Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Original Article

Findings from an online survey on the mental health effects of COVID-19 on Canadians with disabilities and chronic health conditions

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ABSTRACT

Background: Although the COVID-19 pandemic has led to worsening mental health outcomes throughout the Canadian population, its effects have been more acute among already marginalized groups, including people with disabilities and chronic health conditions. This paper examines how heightened fears of contracting the virus, financial impacts, and social isolation contribute to declining mental health among this already vulnerable group.

Objective/hypothesis: This paper investigates how increases in anxiety, stress, and despair are associated with concerns about getting infected, COVID-19-induced financial hardship, and increased social isolation as a result of adhering to protective measures among people with disabilities and chronic health conditions.

Methods: This study uses original national quota-based online survey data (n = 1027) collected in June 2020 from people with disabilities and chronic health conditions. Three logistic regression models investigate the relationship between COVID-19's effects on finances, concerns about contracting the virus, changes in loneliness and belonging, and measures taken to combat the spread of COVID-19 and reports of increased anxiety, stress, and despair, net of covariates.

Results: Models show that increased anxiety, stress, and despair were associated with negative financial effects of COVID-19, greater concerns about contracting COVID-19, increased loneliness, and decreased feelings of belonging. Net of other covariates, increased measures taken to combat COVID-19 was not significantly associated with mental health outcomes.

Conclusions: Findings address how the global health crisis is contributing to declining mental health status through heightened concerns over contracting the virus, increases in economic insecurity, and growing social isolation, speaking to how health pandemics exacerbate health inequalities.

Introduction

Since the World Health Organization declared COVID-19 a global pandemic in March 2020, the virus has infected tens of millions, killing over two million worldwide. Concerned about contracting the virus, while also navigating work, finances, and family life during these unusual times, individuals are feeling the emotional toll of the pandemic with evidence already showing large negative effects on mental health.[1,2] According to an April 2020 national Angus Reid public opinion poll, over half of Canadians have experienced declining mental health since the pandemic began, with many individuals feeling worried (44%) and anxious (41%).[1] These effects, however, will not be felt equally across groups.

The pandemic has made ever more salient the ways in which already marginalized groups are disproportionately affected by health crises. Research on the social determinants of health demonstrates how certain groups are more at risk of contracting disease because of how gender, race, class, and disability determine their position in the social structure.[3,4] With increased susceptibility to COVID-19, people with disabilities and chronic health conditions

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[1] *Angus Reid Institute* http://angusreid.org/covid19-mental-health/.

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have been especially affected by the pandemic. Questions remain, however, about how COVID-19 has contributed to mental health struggles among people with disabilities and chronic health conditions and how potential increases in anxiety, stress, and despair vary with deteriorating financial situations and social isolation brought on by the pandemic.

Disability includes diverse groups of individuals with different and often multiple functional limitations. Two-thirds of people with disabilities report having two or more types of disabilities and one-third report four or more in the 2017 Canadian Survey on Disability.[5] Considering chronic health conditions sheds further light on comorbidity. People with disabilities are more likely to experience other chronic health conditions which, in the context of the coronavirus pandemic, creates additional obstacles, contributing to deteriorating mental health.

As of 2017, 6.2 million Canadian adults (22%) reported one or more disabilities,[5] and 25.5% of Canadians had been diagnosed with hypertension, 8.8% with diabetes, 11.6% with asthma, 10.3% with chronic obstructive pulmonary disease, and 7.3% with cancer.[6] People with physical, emotional, cognitive, sensory, and independent living-related functional limitations are less likely to access health services and are more likely to experience unmet health needs in virtually all nations, contributing to greater health disparities.[7,8] People with disabilities, especially those with intellectual and developmental disabilities, are also more likely to develop complex health needs and are less likely to receive preventative care.[9]

People with disabilities and chronic health conditions disproportionately struggle with physical and mental health challenges that are exacerbated by structural and attitudinal barriers, which make overall health status a more salient aspect of concern in daily life. They are at higher risk of contracting the coronavirus precisely because of these pre-existing or secondary health conditions.[10,11] They are feeling the immediate impacts of the virus and measures meant to mitigate its adverse health and economic effects, and they will experience long-term social, economic, and health disadvantages throughout the recovery and beyond. All of this contributes to greater anxiety, stress, and despair; yet, these effects will not be uniformly felt among individuals within this diverse group. We expect that these mental health outcomes will further vary based on individuals' concerns about contracting COVID-19, experiences of social isolation, ability to comply with social distancing measures, and broader financial situations.

Unsurprisingly, individuals who are already concerned about their physical and mental health report a heightened sense of worry during health pandemics. Worry refers to "an attempt to engage in mental problem-solving to deal with an issue whose outcome is uncertain but likely negative or can be conceived as an apprehensive expectation about real-life concerns such as health, relations, finances, work, and school".[12] Consequently, worry about being infected by COVID-19 has been an important factor contributing to poor mental health outcomes.

Pandemic aside, people with disabilities and chronic health conditions are already more likely than other groups to experience social isolation and multiple forms of low social connectedness.[13] Made worse by the health crisis, social distancing measures and quarantines are further linked to feelings of social isolation and to negative physical and mental health outcomes.[1,14,15]

Additionally, many people with disabilities struggle to comply with protective measures, such as physical distancing, effective handwashing, or mask wearing.[7,10,16] Throughout much of the pandemic, public policies have remained oblivious to the negative impacts of these measures on vulnerable groups, including individuals with respiratory issues, individuals who experience debilitating panic attacks, people on the autism spectrum, and people who rely on lip-reading to effectively communicate. Additionally, while many nursing homes became COVID-19 "hot spots," people with disabilities who live independently in their communities are facing disruptions to services offered by care workers feeling uneasy about entering people's homes.[2]

Finally, mental health status is also affected by economic insecurity. People with disabilities are already among the most economically marginalized groups in society with low employment rates. Although employed individuals directly affected by COVID-19 are able to make use of income supports like the Canadian Emergency Response Benefit (or CERB), many people with disabilities and chronic health conditions are unable to access such a benefit. Those looking for work in early-2020 suddenly found a labor market with 50% fewer vacancies.[19] Remaining unemployed, they are living off relatively meagre provincial disability benefits with little federal government support during the pandemic.

When people with disabilities and chronic health conditions do work, they are usually in more precarious jobs, earning low wages.[17] People with disabilities are concentrated in retail and food-related service sector jobs, sectors most impacted by the pandemic.[17,23,24] These sectors are less likely to provide opportunities to work from home, increasing exposure to the virus. Alternatively, with the possible exception of "essential workers," many workers have been let go or are working with reduced income. Others, about 40% of the Canadian labor force primarily in white-collar jobs, are now working from home full time[25] posing a variety of obstacles when it comes to stress due to rising work-life imbalances.[26] Consequently, work disruptions, changing work conditions, and financial turmoil have adverse effects on households, social relationships, and health and mental health outcomes.[27]

Low employment earnings contribute to economic insecurity, but people with disabilities and chronic health conditions also face broader obstacles in accumulating assets. Most Canadians with disabilities and chronic health conditions rely on provincial disability supports with stringent income thresholds discouraging work as they face additional living and healthcare costs.[18] This means that compared to the rest of the population, most people with disabilities and chronic health conditions have less money saved to weather financial storms sparked by exogenous shocks like health crises.

Without a doubt, the economic crisis brought on by COVID-19 has disproportionately affected already disadvantaged groups whether in terms of temporary or permanent layoffs, continued unemployment, or increased economic insecurity. Using data from an original national quota-based online survey (n = 1027), this study examines three mental health outcomes related to anxiety, stress, and despair among people with disabilities and chronic health conditions during the COVID-19 pandemic. Based on previous research, we hypothesize that: *(1) individuals who have experienced direct financial losses due to COVID-19 will report larger increases in anxiety, stress, and despair; (2) individuals who report greater concerns about contracting COVID-19 will report larger increases in anxiety, stress, and despair; (3) individuals who have experienced more social isolation, measured as increases in loneliness and decreases in belonging, will report larger increases in anxiety, stress, and despair; and that (4) individuals who take more measures to combat COVID-19 will report larger increases in anxiety, stress, and despair.*

[2] *Why COVID-19 has personal support workers feeling uneasy during home-care visits*. https://www.cbc.ca/news/canada/toronto/why-covid-19-has-personal-support-workers-feeling-uneasy-during-home-care-visits-1.5520722.

Methods

Data

The sample was obtained from a quota-based online survey administered from June 11 to June 22, 2020.[3] Data collection occurred just as many cities and provinces across Canada were beginning to end their "lockdowns" and "open up" their economies.[4] Participants were recruited by *Qualtrics,* an internet-based survey research company that uses paid panels of respondents. In addition to payment received from the survey company, we provided respondents with additional $10 Amazon.ca gift cards.

To qualify for the survey, respondents had to satisfy the following inclusion criteria: (1.) be 18 years or older; (2.) currently reside in a Canadian province; and (3.) indicate that they either (a.) experienced difficulties related to one of six listed disabilities for at least some of the time or (b.) experienced one of nine listed underlying health conditions.

Following the Canadian Survey on Disability (CSD) and guidance provided by the World Health Organization and the Washington Group on Disability Statistics,[5] we classified disability based on respondents' answers to six questions. Disability-related questions allowed respondents to indicate the severity of their disability by reporting whether they never, sometimes, often, or always experienced any vision, hearing, physical, cognitive, emotional, or other difficulties. Questions were phrased as follows:

- Do you have any difficulty seeing (even when wearing glasses or contact lenses)?
- Do you have any difficulty hearing (even when using a hearing aid)?
- Do you have any difficulty walking, using stairs, using your hands or fingers or doing other physical activities?
- Do you have any difficulty learning, remembering or concentrating?
- Do you have any emotional, psychological or mental health conditions?
- Do you have any other health problem or long-term condition that has lasted or is expected to last for six months or more?

We classified chronic health conditions based on whether the respondent indicated the presence of the nine following conditions: Asthma; Cancer; Chronic kidney disease; Chronic respiratory or lung disease; Diabetes; Hypertension; Heart disease; Immunocompromised; or Obesity. Answers were obtained from a single question, worded as: "Do you presently have any of the following health conditions? Please mark all that apply." Health conditions were chosen based on those indicated by the Government of Canada as increasing vulnerability to COVID-19.

We began with 1392 respondents. Twenty-nine cases were initially dropped due to poor quality (including strings of profanity and repeated song lyrics) in their qualitative responses. An additional 51 cases were removed because respondents did not complete the survey. In order to ensure that respondents were carefully reading and answering the survey questions, we included two quality control screening questions that required respondents provide a specific answer. Those who did not correctly answer both quality control questions were screened out of the survey. A final 285 cases were removed because respondents either did not meet the inclusion criteria or failed quality control and attention checks. This resulted in a final sample of 1027 respondents with no missing data across variables.

Data were collected via quota-based sampling to ensure a representative sample across Canadian provinces with 38% of responses from Ontario, 23% from Québec, 13% from British Columbia, 18% from the Prairie provinces (Alberta, Manitoba, Saskatchewan), and 7% from the Atlantic provinces (Newfoundland and Labrador, New Brunswick, Nova Scotia, and Prince Edward Island) based on Statistics Canada 2016 Census population estimates. Models do not use additional poststratification weights because this procedure requires the distribution of characteristics in a population to be known.[28] In this case, it was unclear as to which population characteristics should be used since there has been no other random survey of individuals with disabilities and chronic health conditions. However, many of the characteristics of this group (e.g., age, gender, and education) mirror those for individuals sampled in the CSD and Canadian Community Health Survey (CCHS), as discussed below and in the appendix.

Measures

Outcome variables measure three self-reported aspects of mental health, indicating whether the respondent experienced any *increases in anxiety*, *stress,* or *despair* in the last 14 days (a time referring to early June 2020). Specific questions asked, "Have you experienced any changes in [anxiety], [stress], [despair] within the last 14 days?" with the options of "decrease," "about the same," and "increase." For the purposes of our analyses, we coded any increases as "1" and all other responses as "0."

Predictor variables measure aspects of economic insecurity, illness concerns, social isolation, and social distancing measures taken. In relation to economic insecurity, *COVID-19-effects on financial outcomes* indicates whether COVID-19 affected a respondent's ability to pay down debt, make mortgage or rent payments, pay utility bills, purchase groceries, or contribute to savings to a moderate or great extent. This variable is coded as "1" if the respondent indicated that COVID-19 affected any of these five separate areas and "0" if there were no effects across areas. *Concerns about contracting COVID-19* is an ordinal variable that indicates whether the respondent was not concerned, somewhat concerned, or very concerned about contracting the virus. Social isolation is captured with two measures – whether the respondent reported *increased feelings of loneliness* and whether they reported *decreased feelings of belonging.*

Finally, *COVID-19 measures taken* is a composite variable that comprises responses to thirteen questions regarding different measures taken to combat COVID-19. These measures include washing hands more often; avoiding public places; avoiding common greetings like kissing and/or handshaking; avoiding contact with individuals outside the household; avoiding gatherings with five or more people present; avoiding travel within Canada; using a separate bathroom from others in the same household; staying in separate rooms within the household; shifting shopping to online; not physically going to work or school; wearing gloves and/or a mask when leaving the house; deferring medical/dental appointments; and avoiding outdoor recreation. Values for the composite variable are the respondent's average across these binary questions (0 = no, 1 = yes) with $\alpha = 0.77$.

Models control for *disability and health condition severity* based on the number of reported disabilities and health conditions. This categorical variable indicates whether the respondent reported

[3] The plan for this study was reviewed and approved by a Research Ethics Board at the University of Alberta (REB Ethics ID Pro00101049) and at the University of Toronto (protocol reference number 39352).

[4] As of June 22, 2020, there were 101,019 confirmed COVID-19 cases in Canada and 8410 deaths with both cases and deaths trending downward across the country (https://covid19.who.int/region/amro/country/ca).

[5] Washington Group on Disability Statistics, https://www.washingtongroup-disability.com.

one, two or three, four or five, or six or more disabilities or chronic health conditions. Other demographic control variables include *age* measured in years; *gender* with three categories of male, female, and other; and *marital status* with four categories of never married, cohabiting (living together but not married), currently married, and formerly married (widowed, separated, or divorced). Models also control for the presence of *any children* in the household, *employment status* with four categories of employed, unemployed, not in the labor force due to being a homemaker or retired, and unable to work due to COVID-19; and whether the respondent had a *Bachelor's degree or higher* for their highest level of education. Models also include whether the respondent is a member of a *racial minority group*. This variable was based on a question asking respondents to self-identify their race or ethnicity. Reduced categories for this variable are used due to sample size limitations.

Analytic models

We use three logistic regression models to examine the relationship between four sets of predictor variables – individuals' concerns about contracting COVID-19, experiences of social isolation, social distancing measures taken, and broader financial situations – and three outcome variables – increases in anxiety, stress, and despair. We primarily discuss our results as predicted probabilities and average marginal effects (AMEs), which present the marginal effects averaged across the sample. For categorical variables, AMEs indicate the average difference in the outcome variable associated with a discrete change in the predictor variable. For continuous variables, AMEs provide the instantaneous rate of change in the outcome, calculated by taking the derivative of the function, which shows the rate of change at a given point.

Results

Descriptive results

Table 1 presents descriptive statistics for all model variables. In total, 38.2% of respondents with disabilities or chronic health conditions reported increased anxiety, 38.9% reported increased stress, and 18.2% reported increased despair. Almost half of respondents reported that COVID-19 had negatively affected their finances and most indicated that they were either somewhat or very concerned about contracting the virus. Additionally, 30.8% reported increases in loneliness and 14.9% reported decreases in belonging.

The mean age for respondents in our sample was 49 years, which is older than the mean age of 41 years for the population in 2016.[21] This was expected, however, because disabilities and chronic health conditions tend to be more prevalent among older populations.[5] The gender make-up of our sample was 53% female, 46% male, and 1% non-binary or other. According to the 2017 CSD, disabilities are more prevalent among women; 56% of people with disabilities were female.[5]

Approximately 47.7% of respondents were employed, 4.4% were unemployed, and 39.1% were not in the labor force. In this sample, 8.8% of respondents reported that they were unable to work due to COVID-19. According to the 2017 CSD, the employment rate among people with disabilities was 59.4%,[5] which indicates a lower employment rate in our sample (47.8%). However, percentages are much closer when respondents unable to work due to COVID-19 are considered.

Racial and ethnic minority groups were underrepresented in this sample. The percentage who identify as Indigenous within this sample (2.3%) was approximately half that of the percentage in the larger population (4.9%) in 2016.[21] The percentage who identify as non-white in the sample (17.8%) was also lower than the percentage of people who identify as visible minorities in Canada (22.3%). However, it is not clear as to whether these groups are over- or under-represented within groups of people with disabilities and chronic health conditions.

When comparing sample respondents to individuals age 15 and older in Canada, the sample closely mirrored the population in terms of marital status and household size. Within the sample, 53.0% of respondents were married or cohabiting, 31.5% were never married, and 15.5% were formerly married. Across Canada in 2016, 57.4% of individuals age 15 and older were married or in common law relationships, 28.2% were never married, and 14.2% were formerly married.[21]

Outcome models

Results are presented in three sets of logistic regression models predicting increased anxiety, stress, or despair in Tables 2–4 and Figs. 1–3. Tables include both model coefficients and average marginal effects (AMEs) for all variables. Figures present predicted probabilities of increased anxiety (Fig. 1), stress (Fig. 2), and despair (Fig. 3), as related to five COVID-19 factors that potentially contribute to decreasing mental health status among an already vulnerable group.

Anxiety

On average, 38.2% of respondents reported increases in anxiety since the pandemic began (Table 1). Model results, presented as AMEs in Table 2, show that people who reported that COVID-19 negatively affected their finances had a higher probability of reporting an increase in anxiety by 9.3% points, net of other covariates. Expanding on these findings, Fig. 1 presents predicted probabilities of experiencing increased anxiety associated with different levels of each variable, along with 95% confidence intervals around the estimates. It shows that 43.0% of respondents who reported that COVID-19 negatively affected their finances experienced increased anxiety compared to 33.3% of respondents who saw no financial effects. Compared to respondents who reported no concerns about contracting COVID-19, those who were very concerned were 11.3% points more likely to experience increased anxiety, as shown in Fig. 1 and Table 2. Increases in anxiety were also much more common when respondents reported increased loneliness and decreased belonging. For instance, 63.3% of respondents who reported increased loneliness also reported increased anxiety.

Stress

Results for stress followed similar patterns to anxiety, as shown in Fig. 2 and Table 3. On average 38.9% of respondents reported increases in stress, but reports were higher when the pandemic also affected respondents' finances, when they were very concerned about contracting COVID-19, and when they experienced increased social isolation. Compared to respondents whose finances remained stable during COVID-19, those who experienced negative effects on their finances were 7.6% points more likely to report increased stress (Table 3). Respondents who were very concerned about contracting COVID-19 were 12% points more likely than those without any concerns to report increased stress. Finally, reporting increased loneliness was associated with a 27.5% point increase in stress and decreased belonging was associated with a 15.6% point increase. Presenting predicted probabilities, Fig. 2 shows that 42.8% of respondents who believed that COVID-19 negatively affected their finances and 45.7% of respondents who were very concerned about contracting the virus reported increased stress. Additionally, 60.7% of respondents who reported

Table 1
Descriptive statistics for model variables.

	Sample Frequency	Proportion or Mean		
		Estimate	95% Confidence Interval	
			Lower	Upper
Increased anxiety	392	0.382	0.352	0.411
Increased stress	399	0.389	0.359	0.418
Increased despair	186	0.181	0.158	0.205
COVID-19 effects on finances	485	0.472	0.442	0.503
Concerns about contracting COVID-19				
Not concerned	225	0.219	0.194	0.244
Somewhat concerned	480	0.467	0.437	0.498
Very concerned	322	0.314	0.285	0.342
Increased loneliness	316	0.308	0.279	0.336
Decreased belonging	153	0.149	0.127	0.171
COVID-19 measures taken (mean score)	–	0.531	0.517	0.544
Number of disabilities or CHCs				
One	109	0.106	0.087	0.125
Two or three	359	0.350	0.320	0.379
Four or five	333	0.324	0.296	0.353
Six or more	226	0.220	0.195	0.245
Age (mean years)	–	48.999	47.923	50.075
Gender				
Male	472	0.460	0.429	0.490
Female	544	0.530	0.499	0.560
Non-binary or other	11	0.011	0.004	0.017
Member of a racialized minority group	184	0.179	0.156	0.203
Employment status (reduced variable)				
Employed	490	0.477	0.447	0.508
Unemployed	45	0.044	0.031	0.056
NILF (homemaker, retired, in school)	402	0.391	0.362	0.421
Unable to work due to COVID-19	90	0.088	0.070	0.105
Bachelor's degree or higher	360	0.351	0.321	0.380
Marital status				
Never married	324	0.315	0.287	0.344
Cohabiting	138	0.134	0.114	0.155
Married	406	0.395	0.365	0.425
Formerly married	159	0.155	0.133	0.177
Any children	246	0.240	0.213	0.266

NOTES: Estimates refer to sample data. Estimates provided as proportions unless otherwise specified.
SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults

feelings of increased loneliness and 53.2% who reported decreased belonging reported increased stress.

Despair

Fewer respondents reported feeling increases in despair during the pandemic with 18.1% reporting increases on average. Reports of increased despair were higher again, though, among people who also reported negative effects on finances, concerns about contracting COVID-19, increases in loneliness, and decreases in belonging, as shown in Fig. 3 and Table 4. Those reporting increased loneliness and decreased belonging showed some of the highest rates of increased despair; 32.6% of people reporting increases loneliness and 30.2% reporting a decrease in belonging also reported increased despair.

Discussion

Clear relationships were present when examining COVID-19 financial effects, concerns about COVID-19, and increased social isolation. Supporting our first hypothesis, results show that COVID-19 effects on financial outcomes were associated with increased anxiety, stress, and despair. Those who were very concerned about contracting COVID-19 were more likely to report increased anxiety, stress, and despair, supporting our second hypothesis. We also find support for hypothesis three; those who reported increased loneliness were more likely to report increased anxiety, stress, and despair as were those who reported decreases in feelings of belonging. Net of other covariates, increased measures taken to combat COVID-19 was not significantly associated with mental health outcomes, which did not support our expectations in hypothesis 4. Although models do not find evidence for the direct effects of protective measures on mental health outcomes, taking protective measures may still indirectly shape other factors like social isolation and ability to perform work duties that contribute to mental health status.

There is some evidence that having multiple disabilities and chronic health conditions is positively associated with decreasing mental health status, as is cohabitating and/or being married. The latter may reflect recent findings showing the negative impacts of the pandemic on households as it intersects with gender, childcare, and work.[29] In the case of the former, our findings suggest that declining mental health status is an issue for all people with disabilities and chronic health conditions. Although we use a common scale developed and supported by multiple disability groups, other measures perhaps related to the length of time the person has had a disability or health condition may show more variable results. Future research should directly investigate this potential variation.

Existing research points to two key dimensions regarding how social determinants of health shape inequality in mental health status. First, pandemics aside, people with disabilities and chronic health conditions are already more likely to worry about their health and experience stress, isolation, and anxiety. Second, disasters and health pandemics like COVID-19 are negatively associated with mental health outcomes in the general population.

Table 2
Logistic regression models predicting increased anxiety.

	b	SE	AME	SE
Intercept	−2.887***	(.395)		
COVID-19 effects on finances	.563***	(.162)	.093***	(.026)
Concerns contracting COVID-19 (Ref: No concern)				
Somewhat concerned	.211	(.211)	.034	(.034)
Very concerned	.669**	(.237)	.113**	(.040)
Increased loneliness	1.810***	(.170)	.300***	(.022)
Decreased belonging	1.091***	(.225)	.181***	(.036)
COVID-19 measures taken	-.230	(.390)	-.038	(.065)
Number of disabilities or CHCs (Ref: One)				
Two or three	.432	(.287)	.067	(.043)
Four or five	.688*	(.287)	.110*	(.044)
Six or more	.842**	(.306)	.137**	(.048)
Age	-.033***	(.007)	-.005***	(.001)
Gender (Ref: Male)				
Female	.189	(.164)	.031	(.027)
Non-binary or other	-.063	(.756)	-.010	(.122)
Member of a racialized minority group	-.224	(.211)	-.037	(.035)
Employment status (Ref: Employed)				
Unemployed	.659	(.380)	.112	(.067)
NILF (homemaker, retired, in school)	.326	(.197)	.054	(.032)
Unable to work due to COVID-19	.351	(.276)	.058	(.047)
Bachelor's degree or higher	.103	(.168)	.017	(.028)
Marital status (Ref: Never married)				
Cohabiting	.624*	(.251)	.102*	(.041)
Married	.466*	(.226)	.075*	(.035)
Formerly married	.179	(.286)	.028	(.045)
Any children	-.090	(.194)	-.015	(.032)
Pseudo R-Squared	.241			

***p < .001, **p < .01, *p < .05.
NOTES: Logistic regression models predicting increased anxiety. Estimates (b) and standard errors (SE), and average marginal effects (AME) and standard errors (SE). Source: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults

Table 3
Logistic regression models predicting increased stress.

	b	SE	AME	SE
Intercept	−2.211***	(.362)		
COVID-19 effects on finances	.415**	(.155)	.076**	(.028)
Concerns contracting COVID-19 (Ref: No concern)				
Somewhat concerned	.169	(.201)	.030	(.036)
Very concerned	.645**	(.226)	.120**	(.042)
Increased loneliness	1.506***	(.163)	.275***	(.025)
Decreased belonging	.855***	(.213)	.156***	(.038)
COVID-19 measures taken	-.184	(.373)	-.034	(.068)
Number of disabilities or CHCs (Ref: One)				
Two or three	-.090	(.262)	-.016	(.047)
Four or five	.323	(.262)	.060	(.048)
Six or more	.256	(.282)	.047	(.051)
Age	-.024***	(.006)	-.004***	(.001)
Gender (Ref: Male)				
Female	.344*	(.156)	.063*	(.029)
Non-binary or other	.563	(.725)	.105	(.140)
Member of a racialized minority group	-.236	(.200)	-.043	(.037)
Employment status (Ref: Employed)				
Unemployed	.332	(.362)	.062	(.069)
NILF (homemaker, retired, in school)	-.022	(.186)	-.004	(.034)
Unable to work due to COVID-19	.235	(.265)	.044	(.050)
Bachelor's degree or higher	.096	(.161)	.018	(.029)
Marital status (Ref: Never married)				
Cohabiting	.344	(.242)	.060	(.042)
Married	.551*	(.215)	.098**	(.037)
Formerly married	.386	(.272)	.068	(.048)
Any children	.169	(.185)	.031	(.034)
Pseudo R-Squared	.185			

***p < .001, **p < .01, *p < .05.
NOTES: Logistic regression models predicting increased stress. Estimates (b) and standard errors (SE), and average marginal effects (AME) and standard errors (SE). SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults

Table 4
Logistic regression models predicting increased despair.

	b	SE	AME	SE
Intercept	−4.391***	(.539)		
COVID-19 effects on finances	.629**	(.206)	.068**	(.022)
Concerns contracting COVID-19 (Ref: No concern)				
Somewhat concerned	.215	(.284)	.021	(.027)
Very concerned	.757*	(.301)	.084**	(.032)
Increased loneliness	1.722***	(.203)	.187***	(.020)
Decreased belonging	1.140***	(.223)	.124***	(.023)
COVID-19 measures taken	-.422	(.482)	-.046	(.052)
Number of disabilities or CHCs (Ref: One)				
Two or three	.298	(.417)	.026	(.035)
Four or five	.829*	(.409)	.083*	(.036)
Six or more	.992*	(.424)	.104**	(.040)
Age	-.014	(.008)	-.002	(.001)
Gender (Ref: Male)				
Female	.215	(.204)	.023	(.022)
Non-binary or other	1.997**	(.764)	.289*	(.134)
Member of a racialized minority group	.547*	(.238)	.059*	(.026)
Employment status (Ref: Employed)				
Unemployed	.975*	(.407)	.123*	(.058)
NILF (homemaker, retired, in school)	.085	(.248)	.009	(.027)
Unable to work due to COVID-19	.177	(.322)	.019	(.036)
Bachelor's degree or higher	-.052	(.213)	-.006	(.023)
Marital status (Ref: Never married)				
Cohabiting	.465	(.315)	.049	(.034)
Married	.641*	(.278)	.069*	(.029)
Formerly married	.019	(.358)	.002	(.034)
Any children	.104	(.236)	.011	(.026)
Pseudo R-Squared	.255			

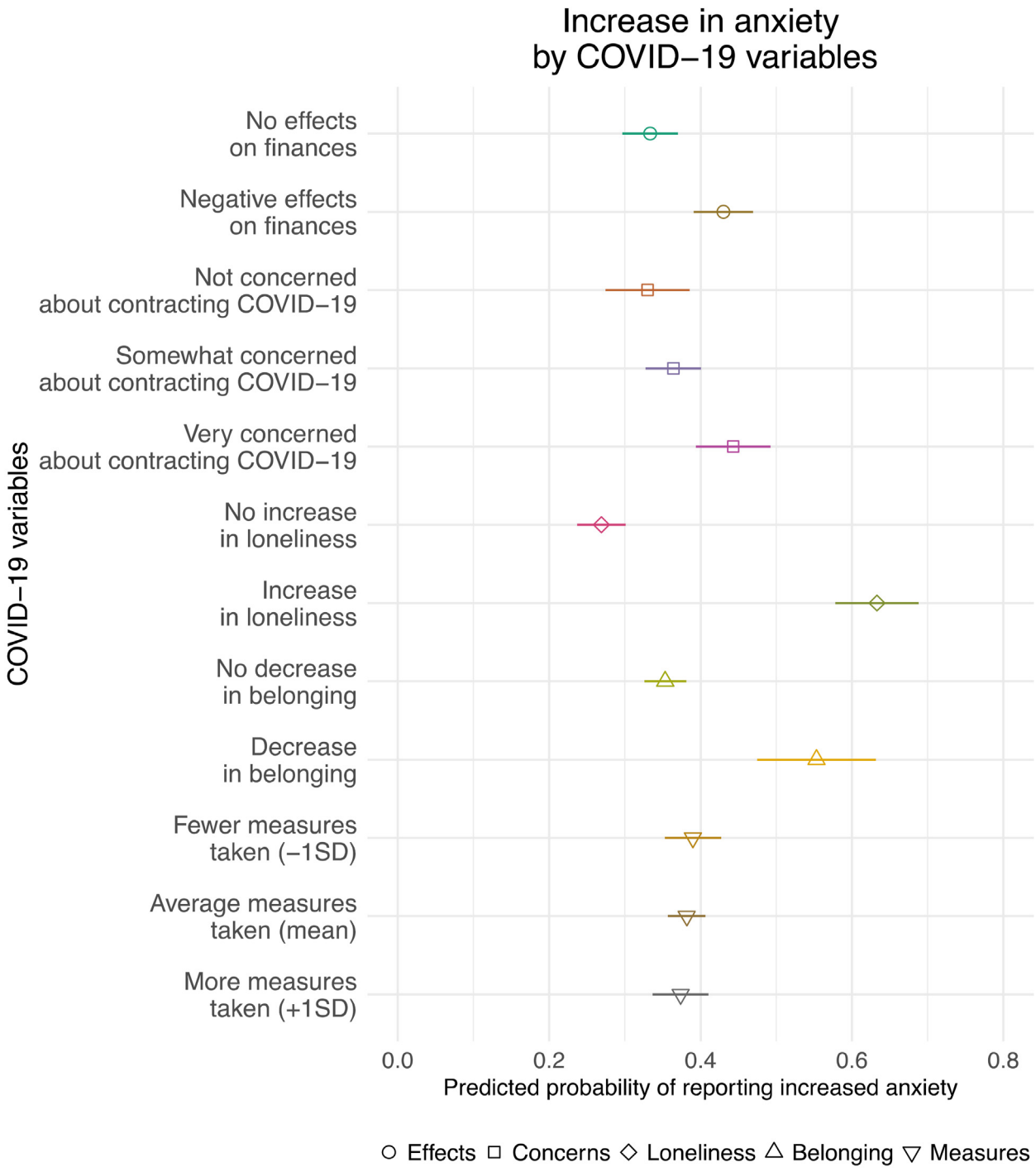
***p < .001, **p < .01, *p < .05.
NOTES: Logistic regression models predicting increased despair. Estimates (b) and standard errors (SE), and average marginal effects (AME) and standard errors (SE). SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults

Much less is known about how people with disabilities and chronic health conditions are handling the pandemic and how prolonged disruptions to social and economic life contribute to negative mental health outcomes.

Presenting findings from the only national survey of Canadians with disabilities and chronic health conditions conducted during the COVID-19 pandemic, this study provides important insight regarding the mental health situation of people in this marginalized group. Nevertheless, the study does have certain limitations related to our sampling procedures and analyses.

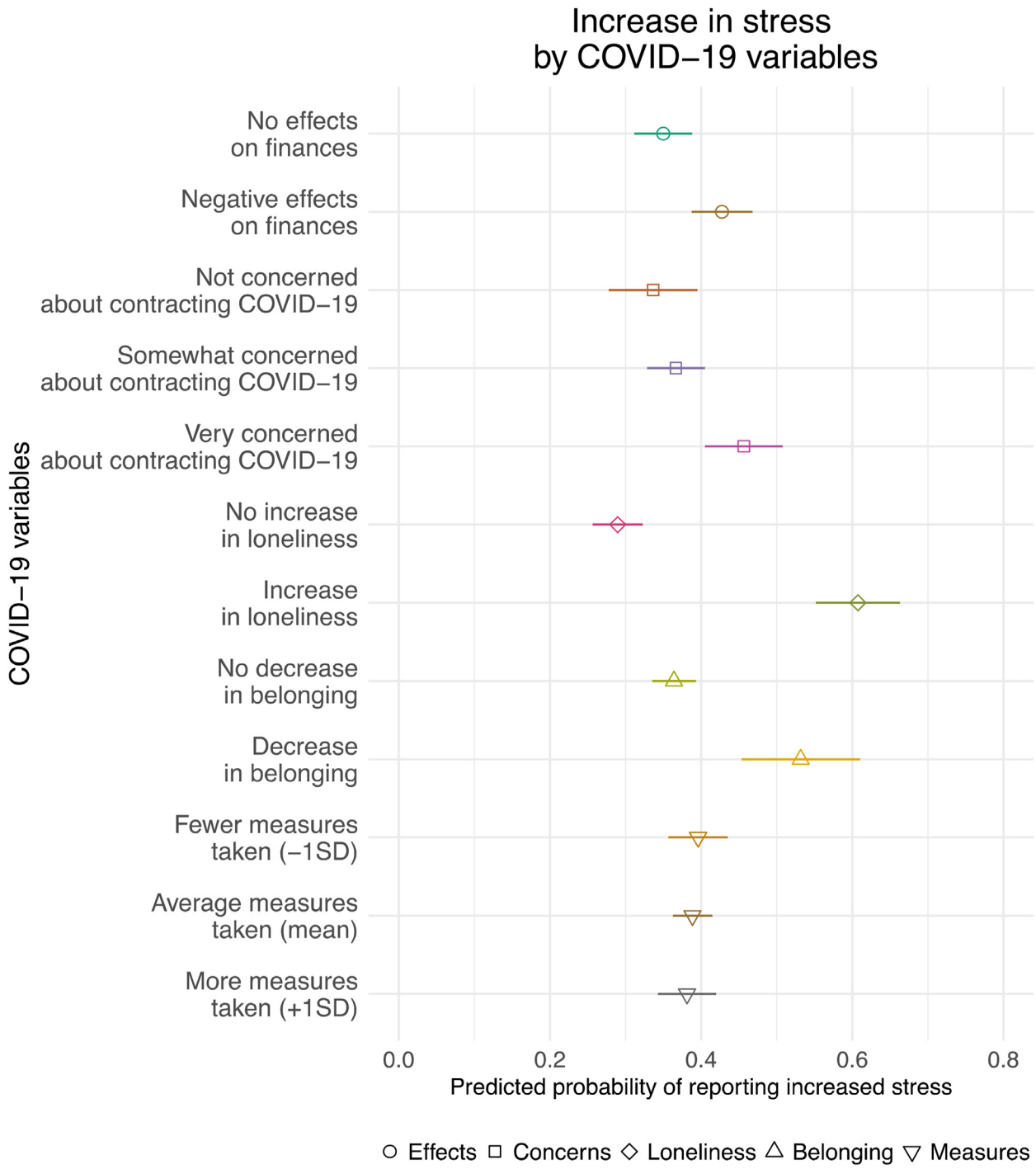
First, our reliance on an online quota-based sample meant that we were unable to include a fully representative sample. Time and resource-limitations associated with conducting large surveys, inadequate sampling frames, as well as significant underrepresentation of marginalized communities in large national surveys makes quota sampling extremely useful in studying the immediate effects of health crises on people with disabilities and chronic health conditions. Although quota sampling is not truly reflective of a random sample of the population, we ensured representation across provinces and note that the Internet-based sample mirrors the demographic characteristics of members of this population, which we discuss in more detail in the Appendix.

Second, our goal of creating a diverse sample that considered multiple types of disabilities and chronic health conditions meant that some respondents did not report severe disabilities. Including people with less severe disabilities and health conditions likely produces more conservative estimates of mental health status. Models show greater effects for those individuals reporting multiple disabilities and health conditions. Additional surveys with larger sample sizes would allow for better comparisons across individuals with different types of disabilities and chronic health conditions. Larger sample sizes would also facilitate more robust



SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults
NOTES: Predicted probabilities and 95% confidence intervals based on logistic regression models predicting increased anxiety. Models appear in Table 2.

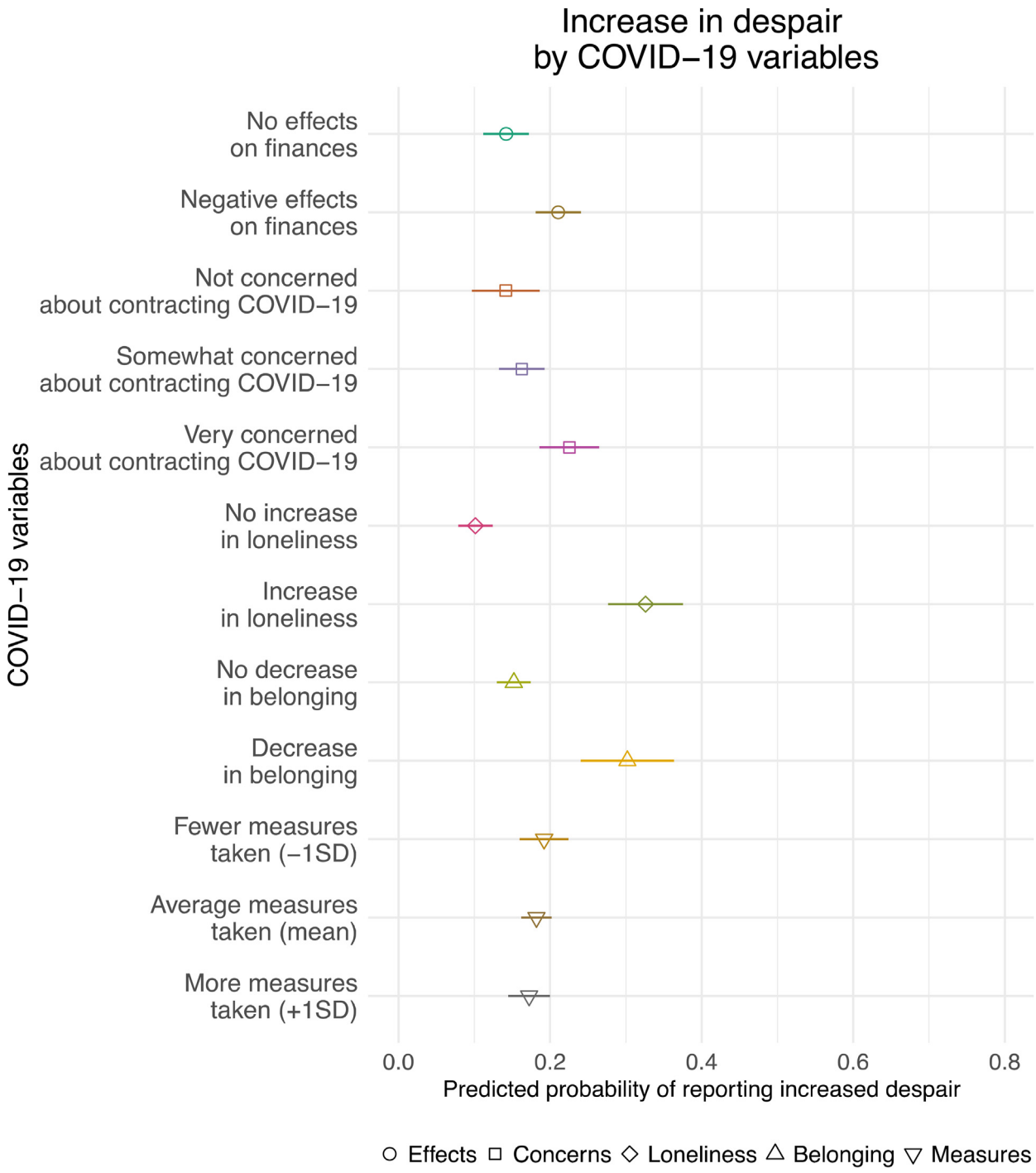
Fig. 1. Predicted Probabilities of Increased Anxiety Across Key Predictor Variables Based on Table 2 Model Results
SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults
NOTES: Predicted probabilities and 95% confidence intervals based on logistic regression models predicting increased anxiety. Models appear in Table 2.



SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults

NOTES: Predicted probabilities and 95% confidence intervals based on logistic regression models predicting increased stress. Models appear in Table 3.

Fig. 2. Predicted Probabilities of Increased Stress Across Key Predictor Variables Based on Table 3 Model Results
SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults
NOTES: Predicted probabilities and 95% confidence intervals based on logistic regression models predicting increased stress. Models appear in Table 3.



SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults
NOTES: Predicted probabilities and 95% confidence intervals based on logistic regression models predicting increased despair. Models appear in Table 4.

Fig. 3. Predicted Probabilities of Increased Despair Across Key Predictor Variables Based on Table 4 Model Results
SOURCE: 2020 COVID-19 Response Survey of People with Disabilities and Health Conditions, N = 1027 adults
NOTES: Predicted probabilities and 95% confidence intervals based on logistic regression models predicting increased despair. Models appear in Table 4.

comparisons among gendered and racial and ethnic minority groups and the intersection of multiple status characteristics. We recommend that future surveys also attempt to oversample members of minority groups in order to achieve a better representation.

Third, although we had hoped to provide additional accommodations to respondents with visual, cognitive, or other disabilities, we were unable to do so over the Qualtrics platform. It is likely that many of the respondents with visual functional limitations used their own technology that facilitated accessing the survey. This online survey likely missed people without access to computers or the Internet, as well individuals with more severe disabilities lacking assistance from caregivers and/or assistive technology.

Finally, with the goal of creating a clear and accessible survey, we included single question measures that asked participants to self-assess changes in their levels of anxiety, stress, and despair. We did not opt for a complex multi-item scale to measure stress and anxiety. Rather, adapting mental health measures from the joint Vox Pop Labs, MassLBP, and Toronto's St. Michael's Hospital national survey conducted in March 2020 with 2439 Canadians,[30] we asked about increases in anxiety, stress, and despair in order to speak to changes in these mental health outcomes since the onset of the pandemic. To assess the recency of such symptoms, we also instructed respondents to consider only the last two weeks.

In addition to supporting public health investments[31] especially in mental health,[1] the findings in this study allude to important pathways to improving mental health outcomes among people with disabilities and chronic health conditions during and post-pandemic. Study results suggest that targeted aide including but not limited to financial supports, especially to a group largely ineligible for income-support programs (like CERB in the Canadian case) as well as social programs and virtual connections that mitigate social isolation's negative impacts on stress, anxiety and despair, can go a long way in improving mental health outcomes.

Conclusion

This study highlights mental health struggles among people with disabilities and chronic health conditions illustrating how increases in anxiety, stress, and despair are associated with COVID-19-induced financial hardship and increased social isolation as a result of adhering to protective measures. More specifically, this study finds that people with disabilities and chronic health conditions very concerned about *contracting COVID-19,* those with an increased sense of *loneliness and isolation* as a result of the pandemic, and those experiencing *negative financial outcomes* due to the pandemic, report feeling more stressed, anxious, and have a greater sense of despair.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A and B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dhjo.2021.101085.

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