration of the isolation period and the fear of being alone for a longer period	'How long will I be able to stand the relative isolation?' (woman, 67 years, Type-1, Q4)
Changes in everyday life	Restrictions on leisure activities and limited travel opportunities	'I cannot exercise with my friends at the (cycling) club' (man, 77 years, Type-2, Q5)
	Changes in shopping habits, diet and exercise	'Avoiding stores and have groceries delivered to avoid too many people' (woman, 50 years, Type-2, Q5) 'Miss going to the gym and eating too much' (woman, 60 years, Type-2, Q2)
Being identified as a member of a risk group	Being at risk due to diabetes and other diseases	'That I am in a risk group – with both a heart condition and diabetes' (woman, 65 years, Type-1, Q1)

unable to manage diabetes if ill with COVID-19. In general, worries declined as society in Denmark gradually reopened. Similarly, studies of general populations have found positive changes in psychosocial health related to societal reopening.²⁰⁻²³

Although no worries were exclusively reported by female respondents or those with type 1 diabetes, the patterns of worries and changes over time were related to gender and diabetes type. Our findings indicate that women may be more affected during crises, particularly in early phases. Other studies have shown that diabetes distress is more prevalent among women,²⁴ who are also more likely to be diagnosed with anxiety and depression.²⁵ The origin of these differences is not well understood. Potential explanations include response bias arising from women being more likely to report emotions

and gender differences in social and cultural roles and coping skills.^{25,26} An additional possible explanation for gender differences we observed in worries related to the COVID-19 pandemic may be isolation from social support systems. Studies among people with type 1 diabetes have shown that women seek social support more often than men do.²⁷

People with type 1 diabetes worried more than those with type 2 diabetes about managing their diabetes and access to health care throughout the 3-month study period. People with type 1 diabetes also more frequently reported distrust of the Danish political and health care systems and system-level management of the COVID-19 pandemic. This finding may be related to differences in the daily burden of diabetes management between people with type 1 and type 2 diabetes.

TABLE 3 Types of worries reported in open-ended items by 550 respondents, *n* (%) and reports per time period, *n*

	All respondents (<i>n</i> = 550)	Type 1 diabetes (<i>n</i> = 237)	Type 2 diabetes (<i>n</i> = 294)	Men (<i>n</i> = 263)	Women (<i>n</i> = 278)	Reports per time period ^{a,b}		
Becoming infected with COVID-19	160 (29)	76 (32)	84 (28)	68 (25)	96 (34) ^d	63	54	45
						48	48	36
Personal health	106 (19)	52 (22)	54 (18)	45 (17)	62 (22)	40	30	20
						22	22	19
Social life and social relations	81 (15)	31 (13)	50 (17)	37 (14)	45 (16)	11	18	15
						17	26	19
Other people's risk of being infected with COVID-19	58 (11)	22 (9)	36 (12)	26 (10)	32 (12)	30	11	14
						12	9	5
General worries	145 (26)	66 (28)	79 (27)	60 (23)	89 (32) ^d	58	52	33
						32	24	22
The Danish system	44 (8)	29 (12)	15 (5) ^c	24 (9)	21 (8)	18	12	13
						12	16	8
Risks of reopening society	51 (9)	30 (13)	21 (7) ^c	18 (7)	33 (12) ^d	0	5	13
						14	15	21
Future consequences	141 (26)	77 (32)	64 (22) ^c	67 (25)	76 (27)	61	40	33
						22	31	21
Longer isolation period	4 (1)	1 (0.5)	3 (1)	2 (1)	2 (1)	0	0	0
						3	1	0
Changes in everyday life	38 (7)	19 (8)	19 (6)	24 (9)	17 (6)	3	10	6
						3	18	6
Being a member of a risk group	49 (9)	20 (8)	29 (10)	23 (9)	27 (10)	18	6	14
						9	9	3

^aTop row: Q1, Q2, Q3; bottom row: Q4, Q5, Q6.

^bThe sum of the number of responses per time period is greater than the number of respondents for all time periods because respondents reported worries in more than once.

^cStatistically significant difference from type 1 diabetes.

^dStatistically significant difference from men.

Our previous qualitative study in the beginning of the pandemic highlighted differences in perceptions of risk and their influence on daily life during the COVID-19 crisis between people with type 1 and type 2 diabetes.¹³ Those with type 2 diabetes may not have perceived themselves as being at an increased risk nor acknowledged a connection between severe COVID-19 infection and type 2 diabetes.¹³ In contrast, people with type 1 diabetes were significantly more affected by the pandemic and lockdown and described difficulties related to managing diabetes.¹³ Another possible explanation for differences in worry between people with type 1 and type 2 diabetes may be related to younger age among those with type 1 diabetes; previous studies have shown that young people have more worries related to diabetes than older people do.²⁴ In addition, work plays a larger role in daily life for younger individuals, which may contribute to pandemic-related

worries, such as potential infection and challenges in managing diabetes.

Study strengths include a relatively large survey sample for closed-ended questionnaire items and a thorough analysis of responses to open-ended items. Qualitative analysis of open-ended survey items has been used in other studies to elaborate on questionnaire responses, and the use of both to explore worries increased the robustness of our results.²⁸ However, responses to open-ended items provided limited additional information of the content of and variety in worries, validating the relevance of the content of the closed-ended items exploring COVID-19 worries. Finally, we have detailed information about respondent characteristics that informs the generalisability of the findings. However, our study sample was recruited from patient panels that may not be representative of the entire population of people with diabetes in Denmark, and caution should

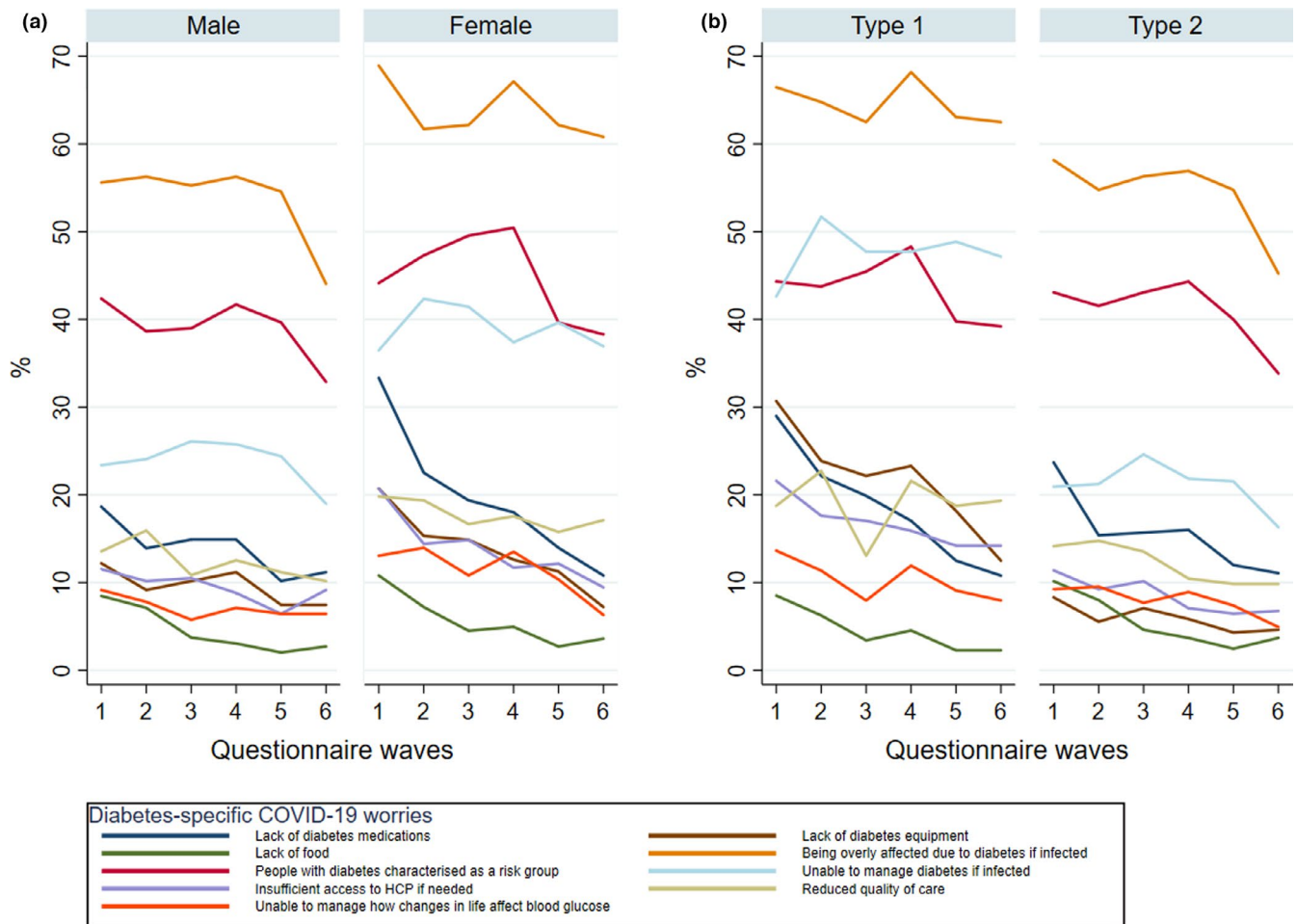


FIGURE 4 Diabetes-specific worries related to COVID-19 during the study period among 517 respondents completing all surveys by gender and diabetes type. (a) diabetes-specific worries by gender. (b) diabetes-specific worries by diabetes type

be taken when generalising to populations with other characteristics or in other countries or other social and cultural contexts. In consideration of generalizing the results to other countries and other health crisis situations, it is important to be aware that the reported changes in worries in Denmark were explored in a period with decreasing risk of infection and reopening of the society. In addition, the initial results were based on the earliest phase of the pandemic in Denmark and little was known about the future and the consequences. However, the presence and magnitude of worries and the differences regarding, for example, gender and diabetes type are likely to be transferable to other health crises and periods of time with isolation and uncertainty at many levels.

In previously reported findings from the surveyed population, feelings of psychological distress, anxiety and loneliness decreased along with overall COVID-19 worries.¹² Previous studies have shown that worry related to diabetes (diabetes distress) affect self management and

quality of life.²⁴ Thus, it is likely that worries about daily life with COVID-19 and diabetes affect both psychological health and self management. However, further studies are needed to explore long-term consequences of COVID-19 worries during lockdown.

The insight provided by the study into types of worry and differences in patterns of worry over time and by gender and diabetes diagnosis can be helpful when providing support for people with diabetes in crisis situations. Acknowledging common worries and providing support, such as peer support and support help lines in early pandemic phases and during lockdowns, may prevent or reduce worry, enhancing quality of life for people with diabetes.

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CONFLICT OF INTEREST

All authors declare that they have no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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