Barriers and Facilitators of Adherence to Social Distancing Recommendations among a Large International
Sample of Adults Recruited in April 2020

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Ethics Statement

This study was approved by the University of Calgary Conjoint Health Research Ethics Board. Informed consent was obtained online from all eligible participants.

Conflict of Interests Statement

The authors declare that they have no competing interests.

Authors' Contribution:

AC and CM conceptualized the study. AC, CM, TC, and AG contributed to the design of the study. AC and CM developed some of the study measures, compiled the study questionnaire in Qualtrics, conducted data analyses, and co-wrote the first draft of the manuscript. All co-authors read and approved the final draft of the manuscript.

Data Sharing

Data can be accessed at <https://doi.org/10.17605/OSF.IO/YX67C>

Patient Involvement Statement

Patients were not involved in this study

Abstract

Background

Social distancing measures (e.g., avoiding travel, limiting physical contact with people outside of one's household, and maintaining a 2-metre distance between self and others when in public) are the primary strategies used to prevent transmission of the SARS-Cov-2 virus that causes COVID-19. Given that there is no effective treatment or vaccine for COVID-19, it is important to identify barriers and facilitators to adherence to social distancing to inform ongoing and future public health campaigns.

Method

This cross-sectional study was conducted online with a convenience sample of English-speaking adults. The survey was administered over the course of three weeks (March 30 – April 16, 2020) when social distancing measures were well-enforced in North America and Europe. Participants were asked to complete measures assessing socio-demographic characteristics, psychological constructs, including motivations to engage in social distancing, prosocial attitudes, distress, and social distancing behaviors. Descriptive (mean, standard deviation, percentage) and inferential statistics (logistic regression) were used to describes endorsement rates for various motivations, rates of adherence to social distancing recommendations, and predictors of adherence.

Results

Data were collected from 2013 adults living primarily in North America and Europe. Most frequently endorsed motivations to engage in social distancing (or facilitators) included “I want to protect others” (86%), “I want to protect myself” (84%), and “I feel a sense of responsibility to protect our community” (84%). Most frequently endorsed motivations against social distancing (or barriers) included “There are many people walking on the streets in my area” (31%), “I have friends or family who need me to run errands for them” (25%), “I don't trust the messages my government provides about the pandemic” (13%), and “I feel stressed when I am alone or in isolation” (13%). Adherence to social distancing recommendations ranged from 45% for “working from home or remotely” to 90% for “avoiding crowded places/non-essential travel”, with men and younger individuals (18 – 24 years) showing lower adherence compared to women and older individuals

Conclusion

This study found that adherence to social distancing recommendations vary depending on the behaviour, with none of the surveyed behaviours showing perfect adherence. Strongest facilitators included wanting to protect the self, feeling a responsibility to protect the community, and being able to work/study remotely; strongest barriers included having friends or family who needed help with running errands and socializing in order to avoid feeling lonely. Future interventions to improve adherence to social distancing measures should couple individual-level strategies targeting key barriers to social distancing identified herein, with effective institutional measures and public health interventions. Public health campaigns should continue to highlight compassionate attitudes towards social distancing.

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Background

The incidence of SARS-Cov-2 virus, which causes the disease called COVID-19, has increased dramatically worldwide since December 2019, when the first case was recorded in humans (1). Currently, no effective pharmaceutical treatment or vaccine exist. It is believed that SARS-Cov-2 can be transmitted by both symptomatic and asymptomatic individuals (2–4) and its rate of transmission is higher than that of the influenza virus (5,6), which makes it highly contagious. Since the World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020, national and international public health agencies proposed several measures to contain or mitigate the virus transmission ranging from complete quarantine of the population of an entire region, as in Wuhan, China (virus containment) to various degrees of social distancing measures coupled with rigorous personal hygiene (e.g., washing hands frequently and thoroughly, avoiding touching the eyes, nose, and mouth, coughing and sneezing into the elbow; wearing face masks when in public) in Canada, the United States, and Europe (mitigation of transmission).

For countries adopting a “mitigation scenario” social distancing measures (e.g., avoiding travel, limiting physical contact with people outside of one’s household, and maintaining a 2-metre distance between self and others when in public) are the primary strategies used to prevent the over-burdening of health care systems by reducing the rate of transmission at the level of the general population (7,8). More stringent measures, including full quarantine and isolation have been recommended for individuals at high risk for contracting the virus, such as older individuals and those with pre-existing medical conditions (9,10). Prediction modelling investigating various scenarios of prolonged and intermittent social distancing, suggested some form of these measures may be required into 2024 to prevent overloading of health care systems, absent effective therapeutic interventions and accurate knowledge of immunity duration for those infected with SARS-Cov-2 (11). These results are also supported by other analyses, currently in pre-print (i.e., not yet gone through peer review), suggesting multiple or extended periods of social distancing might be needed in the future (12–16). However, many modelling estimates assume high compliance to public health measures by the general population (17), which may not adequately represent actual practice of health behaviours, such as social distancing.

Given that social distancing measures (“stay-at-home” or “shelter-in-place” orders) are imposing significant lifestyle changes for the general population and they may potentially be required for months or years to come, it is important to understand what facilitates or prevents adherence to these measures, so that public health interventions could be developed in a timely manner. Further, given the current climate where most countries are considering relaxing the social distancing measures as early as May 2020, it is crucially important to determine the factors that might affect individual choices to adhere versus not to practice preventive health behaviours, such as social distancing, in the long run.

Various models of health behaviour change conceptualize motivation as a central predictor for the adoption and maintenance of preventative health behaviours. For example, the Capability-Opportunity-Motivation-Behaviour (COM-B) model (18) posits that the interaction between individual capability (or having the necessary knowledge and skills) and opportunity (physical, social, and environmental support) directly influence motivation to engage in a behavior (reflective and automatic processes driving behavior), which leads to behaviour change and maintenance. Self-determination theory (19) suggests there are two types of motivations that drive behaviour change, intrinsic motivation, where the individual derives pleasure from the behavior, and extrinsic motivation, where external pressures are facilitating adherence to behaviour. Lastly, Motivational Interviewing (20), which is primarily an intervention modality, posits that motivations are the driving force for behavioral change, and are reflected in personal statements closely related to core values. In the context of the COVID-19 pandemic, it seems reasonable to assume that individual reasons to adhere to social distancing measures (e.g., desire to protect self and others) as well as external circumstances or motivators (e.g., workplace/school conducted remotely) contribute to engagement in and adherence to preventative behaviours, such as social distancing. In addition, individual characteristics, such as demographic and psychological profile (educational level, health literacy, anxiety/stress, empathy towards others) might also play a role in adherence. Finally, given that men are more likely to die from COVID and older adults are at higher risk of being infected by Sars-Cov-2, it is likely that gender and age could differentially impact adherence to social distancing behaviours.

Research Aims

This study has three aims:

- 1) to describe rates of motivations (barriers and facilitators) for social distancing;
- 2) to describe rates of adherence to social distancing recommendations;
- 3) to investigate the relationship between socio-demographic characteristics, psychological variables, and motivations for social distancing *and* adherence to social distancing recommendations among a large, convenience sample of English-speaking adults recruited primarily from Europe and North America.

Methods

Study Design

This study used a cross-sectional survey design. Recruitment and data collection were conducted online using the Qualtrics platform. Ethical approval was obtained from the University of Calgary Conjoint Health Research Ethics Board. The reporting of the study followed the STROBE guideline (21).

Participants and procedures

The survey was hosted on the Qualtrics platform and was distributed via snowball convenience sampling through co-author's professional and personal networks and social media accounts (e.g., Twitter, Facebook); ads posted on University of Calgary online platforms; via paid ads (35.00 CAD/day) posted on

Facebook targeting English-speaking adults residing in North America and Europe. Data collection was conducted between March 29th, 2020 and April 16, 2020, when strict regulations about social distancing were in place in North America and most countries in Europe. Paid targeted Facebook ads were placed between April 1st and April 12th, 2020. A preliminary version of the online survey was piloted on 15 individuals whose data were not included in this report. No identifiable data (name, contact information, IPs) were collected through the survey. A copy of the final version of the survey can be found at <https://doi.org/10.17605/OSF.IO/YX67C>.

Eligibility criteria for this study included being 18 years of age or older, ability to read and write in English, and having access to the internet. Participants provided informed consent online, by clicking on a bullet, indicating that they had read through and understood the conditions of their participation in this study. The survey included questions about socio-demographic and medical variables, psychological constructs, including motivations for social distancing, and social distancing behaviors. The average time for completion of the survey was 20.36 minutes (SD=99.26), and 75% of the sample completed the survey in less than 16 minutes (25th percentile: 9.5; minutes; 50th percentile: 12.2; 75th percentile: 16.45 minutes).

Patient and Public Involvement. Aside from providing data for this study, participants were not involved in any other aspect of this research project.

Predictor Variables

Sociodemographic and medical information. Participants were asked to indicate their age, gender, highest level of education completed, country of residence, whether they had a medical condition associated with an increased risk for COVID-19, self-perceived symptoms of COVID-19 over the previous week, and whether they were tested for COVID-19.

MacArthur Scale of Subjective Social Status Scale (22). Perceived socioeconomic status (SES) was assessed via a single item consisting of a picture of a 10-step ladder. Participants were asked to select the rung of the ladder that best represents their socioeconomic position related to others in society, where higher scores indicate higher perceived SES. In a sample of white women, this measure was associated with income, education, and self-rated health status (22). This measure demonstrated adequate test-retest reliability (ICC=.67, weighted kappa statistic=.62) in a general population sample from Brazil (23).

Health Literacy Scale. Health literacy was assessed with one item created by the study authors “If I was given a pamphlet on how to prevent a medical condition (disease), I would be able to understand the main message(s)”, with response options on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree).

Belief in Conspiracy Theories Scale (24). Conspiracy beliefs were assessed using a single-item measure, which provides a scenario about common conspiracy theories and asked respondents to rate the following statement using a Likert-type scale ranging from 1 (“completely false”) to 9 (“completely true”): “I think that the official version of the events given by the authorities very often hides the truth”. The scale showed good

predictive validity, test-retest reliability, and convergent validity with lengthier scales assessing the same construct in samples of students and MTurk workers (24).

Prosocial Behavioral Intentions Scale (25). Prosocial attitudes were assessed with the 4-item scale inquiring about participants' willingness to perform prosocial behaviours on an average day (sample item, "comfort someone I know after they experience hardship"). Answers were scored on a 7-point Likert scale ranging from 1 ("I wouldn't do this") to 7 ("I would do this"). Total scores ranged from 4 to 28, with higher scores indicating more positive attitudes towards prosocial behaviour. The scale was associated with past prosocial behaviour and measures of morality in a general population sample recruited via MTurk (25). Cronbach's alpha was .81 in the validation sample and .76 in the current sample.

Patient Health Questionnaire-4 (PHQ-4) (26). Psychological distress, conceptualized as symptoms of anxiety (sample item, "Not being able to stop or control worrying") and depression (sample item, "Little interest or pleasure in doing things"), was assessed using the PhQ-4. Respondents were asked to indicate whether they experienced symptoms over the previous two weeks using a 4-point Likert scale ranging from 0 ("not at all") to 3 ("nearly every day"). Total scores ranged from 0 to 12, with higher scores indicating higher distress. In a large general population sample the scale was found to be valid and reliable when compared to longer symptom inventories assessing anxiety and depression (27). Cronbach's alpha for the PHQ-4 was .78 in the validation sample .87 in the current sample.

Motivations for Social Distancing. A Motivational Interviewing framework was used to conceptualize personal motivations regarding social distancing and isolation recommendations (20,28). This approach suggests that motivations for and against behaviour change and adherence can exist simultaneously within an individual, and that encouraging individuals to express what motivates them to adopt a certain behaviour helps highlight ambivalence toward health behaviour change. Additionally, the social-ecological model (29) was used to organize a set of 55 statements reflecting various motivations related to adherence to social distancing, created through team discussions including all study authors and piloted with a sample of 15 participants and subsequently revised for clarity and consistency. These motivations were classified as individual (n=20), interpersonal (n=12), organizational (n=9), or community (n=14) related motivations. Further, each cluster included motivations that were conceptualized by study authors as being motivations for or against adherence to social distancing behaviours. For example, at the individual-level, "I want to protect myself" was generated as a motivation that supports adherence to social distancing behaviour (i.e., motivation "for") while "I feel stressed when I'm alone or in isolation" was identified as a motivation that could act as a barrier to social distancing behaviour (i.e., motivation "against").

Participants were given the following instructions: "Below is a list of motivations for social distancing. Some may be reasons to follow social distancing rules and others may be reasons that may make you skeptical or hesitant about following social distancing rules. Please indicate which of the statements below reflect your

motivations for social distancing, by selecting all that apply.” For data analyses, endorsed items were coded as “1” and non-endorsed items as “0”.

Outcome Variables

Social Distancing Behaviours. A list of 15 behaviours consistent with social distancing recommendations from national and international public health authorities (30–32) was generated by the study team. The term “social distancing” was used in favour of the term “physical distancing” because when the study was designed, this was the term most commonly used by public health agencies. Items included references to working from home, practicing social distance from various groups, avoiding large social gatherings or travel, keeping a safe distance from others when in public, and isolating at home when sick.

Participants were asked to rate each behaviour according to the following prompt: “Please indicate to what extent have you done any of these behaviours in the past week (7 days, including today)”. Response options ranged from 1 (“Never”) to 4 (“Always”) and also included a ‘Not applicable’ option. Adherence to social distancing was conceptualized as “always” endorsing the behaviour (coded as “1”) whereas non-adherence was conceptualized as behaviour endorsed less often than “always”, including “never”, “sometimes”, or “often” response choices (coded as “0”).

Data analysis

Descriptive analyses (% , M/SD) were computed for all study measures. Chi square tests were used to compare responses on the outcome variables obtained in the first, second and third week of recruitment. Logistic regression analyses were used to test the association between socio-demographic (age, gender, education, country of residence, medical status, and COVID-19 symptoms), psychological (conspiracy beliefs, health literacy, prosocial behavior, distress), and motivational predictors and social distancing behavioral outcomes. During data collection, recommendations and policies for social distancing differed by region or country but did not change within one region or country, hence our regression models did not account for timing of survey completion.

Post hoc decisions for the selection of motivation and social distancing items to be included in the logistic regressions included a) identifying two motivations “for” (or facilitators) and two “against” (or barriers) social distancing with the highest endorsement rates from each of the four clusters of motivations; and b) excluding social distancing items with adherence rates of > 85% (high) or < 10% (low) as well as items with > 45% “not applicable” answers.

Results

Data were collected from N = 2336 participants, of whom 14.8% completed less than 40% of the questionnaire and were thus excluded. Analyses were conducted with N = 2013 individuals who provided answers to >= 60% of questions with 100% completion rate for the outcome measure, social distancing

behaviors. Respondents completed the survey over three weeks, as follows: first week, March 29-April 4, $n = 635$ (31.5%); second week, April 5-11, $n = 900$ (44.7%); third week, April 12-16, $n = 478$ (23.7%).

Sample Characteristics

Among the entire sample ($n = 2013$), 84% were female, 71% had completed at least a bachelor degree, 38.8% resided in North America (Canada and the United States) versus 59.5% in Europe versus 1.7% other locations; 30.9% had a pre-existing medical condition that made them vulnerable to COVID-19, 25% had experienced at least one symptom associated with COVID-19, and 3% had been tested for COVID-19. With respect to psychological variables, participants endorsed average conspiracy beliefs, health literacy, and distress levels, and increased prosocial attitudes. Detailed descriptive statistics for the study measures are included in Table 1.

Motivations for Social Distancing

Endorsement rates for the four sets of motivations “for” (facilitators) and “against” (barriers) social distancing are included in Table 2. Highest endorsement rates were found for the following facilitators of social distancing: “I want to protect myself” (84%) and “I want to avoid spreading the virus to others” (83%) (individual-level facilitators); “I want to protect others” (86%) and “I feel a sense of responsibility to protect our community” (84%) (interpersonal-level); “My workplace/ school recommended we practice social distancing” (54%) and “My workplace /school conducts operations remotely” (51%) (organizational-level); “Restaurants in my area are closed for eating-in” (95%) and “Community centers and recreational facilities in my area are closed” (94%) (community-level).

Highest endorsement rates were found for the following barriers to social distancing: “I don’t trust the messages my government provides about the pandemic” (13%), and “I feel stressed when I am alone or in isolation” (13%) (individual-level); “I have friends or family who need me to run errands for them” (25%) and “I socialize with people to avoid feeling lonely” (6%) (interpersonal-level); “My work cannot be done remotely” (16%) and “My workplace requires me to come into work” (11%) (organizational-level); “There are many people walking on the streets in my area” (31%) and “It is not possible to shop online and get deliveries in my area” (11%) (community-level). Lowest endorsement rates were found for the following barriers to social distancing: “I believe the best strategy to manage this pandemic is to let the virus run its course” (3.9%), “I think the government is exaggerating the impact of this pandemic” (3.8%), “I think I cannot spread the virus if I am not sick” (1.9%), and “I’ve heard social distancing is not effective at reducing transmission of the virus” (1.1%) (individual-level); “I believe my actions cannot protect others from contracting the virus” (3.2%) and “I believe it’s OK to go out and meet with people in small groups” (2.9%) (interpersonal-level).

Adherence to Social Distancing Behaviors

Detailed descriptive statistics for the social distancing behaviors are included in Table 3. Rates of social distancing behaviours were comparable across the three weeks of recruitment. Relatively high adherence rates

or social distancing behavior endorsed as “always” among $\geq 85\%$ of the sample were found for items reflecting “avoidance of social gatherings”, “avoidance of crowded places”, “avoidance of restaurants, bars, pubs, coffee shops”, “avoidance of non-essential travel”, “avoidance of common greetings (handshakes, hugs)”, and “limiting contact with vulnerable populations”. Low adherence rates, or behavior endorsed as “always” among $< 10\%$ of the sample were found for items reflecting “ordering take out” and “having meals delivered”. Items for which slightly lower than half the sample (46%) answered “not applicable” included “attending classes virtually” and “isolating at home when sick”.

Adherence rates of 45-75% were found for items reflecting “working remotely/from home”, “keeping a safe distance when in public”, “avoiding leaving home except for grocery/pharmacy runs”, “avoiding contact with family members not living in the same household”, and “avoiding socializing in person even with close friends”.

Regression Models Predicting Adherence to Social Distancing Behaviors

Detailed statistics for regression models predicting social distancing behaviors are included in Table 4.

Working remotely from home. Predictors of adherence (behaviour endorsed as “always”) included having completed at least a bachelor’s degree versus less than bachelor’s degree, higher prosocial attitudes, and endorsing “work/school conducting operations remotely”. Predictors of non-adherence included identifying as “other” gender versus male, being ≥ 65 years of age versus 18-24, and endorsing “work has implemented SD policies” and “my work cannot be done remotely”.

Avoiding contact with family members not living in the same household. Predictors of adherence included higher health literacy, higher prosocial attitudes, and “feeling a sense of responsibility to protect the community”. Predictors of non-adherence included living in a country with strict versus moderate rules, having a pre-existing medical condition, lower conspiracy beliefs, and “having friends/family who need me to run errands for them” and seeing “many people walking in the streets”.

Avoiding socializing in person even with close friends. Predictors of adherence included identifying as female versus male, being 45-64 and ≥ 65 years of age versus 18-24, higher distress, and “wanting to protect self”. Predictors of non-adherence included “feeling stressed or alone or in isolation”, “having friends/family who need me to run errands for them”, “socializing with people to avoid feeling lonely”, and seeing “many people walking in the streets”.

Keeping a safe distance when in public. Predictors of adherence included identifying as female versus male, being 25-64, 45-64, or ≥ 65 years of age versus 18-24, higher prosocial attitudes, “wanting to protect self”, and “feeling a sense of responsibility to protect the community”. Predictors of non-adherence included endorsement of “my work cannot be done remotely” and seeing “many people walking in the streets”.

Avoiding leaving home except for grocery/pharmacy runs. Predictors of adherence included identifying as female versus male, higher prosocial attitudes, “wanting to protect self”, and “wanting to protect

others". Predictors of non-adherence included living in a country with strict versus moderate social distancing rules, having a pre-existing medical condition, "feeling stressed when alone or in isolation", and seeing "many people walking in the streets".

Discussion

The current study investigated rates of motivations (or barriers and facilitators) for social distancing and adherence to social distancing recommendations in a large convenience sample of 2013 English-speaking adults recruited primarily from Europe and North America. Data were collected during a period of time where across most countries in Europe and North America regulations about social distancing were relatively strict (e.g., shelter-in-place and working from home orders). Our results suggest that individuals are motivated to engage in social distancing by both internal factors, including wanting to protect self and others, wanting to avoid spreading the virus to others and feeling the responsibility to protect the community, as well as external circumstances, including institutions conducting work remotely and social events being cancelled. Key barriers against social distancing included feeling stressed when alone, socializing to avoid loneliness, having to run errands for family or friends, not being able to do work remotely, and seeing many people on the streets in the area of residence. Importantly, barriers tapping misconceptions and/or conspiratory beliefs, such as inability to pass the virus unless sick or showing symptoms, the government exaggerating the impact of the epidemic, social distancing not being effective at reducing virus transmission, or "letting the virus run its course", were endorsed only by a small minority of respondents (1-3%).

Adherence to social distancing behaviours that are within one's control, such as avoiding non-essential travel, social gatherings, or handshakes, was relatively high, yet not perfect. While adherence might look very promising, it is likely closely linked to the timeline for data collection, which paralleled strictly enforced social distancing regulations. Notably, adherence to behaviours taxed by external circumstances (e.g., institutional policies or geographic location) including working remotely or ordering meals online, was lower. These findings have direct implications to future public health recommendations during this pandemic, especially as several countries are moving towards relaxing social distancing measures currently in place. It is possible that as distancing measures relax, adherence rates to social distancing recommendations would decrease, potentially causing a spike in COVID-19 incidence once again (13). In fact, given that 25% of our sample reported symptoms consistent with COVID-19 but only 3% had been tested, it is imperative that public health initiatives focus on wider scale testing and contact tracing coupled with continued recommendations for social distancing and proper hygiene.

Based on logistic regression models which examined the impact of socio-demographic, medical, and psychological predictors on adherence to social distancing recommendations, we found that women were more likely than men and older individuals (> 45 years old) were more likely than younger individuals (18-24 years old) to avoid socializing in person and maintain a safe distance when in public. Wanting to protect the

self, feeling a responsibility to protect the community, and being able to work/study remotely were the strongest predictors for adherence to social distancing recommendations. In contrast, individuals living in a country with more strict rules for social distancing and those having at least one pre-existing medical condition were less likely to avoid meeting with family members outside of the household and to leave home only for grocery or pharmacy trips. Similarly, having friends or family who needed help with running errands, socializing in order to avoid feeling lonely, and seeing many people in the streets were the strongest barriers to adherence to social distancing recommendations.

Limitations

There are limitations to this study, including the use of a convenience sample (i.e., recruited on social media) and homogeneity of sample characteristics (i.e., 84% female, >70% completed at least a bachelor's degree), which might affect the generalizability of our findings to predominantly male samples, more diverse samples, or individuals without easy access to the internet and social media platforms (Facebook, Twitter). The cross-sectional design allowed for testing of associations between predictor and outcome variables at one point in time, but longitudinal predictions could not be made. Lastly, the outcome variables, social distancing behaviours, and some of the predictor variables, including motivations for social distancing, were created by the authors specifically for this study and their psychometric properties are currently unknown. As such, it is possible our measures did not cover an exclusive range of behaviors and/or motivations about social distancing

Implications and Future Directions

Results from the current study suggest that men are less adherent (~30-40 % non-adherence) to social distancing recommendations compared to women (~15-30% non-adherence). These differences might be due to different responses to stress, compliance levels, preference for seeking and receiving social support, or other factors. It should be noted that substantially fewer men compared to women participated in this study, so differences relating to gender might be a function of our unbalanced enrollment. Similarly, younger individuals, particularly in the 18-24 age group, who were found to be less likely than older individuals to adhere to social distancing recommendations, might have a stronger preference or need to socialize in person to seek and receive social support and facilitate relatedness or feelings of belongingness (19,33). Public health communications about social distancing should incorporate more nuanced guidelines for safely engaging socially with others, while also maintaining appropriate physical distancing standards, using non-blaming and non-stigmatizing language and targeting specific groups such as men and younger individuals. In line with our findings that wanting to protect self, others and the community were the strongest motivators associated with higher adherence to social distancing recommendations, it is important that these compassionate-focused attitudes are kept at the center of future public health campaigns about social distancing. Lastly, the study found that seeing many people walking in the streets was one of the strongest barriers against social distancing (i.e., associated with lower adherence), but seeing few people in the streets acted as a facilitator of adherence

to social distancing (statistic not reported). This highlights the importance of social norms and their impact on the uptake of protective behaviors (34).

Future interventions should target modifiable barriers to social distancing identified herein using strategies designed specifically to improve individual motivation to initiate health protective behaviors (e.g., motivational interviewing), tap personal values around self-protection and protecting of others (e.g., acceptance and commitment therapy) and reduce peer pressure to socialize freely with others for those witnessing crowds or living in crowded areas (e.g., compassion-focused therapy). These individual-level interventions coupled with effective organizational measures and community-based or public health interventions will be extremely important to facilitate the uptake and maintenance of social distancing behaviours among the general population until an effective vaccine and /or treatment for COVID-19 is discovered. Future research could investigate the relationship between motivations and adherence to social distancing recommendations in a longitudinal design, which will be relevant especially as countries transition to “opening up” scenarios where restrictions on social interactions will relax. Future research is also needed to establish the psychometric properties of the measures developed specifically for this study, including the assessment of social distancing behaviours and the motivations for social distancing.

Conclusion

This cross-sectional study collected data from 2013 participants recruited via social media. The study was conducted during a period of well-enforced regulations about social distancing. Adherence to social distancing recommendations was relatively high for most behaviours, but not nearly close to 100%. The study identified key modifiable barriers and facilitators of adherence to social distancing: strongest facilitators included wanting to protect the self, feeling a responsibility to protect the community, and being able to work/study remotely; strongest barriers included having friends or family who needed help with running errands, socializing in order to avoid feeling lonely, and seeing many people in the streets. Future interventions to improve adherence to social distancing measures should couple individual-level strategies targeting key barriers to social distancing identified herein, with effective institutional measures and public health interventions. Public health campaigns should continue to highlight compassionate attitudes towards social distancing.

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References

1. World Health Organization. Pneumonia of unknown cause – China [Internet]. World Health Organization; 2020 [cited 2020 May 1]. Available from: <http://www.who.int/csr/don/05-january-2020-pneumonia-of-unknown-cause-china/en/>
2. Bai Y, Yao L, Wei T, Tian F, Jin D-Y, Chen L, et al. Presumed Asymptomatic Carrier Transmission of COVID-19. *JAMA*. 2020 Apr 14;323(14):1406–7.
3. Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*. 2020 Apr 30;382(18):1708–20.
4. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *N Engl J Med*. 2020 Mar 5;382(10):970–1.
5. Inglesby TV. Public Health Measures and the Reproduction Number of SARS-CoV-2. *JAMA* [Internet]. 2020 May 1 [cited 2020 May 5]; Available from: <http://jamanetwork.com/journals/jama/fullarticle/2765665>
6. Pan A, Liu L, Wang C, Guo H, Hao X, Wang Q, et al. Association of Public Health Interventions With the Epidemiology of the COVID-19 Outbreak in Wuhan, China. *JAMA* [Internet]. 2020 Apr 10 [cited 2020 May 5]; Available from: <http://jamanetwork.com/journals/jama/fullarticle/2764658>
7. Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TD. How will country-based mitigation measures influence the course of the COVID-19 epidemic? *The Lancet*. 2020 Mar 21;395(10228):931–4.
8. Qualls N. Community Mitigation Guidelines to Prevent Pandemic Influenza — United States, 2017. *MMWR Recomm Rep* [Internet]. 2017 [cited 2020 Apr 18];66. Available from: <https://www.facebook.com/CDCMMWR>
9. Public Health Agency of Canada. Vulnerable populations and COVID-19 [Internet]. aem. 2020 [cited 2020 Apr 29]. Available from: <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/vulnerable-populations-covid-19.html>
10. CDC. Coronavirus Disease 2019 (COVID-19) - Older Adults [Internet]. Centers for Disease Control and Prevention. 2020 [cited 2020 Apr 29]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html>
11. Kissler SM, Tedijanto C, Goldstein E, Grad YH, Lipsitch M. Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science* [Internet]. 2020 Apr 14 [cited 2020 Apr 17]; Available from: <https://science.sciencemag.org/content/early/2020/04/14/science.abb5793>
12. Davies N, Kucharski AJ, Eggo RM, CMMID nCov working group, Edmunds WJ. The effect of non-pharmaceutical interventions on COVID-19 cases, deaths and demand for hospital services in the UK: a modelling study. *CMMID Repos* [Internet]. 2020 Apr 1 [cited 2020 May 1]; Available from: <https://cmmid.github.io/topics/covid19/uk-scenario-modelling.html>
13. Kissler SM, Tedijanto C, Lipsitch M, Grad Y. Social distancing strategies for curbing the COVID-19 epidemic. *medRxiv* [Internet]. 2020 [cited 2020 May 1]; Available from: <https://www.medrxiv.org/content/10.1101/2020.03.22.20041079v1>

14. Perkins A, Espana G. Optimal control of the COVID-19 pandemic with non-pharmaceutical interventions. medRxiv [Internet]. 2020 [cited 2020 May 1]; Available from: <https://www.medrxiv.org/content/10.1101/2020.04.22.20076018v1>
15. Roche B, Garchitorena A, Roiz D. Optimal strategies for quarantine stopping in France. General expected patterns of strategies focusing on contact between age groups. medRxiv. 2020 Apr 24;2020.04.21.20073932.
16. WHO CC for IDM, MRC Centre for Global Infectious Disease Analysis, Abdul Latif Jameel Institute for Disease and Emergency Analytics, Imperial College London, UK. Report 9 - Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand | Faculty of Medicine | Imperial College London [Internet]. 2020 [cited 2020 May 1]. Available from: <https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-9-impact-of-npis-on-covid-19/>
17. Lewnard JA, Lo NC. Scientific and ethical basis for social-distancing interventions against COVID-19. Lancet Infect Dis [Internet]. 2020 Mar 23 [cited 2020 Apr 29]; Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7118670/>
18. Michie S, van Stralen MM, West R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implement Sci. 2011 Apr 23;6(1):42.
19. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol. 2000;55(1):68.
20. Rollnick S, Miller WR. What is Motivational Interviewing? Behav Cogn Psychother. 1995 Oct;23(4):325–34.
21. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for reporting observational studies. Int J Surg. 2014 Dec 1;12(12):1495–9.
22. Adler NE, Epel ES, Castellazzo G, Ickovics JR. Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. Health Psychol. 2000;19(6):586–92.
23. Giatti L, Camelo L do V, Rodrigues JF de C, Barreto SM. Reliability of the MacArthur scale of subjective social status - Brazilian Longitudinal Study of Adult Health (ELSA-Brasil). BMC Public Health. 2012 Dec 20;12:1096.
24. Lantian A, Muller D, Nurra C, Douglas KM. Measuring Belief in Conspiracy Theories: Validation of a French and English Single-Item Scale. Int Rev Soc Psychol. 2016 Feb 4;29(1):1–14.
25. Baumsteiger R, Siegel JT. Measuring Prosociality: The Development of a Prosocial Behavioral Intentions Scale. J Pers Assess. 2019 Jun;101(3):305–14.
26. Kroenke K, Spitzer RL, Williams JBW, Löwe B. An Ultra-Brief Screening Scale for Anxiety and Depression: The PHQ–4. Psychosomatics. 2009 Nov 1;50(6):613–21.
27. Löwe B, Wahl I, Rose M, Spitzer C, Glaesmer H, Wingenfeld K, et al. A 4-item measure of depression and anxiety: Validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. J Affect Disord. 2010 Apr 1;122(1):86–95.

28. Miller WR. Motivational Interviewing with Problem Drinkers. *Behav Cogn Psychother*. 1983 Apr;11(2):147–72.
29. McLeroy KR, Bibeau D, Steckler A, Glanz K. An Ecological Perspective on Health Promotion Programs. *Health Educ Q*. 1988 Dec 1;15(4):351–77.
30. CDC. Social Distancing, Quarantine, and Isolation [Internet]. 2020 [cited 2020 Apr 25]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>
31. CDC. Social Distancing - Coronavirus Disease 2019 (COVID-19) [Internet]. Centers for Disease Control and Prevention. 2020 [cited 2020 Apr 25]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>
32. World Health Organization. Coronavirus disease (COVID-19): advice for the public [Internet]. 2020 [cited 2020 Apr 18]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>
33. Baumeister RF, Leary MR. The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychol Bull*. 1995 May;117(3):497–529.
34. Cialdini RB, Goldstein NJ. Social Influence: Compliance and Conformity. *Annu Rev Psychol*. 2004 Jan 14;55(1):591–621.

Table 1. Sample Characteristics (N=2013)

Variable	N	n (%)	M (SD)	Range
Age	2013		42.91 (15.15)	18-100
18 – 24		231 (11.5)		
25 – 44		922 (45.8)		
45 – 64		657 (32.6)		
>= 65		203 (10.1)		
Gender	2005			
Female		1685 (84.0)		
Male		294 (14.7)		
Other		26 (1.3)		
Education	1991			
Elementary		4 (0.2)		
Middle school		15 (0.8)		
Highschool or equivalent		212 (10.6)		
Apprenticeship/trade school		31 (1.6)		
College (non-univ)		167 (8.4)		
Univ, below bachelor level		159 (8.0)		
Univ, bachelor level or higher		1403 (70.5)		
Socio-economic status (ladder)	1952		6.38 (1.70)	1-10
Country of residence	1963			
North America, Canada and United States		762 (38.8)		
European, European Union [EU] members		804 (39.9)		
European, non-EU members		364 (18.1)		
Other		33 (1.6)		
Pre-existing health conditions, Yes (any)	1943	600 (30.9)		
Heart condition or cardiovascular disease		68 (3.5)		
Chronic respiratory diseases		236 (12.2)		
Type 2 Diabetes		49 (2.5)		
Autoimmune disease		192 (9.9)		
Currently receiving chemotherapy		10 (0.5)		
Other conditions that affect immune function		205 (10.7)		
COVID-19 symptoms during past week, Yes (any)	2012	496 (24.7)		
Dry cough		218 (10.8)		
Low-grade fever		93 (4.6)		
Difficulty breathing		94 (4.7)		
Fatigue or muscle pains		297 (14.8)		
Tested for COVID-19	2010			
Yes, test result was positive		3 (0.1)		

Variable	N	n (%)	M (SD)	Range
Yes, test result was negative		47 (2.3)		
Yes, don't know the result yet		7 (0.3)		
No		1953 (97.2)		
Live with someone diagnosed with COVID-19	2009			
Yes		7 (0.3)		
No		2002 (99.7)		
Belief in conspiracy theories	1929		4.2 (2.3)	1 – 9
Health literacy	1934		3.7 (0.6)	1 – 4
Prosocial attitudes, Sum score	1913		6.05 (.97)	1 – 7
Distress (PHQ-4), Sum score	1912		2.10 (.83)	1 - 4

Note. PHQ-4 – Patient Health Questionnaire-4.

Table 2. Endorsement Rates Motivations “for” and “against” Social Distancing (N=2013)

Crt no.	Variable	N	%
Individual-level Motivations			
1	I want to protect myself	1690	84.0
2	I want to avoid spreading the virus to others	1666	82.8
3	I am concerned about spreading the virus to vulnerable people.	1634	81.2
4	I feel good about myself when I protect others.	934	46.4
5	I feel less stressed when I practice social distancing.	877	43.6
6	I feel more in control when I practice social distancing	822	40.8
7	I don't have a pre-existing medical condition	611	30.4
8	I have an elevated risk for COVID-19	391	19.4
9	*I feel stressed when I am alone or in isolation	268	13.3
10	*I don't trust the messages my government provides about the pandemic	255	12.7
11	*I think it's unlikely I will catch the virus.	159	7.9
12	*I cannot afford to pay for delivery for food or groceries	116	5.8
13	*I don't like to be told what to do.	112	5.6
14	*I believe the best strategy to manage this pandemic is to let the virus run its course.	78	3.9
15	*I think the government is exaggerating the impact of this pandemic.	77	3.8
16	*I think I cannot spread the virus if I am not sick.	39	1.9
17	*I don't have a good internet connection at home	38	1.9
18	*I think this pandemic is not serious.	30	1.5
19	*I believe prayers and religious rituals can protect me from this virus.	29	1.4
20	*I've heard social distancing is not effective at reducing transmission of the virus	22	1.1
Interpersonal-level Motivations			
21	I want to protect others.	1726	85.7
22	I feel a sense of responsibility to protect our community.	1688	83.9
23	I care about the well-being of others.	1634	81.2
24	I have friends or family who are vulnerable to the virus.	1415	70.3
25	I feel connected to others even when I practice social distancing.	1135	56.4
26	I live with someone who is vulnerable to the virus.	569	28.3
27	*I have friends or family who need me to run errands for them.	497	24.7
28	*I socialize with people to avoid feeling lonely.	124	6.2
29	*I don't have friends or family who are vulnerable to the virus.	84	4.2
30	*I believe it's OK to invite people to your home to socialize in small groups.	69	3.4
31	*I believe my actions cannot protect others from contracting the virus.	64	3.2
32	*I believe it's OK to go out and meet with people in small groups.	59	2.9

Crt no.	Variable	N	%
Organizational-level Motivations			
33	My workplace or school recommended we practice social distancing.	1076	53.5
34	My workplace or school conducts operations remotely	1025	50.9
35	My workplace or school closed down	712	35.4
36	My workplace or school discouraged us from coming in	648	32.2
37	*My workplace has implemented social distancing policies for workers that have to come to work	530	26.3
38	*My work cannot be done remotely.	324	16.1
39	*My workplace requires me to come into work.	224	11.1
40	*My workplace won't pay me if I do not go into work.	93	4.6
41	*My workplace told me that I could lose my job if I do not go into work.	18	0.9
Community-level Motivations			
42	Restaurants in my area are closed for eating-in.	1911	94.9
43	Community centers and recreational facilities in my area are closed.	1897	94.2
44	There are no social events held in person in my area.	1825	90.7
45	My government says I must do social distancing.	1777	88.3
46	My news sources say I should do social distancing.	1675	83.2
47	It is possible to shop online and have items delivered to my house.	1653	82.1
48	There is barely anyone walking outside in my area.	1098	54.5
49	*My place of faith is closed (for example, mosque, temple, church, synagogue).	916	45.5
50	*There are many people walking on the streets in my area.	624	31.0
51	*It is not possible to shop online and get deliveries in my area.	215	10.7
52	*My place of faith is open (for example, mosque, temple, church, synagogue).	71	3.5
53	*There are social events held in person in my area.	36	1.8
54	*Community centers and recreational facilities in my area are open.	31	1.5
55	*Restaurants in my area are open for eating-in	16	0.8

Note. Instructions were to check all that apply.

Motivations "for" were conceptualized as facilitators of social distancing.

* Motivations "against" were conceptualized as barriers to social distancing.

Table 3. Descriptive Statistics for Adherence to Social Distancing Recommendations (N=2,013)

Crt no	Variable	M (SD)	Never (%)	Sometimes (%)	Often (%)	Always (%)	N/A (%)	Always (%)			
								Week 1	Week 2	Week 3	p
1	Working from home or remotely	3.2 (1.2)	12.0	9.3	9.4	44.8	24.5	46.8	42.3	46.7	-
2	Attending classes virtually or completing coursework remotely	2.7 (1.2)	13.1	9.9	9.2	20.6	47.2	19.4	19.6	24.3	<.001
3	Avoiding non-essential gatherings (social events)	3.9 (0.5)	2.1	1.5	4.9	88.7	2.7	89.6	88.3	88.3	-
4	Avoiding crowded places (concerts, conferences, arenas, festivals)	3.9 (0.4)	0.9	0.7	2.0	90.6	5.8	92.4	88.8	91.6	.03
5	Avoiding going out to restaurants, bars, pubs, coffee shops, etc.	3.9 (0.4)	1.0	1.1	3.6	88.8	5.5	90.6	86.4	91.0	.001
6	Avoiding any non-essential travel (domestic, international)	3.9 (0.4)	1.0	0.9	3.8	90.5	3.7	92.3	87.9	92.9	-
7	Avoiding common greetings that involve close contact (hugs, kisses, handshakes)	3.9 (0.5)	1.3	1.7	6.4	88.1	2.5	90.2	87.2	86.8	-
8	Avoiding making contact with family members who do not typically live with you	3.7 (0.7)	2.8	4.5	14.2	73.6	5.0	73.9	73.2	73.8	-
9	Avoiding socializing in person even with close friends	3.8 (0.6)	1.6	3.0	12.3	82.0	1.0	81.6	81.8	83.1	-
10	Avoiding or limiting contact with people at higher risk or vulnerable populations (for example, older adults, those with at risk conditions or those in poor health)	3.9 (0.5)	1.4	1.8	7.0	85.0	4.8	88.5	84.2	86.0	-
11	Ordering take-out from restaurants (picked up in person)	1.7 (1.0)	54.1	23.1	5.6	8.2	9.0	9.4	7.6	7.9	-
12	Having meals/groceries delivered to your house	1.8 (.1.0)	49.7	27.3	8.8	8.7	5.4	8.5	8.9	8.8	-
13	Keeping a safe distance of at least 6 feet (approximately 2 meters)	3.6 (0.6)	0.5	3.5	28.4	66.2	1.4	66.1	66.6	65.5	.02
14	Isolating myself at home, when sick	3.8 (0.6)	1.4	1.2	2.8	45.9	48.7	45.7	43.3	50.8	.001
15	Avoiding leaving the home, except to go to grocery store or pharmacy	3.6 (0.7)	2.3	7.7	20.5	66.9	2.6	69.3	70.2	57.3	<.001

Note. Response options for each item ranged from 1 (‘Never’) to 4 (‘Always’).

Table 4. Stepwise Logistic Regression Models Predicting Adherence to Social Distancing Behaviors

Variable	Working from home/remotely			Avoiding contact with family members outside of household			Avoiding socializing in person even with close friends			Keeping a safe distance of at least 6 feet (approximately 2 meters)			Avoiding leaving the home, except for grocery store or pharmacy		
	Adherent	Non adherent	Adj OR	Adherent	Non adherent	Adj OR	Adherent	Non adherent	Adj OR	Adherent	Non adherent	Adj OR	Adherent	Non adherent	Adj OR
Gender, n (%)															
Male	138 (61.1)	88 (38.9)	REF	205 (76.2)	64 (23.8)	REF	206 (70.8)	85 (29.2)	REF	170 (58.6)	120 (41.4)	REF	170 (58.8)	119 (41.2)	REF
Female	753 (59.4)	515 (40.6)	0.84 [0.57, 1.25]	1254 (77.7)	360 (22.3)	0.95 [0.67, 1.34]	1420 (85.0)	250 (15.0)	2.02 [1.45, 2.82]	1146 (69.0)	516 (31.0)	1.50 [1.11, 2.03]	1159 (70.6)	482 (29.4)	1.42 [1.05, 1.91]
Other	6 (31.6)	13 (68.4)	0.21 [0.06, 0.78]	18 (78.3)	5 (21.7)	1.27 [0.42, 3.79]	20 (83.3)	4.0 (16.7)	2.79 [0.87, 8.98]	13 (52.0)	12 (48.0)	1.12 [0.45, 2.76]	13 (54.2)	11 (45.8)	0.85 [0.33, 2.16]
Age, n (%)															
18-24	88 (60.3)	58 (39.7)	REF	157 (70.7)	65 (29.3)	REF	158 (68.7)	72 (31.3)	REF	109 (48.9)	114 (51.1)	REF	137 (60.4)	90 (39.6)	REF
25-44	507 (63.3)	294 (36.7)	0.98 [0.58, 1.63]	683 (78.0)	193 (22.0)	1.21 [0.81, 1.80]	751 (82.0)	165 (18.0)	1.44 [0.96, 2.15]	539 (58.9)	376 (41.1)	1.45 [1.02, 2.07]	603 (66.3)	306 (33.7)	1.09 [0.76, 1.58]
45-64	283 (56.0)	222 (44.0)	0.96 [0.56, 1.66]	486 (77.3)	143 (22.7)	1.21 [0.79, 1.85]	561 (87.0)	84 (13.0)	2.27 [1.43, 3.59]	510 (78.5)	140 (21.5)	3.25 [2.20, 4.81]	462 (73.4)	167 (26.6)	1.24 [0.83, 1.86]
>=65	23 (33.8)	45 (66.2)	0.39 [0.18, 0.88]	155 (83.8)	30 (16.2)	1.65 [0.90, 3.01]	181 (90.0)	20 (10.0)	2.55 [1.32, 4.95]	174 (88.8)	22 (11.2)	6.77 [3.65, 12.57]	144 (73.5)	52 (26.5)	1.06 [0.63, 1.79]
Education, n (%)															
< Bachelor	164 (45.8)	194 (54.2)	REF	414 (74.2)	144 (25.8)	REF	466 (80.5)	113 (19.5)	REF	397 (69.0)	178 (31.0)	REF	398 (70.3)	168 (29.7)	REF
>= Bachelor	731 (63.7)	417 (36.3)	1.48 [1.06, 2.08]	1054 (79.1)	279 (20.9)	1.25 [0.95, 1.65]	1168 (83.9)	224 (16.1)	1.14 [0.84, 1.56]	919 (66.2)	469 (33.8)	0.77 [0.59, 1.00]	932 (67.8)	442 (32.2)	0.90 [0.70, 1.17]
SES-ladder	6.5 ± 1.6	6.3 ± 1.8	0.97 [0.90, 1.06]	6.4 ± 1.7	6.3 ± 1.7	1.00 [0.93, 1.08]	6.4 ± 1.7	6.4 ± 1.8	0.95 [0.87, 1.03]	6.5 ± 1.7	6.3 ± 1.7	1.03 [0.96, 1.10]	6.3 ± 1.7	6.5 ± 1.7	0.96 [0.90, 1.03]
**Country of residence															
*Moderate rules	515 (59.6)	349 (40.4)	REF	848 (76.9)	255 (23.1)	REF	949 (82.6)	200 (17.4)	REF	783 (68.6)	359 (31.4)	REF	709 (63.0)	416 (37.0)	REF

MOTIVATION AND ADHERENCE TO SOCIAL DISTANCING RECOMMENDATIONS

*Strict rules	356 (59.1)	246 (40.9)	1.06 [0.79, 1.41]	589 (79.3)	154 (20.7)	0.73 [0.57, 0.95]	651 (84.2)	122 (15.8)	0.90 [0.68, 1.20]	504 (65.3)	268 (34.7)	1.15 [0.91, 1.44]	594 (77.4)	173 (22.6)	0.46 [0.36, 0.59]
Pre-existing conditions, n (%)															
No	628 (60.2)	415 (39.8)	REF	975 (70.7)	300 (29.3)	REF	1090 (81.8)	242 (18.2)	REF	859 (64.8)	467 (35.2)	REF	853 (65.2)	455 (34.8)	REF
Yes	245 (57.9)	178 (42.1)	1.02 [0.75, 1.39]	464 (70.7)	109 (29.3)	0.71 [0.54, 0.95]	509 (86.0)	83 (14.0)	0.81 [0.59, 1.11]	424 (71.9)	166 (28.1)	0.81 [0.63, 1.04]	446 (76.0)	141 (24.0)	0.66 [0.51, 0.86]
COVID-19 symptoms, n (%)															
No	695 (60.3)	457 (39.7)	REF	1117 (70.7)	320 (29.3)	REF	1249 (83.3)	251 (16.7)	REF	1018 (68.2)	475 (31.8)	REF	1001 (67.5)	482 (32.5)	REF
Yes	206 (56.1)	161 (43.9)	0.96 [0.70, 1.32]	364 (70.7)	110 (29.3)	1.09 [0.82, 1.44]	402.0 (81.9)	89.0 (18.1)	1.14 [0.84, 1.55]	314 (64.1)	176 (35.9)	1.10 [0.85, 1.41]	345 (72.3)	132 (27.7)	0.77 [0.59, 1.00]
Psychological variables, M ± SD															
Conspiracy beliefs	4.0 ± 2.3	4.3 ± 2.3	0.95 [0.89, 1.01]	4.1 ± 2.3	4.5 ± 2.3	0.93 [0.88, 0.98]	4.2 ± 2.3	4.3 ± 2.3	0.99 [0.93, 1.05]	4.1 ± 2.3	4.3 ± 2.2	0.98 [0.94, 1.03]	4.2 ± 2.3	4.1 ± 2.3	1.00 [0.95, 1.05]
Health literacy	3.7 ± 0.6	3.6 ± 0.6	1.25 [0.99, 1.58]	3.7 ± 0.6	3.6 ± 0.7	1.43 [1.18, 1.72]	3.7 ± 0.6	3.6 ± 0.6	1.19 [0.96, 1.48]	3.7 ± 0.6	3.6 ± 0.6	1.14 [0.95, 1.37]	3.7 ± 0.6	3.7 ± 0.6	1.18 [0.98, 1.42]
PhQ-4	2.1 ± 0.8	2.1 ± 0.8	1.15 [0.96, 1.38]	2.1 ± 0.8	2.1 ± 0.8	1.12 [0.96, 1.32]	2.1 ± 0.8	2.1 ± 0.8	1.31 [1.09, 1.57]	2.1 ± 0.8	2.2 ± 0.8	1.08 [0.93, 1.24]	2.1 ± 0.8	2.1 ± 0.8	1.09 [0.94, 1.26]
Prosocial behavior	6.1 ± 1.0	6.0 ± 1.0	1.17 [1.02, 1.35]	6.1 ± 1.0	6.0 ± 0.9	1.13 [1.00, 1.28]	6.1 ± 1.0	5.9 ± 1.0	1.10 [0.96, 1.26]	6.2 ± 0.9	5.9 ± 1.0	1.22 [1.09, 1.37]	6.1 ± 1.0	5.9 ± 0.9	1.16 [1.04, 1.30]
Individual-level motivations (yes), n (%)															
Want to protect myself	754 (59.5)	514 (40.5)	1.04 [0.70, 1.55]	1270 (78.8)	342 (21.2)	1.37 [0.98, 1.90]	1427 (85.0)	252 (15.0)	2.17 [1.54, 3.05]	1167 (69.8)	506 (30.2)	1.62 [1.20, 2.19]	1175 (71.2)	475 (28.8)	1.93 [1.43, 2.61]
Want to avoid spreading virus	744 (59.2)	512 (40.8)	0.84 [0.55, 1.29]	1240 (78.2)	346 (21.8)	0.98 [0.68, 1.42]	1394 (84.2)	262 (15.8)	1.41 [0.96, 2.08]	1132 (68.8)	513 (31.2)	1.02 [0.73, 1.42]	1133 (69.8)	490 (30.2)	0.99 [0.71, 1.39]
*Don't have a pre-existing medical condition	280 (60.7)	181 (39.3)	1.11 [0.82, 1.51]	447 (76.8)	135 (23.2)	1.05 [0.80, 1.37]	487 (80.6)	117 (19.4)	1.08 [0.80, 1.45]	391 (64.6)	214 (35.4)	0.96 [0.75, 1.22]	378 (63.3)	219 (36.7)	0.81 [0.64, 1.03]

*Feel stressed when I’m alone or in isolation	118 (58.1)	85 (41.9)	0.68 [0.44, 1.04]	185 (72.5)	70 (27.5)	0.94 [0.66, 1.35]	195 (73.3)	71 (26.7)	0.56 [0.38, 0.81]	153 (58.4)	109 (41.6)	0.97 [0.70, 1.34]	157 (59.0)	109 (41.0)	0.71 [0.51, 0.98]
Interpersonal -level motivations (yes), n (%)															
Want to protect others	775 (59.5)	528 (40.5)	1.03 [0.64, 1.66]	1285 (78.1)	360 (21.9)	0.95 [0.64, 1.42]	1430 (83.5)	282 (16.5)	0.75 [0.48, 1.17]	1181 (69.2)	526 (30.8)	1.35 [0.94, 1.95]	1187 (70.6)	495 (29.4)	1.53 [1.07, 2.20]
Feel a sense of responsibility to protect our community	769 (60.1)	510 (39.9)	1.18 [0.78, 1.79]	1273 (79.1)	337 (20.9)	1.52 [1.08, 2.15]	1408 (84.0)	268 (16.0)	1.22 [0.83, 1.78]	1164 (69.9)	502 (30.1)	1.47 [1.07, 2.02]	1159 (70.5)	486 (29.5)	1.25 [0.90, 1.74]
*Have friends/family who need me to run errands	217 (57.3)	162 (42.7)	0.79 [0.58, 1.09]	333 (70)	143 (30.0)	0.54 [0.41, 0.70]	393 (80.2)	97 (19.8)	0.62 [0.46, 0.84]	334 (67.5)	161 (32.5)	0.99 [0.77, 1.27]	327 (67.0)	161 (33.0)	0.80 [0.63, 1.03]
*I socialize with people to avoid feeling lonely	70 (68.0)	33 (32.0)	1.43 [0.82, 2.50]	76 (65.5)	40 (34.5)	0.68 [0.44, 1.07]	81 (65.3)	43 (34.7)	0.51 [0.33, 0.79]	61 (49.6)	62 (50.4)	0.69 [0.45, 1.04]	65 (52.4)	59 (47.6)	0.70 [0.46, 1.06]
Organizational-level motivations (yes), n (%)															
My work/school recommended we practice social distancing	607 (64.4)	336 (35.6)	1.29 [0.94, 1.77]	803 (78.0)	227 (22.0)	1.25 [0.94, 1.67]	874 (81.7)	196 (18.3)	0.96 [0.70, 1.33]	672 (63.0)	394 (37.0)	0.86 [0.66, 1.11]	705 (67.3)	343 (32.7)	1.15 [0.88, 1.50]
My work/school conducts operations remotely	719 (77.0)	215 (23.0)	4.66 [3.46, 6.26]	752 (76.5)	231 (23.5)	0.82 [0.61, 1.08]	834 (82.0)	183 (18.0)	1.05 [0.76, 1.43]	638 (62.9)	376 (37.1)	0.86 [0.67, 1.11]	674 (66.5)	340 (33.5)	0.83 [0.64, 1.07]
*My work has implemented SD policies for workers	261 (53.5)	227 (46.5)	0.61 [0.44, 0.83]	389 (76.9)	117 (23.1)	0.94 [0.70, 1.27]	434 (82.5)	92 (17.5)	0.96 [0.70, 1.33]	345 (65.7)	180 (34.3)	1.02 [0.78, 1.33]	342 (66.8)	170 (33.2)	0.96 [0.73, 1.25]
*My work cannot be done remotely	24 (9.3)	234 (90.7)	0.07 [0.04, 0.11]	232 (74.8)	78 (25.2)	0.82 [0.58, 1.16]	258 (80.6)	62 (19.4)	0.88 [0.61, 1.29]	198 (61.3)	125 (38.7)	0.69 [0.50, 0.93]	186 (62.2)	113 (37.8)	0.71 [0.51, 0.97]

Community-level motivations (yes), n (%)															
Recreational facilities closed	853 (59.7)	577 (40.3)	1.29 [0.65, 2.58]	1402 (77.7)	403 (22.3)	1.00 [0.55, 1.83]	1563 (83.0)	320 (17.0)	0.86 [0.43, 1.75]	1261 (67.3)	612 (32.7)	1.17 [0.68, 2.03]	1270 (68.5)	583 (31.5)	0.93 [0.52, 1.67]
Restaurants closed for eating in	858 (59.7)	580 (40.3)	0.72 [0.34, 1.52]	1415 (77.7)	405 (22.3)	1.32 [0.70, 2.49]	1577 (83.1)	321 (16.9)	1.15 [0.56, 2.39]	1270 (67.3)	617 (32.7)	1.21 [0.67, 2.19]	1277 (68.5)	588 (31.5)	0.83 [0.44, 1.57]
*There are many people walking on the streets	305 (60.8)	197 (39.2)	1.25 [0.93, 1.68]	444 (74.0)	156 (26.0)	0.76 [0.59, 0.98]	486 (78.3)	135 (21.7)	0.69 [0.52, 0.91]	360 (58.1)	260 (41.9)	0.66 [0.52, 0.82]	356 (58.3)	255 (41.7)	0.57 [0.45, 0.71]
*Not possible to shop online and get deliveries	81 (56.3)	63 (43.8)	1.19 [0.75, 1.90]	158 (80.2)	39 (19.8)	1.42 [0.92, 2.17]	182 (86.3)	29 (13.7)	1.39 [0.85, 2.26]	144 (68.6)	66 (31.4)	0.78 [0.54, 1.12]	160 (75.8)	51 (24.2)	1.29 [0.88, 1.89]

Note. *Motivations “against” social distancing. PHQ-4 – Patient Health Questionnaire-4.

**Countries in North America and Europe with moderate or strict regulations about social distancing

*Countries with moderate social distancing restrictions included: Canada, the United States, Belgium, Croatia, Estonia, Germany, Latvia, Lichtenstein, Lithuania, Luxembourg, Malta, Poland, Slovakia, Slovenia, Switzerland, the United Kingdom.

*Countries with strict social distancing regulations, such as police enforced isolation, included Albania, Andorra, Austria, Bosnia and Herzegovina, Bulgaria, Czech Republic, France, Greece, Hungary, Ireland, Italy, Monaco, Montenegro, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Spain, The Former Yugoslav Republic, Ukraine.

Participants from European countries with minimal to no regulations about social distancing, including Denmark (n=1), Finland (n=1), Iceland (n=1), Netherlands (n=11), and Sweden (n=1) were excluded from analyses.