Mental health disorders, autism and Covid-19 severity: Integrating quantitative data with participant experiences

Natasha Biscoe[1] *& Silvia Riva*[1]

Abstract

Background: The Covid-19 pandemic has mobilized a concerted research effort to identify biological, socio-demographic, and behavioral factors which may increase the risk of infection and severity of the disease. Whilst much research has explored physical health factors which may affect these risks, the effects of mental health and attitudes have been less fully investigated.

Objective: The current study is one of the first to investigate possible associations between optimism bias, self-reported mental health, neurodiversity, and Covid-19 severity. A second aim of the present study was to explore any observed relationships by exploring the subjective experiences of being ill with Covid-19 of individuals with these disorders.

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[1] School of Allied Health, and Life Science, St Mary's University, Twickenham, London.

Silvia Riva https://orcid.org/0000-0003-2153-0169

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Correspondence to: Dr. Silvia Riva, School of Allied Health, and Life Sciences, St Mary's University, Twickenham. Waldegrave Road, Strawberry Hill, London, UK, TW1 4SX. Phone: 02082401039; E-mail: silvia.riva@stmarys.ac.uk.

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Methods: A convenience sample of 400 adults (210 Males; aged 18-64; M = 33.3; SD = 11.8 years) who had tested positive for Covid-19 completed a survey that asked them whether they had any mental health or developmental disorders. They were also asked questions about how likely they had thought it was they would become ill (optimism bias) and a free-response item about their experience of having Covid-19. Sentiment analysis coded these responses as negative, neutral, or positive.

Results: Binary logistic regression analysis revealed that having an eating disorder ($\chi^2_1 = 5.86$; $p < .001$) and having a higher optimism bias ($\chi^2_1 = 4.65$, $p < .001$) were associated with increased odds of being hospitalized with Covid-19 (a proxy for Covid severity). Presence of autism was associated with a decreased likelihood of having a negative sentiment towards being ill ($\chi^2_1 = -632.46$; $p < .001$).

Conclusions: Supplemented by future research with a larger sample size and more targeted qualitative analysis, these findings may inform public health messaging and care provision for individuals with these disorders in pandemic or health contexts.

Keywords: Mental Health; Covid-19; Optimistic bias; Disease experience; Neurodiversity.

1. Introduction

1.1. Background

The Covid-19 pandemic has impacted over a hundred countries, with more than 350 million cases and 5 million fatalities reported worldwide, as of December 2021. In May 2023, COVID-19 was officially no longer classified as a global public health emergency. Nevertheless, the virus still spreads within communities and continues to pose a potentially significant health threat (European Centre for Disease Prevention and Control [ECDC], 2021). Covid-19 has therefore become an acute global health emergency, which has mobilized a concerted research effort to identify biological, socio-demographic, and behavioral factors that may increase the risk of infection and severity of the disease. The social and economic costs of the pandemic also motivate a better understanding of such risk factors so that those most at risk can be supported by targeted policies and health information. This research is part of an EU Horizon 2020 project, funded under the *Societal Challenges - Health, Demographic Change and Well-being programme*, which aims to foster innovation and collaboration across Europe to tackle pressing health challenges. A further reason why accurate information on factors that affect Covid-19 risk is important is that such crises may be associated with increased prejudice and discrimination. This is because fear and greater perceived threat may be associated with intolerance towards outgroups (Feldman & Stenner, 1997; Bhanot, Singh, Verma, & Sharad, 2021).

In the UK, approximately 25% of people have been ascribed 'high-risk' status (UK Health Security Agency & Department of Health and Social Care, 2021). This group encompasses all those aged 70 and above, and individuals with underlying health conditions including respiratory and cardiovascular disease and cancer. Furthermore, older age, diabetes, and hypertension have all been associated with an increased risk of death (Wu, Chen, Cai, Xia, Zhou, Xu *et al.*, 2020; Yang, Zheng, Gou, Pu, Chen, Guo *et al.*, 2020). Both smoking, and higher BMI are also widely reported as factors for greater mortality risk from Covid-19 (Yang *et al.*, 2020) as well as being male (Livingston, Rostamipour, Gallagher, Kalafatis, Shastri, Huzzey *et al.*, 2020), although this could be due to the higher rates of smoking and other comorbidities in men.

1.2. Mental health and Covid-19

However, the effects of mental health and attitudes towards subjective perceived risk for Covid-19 have been less fully explored. The field of Psychoneuroimmunology explores the associations between the brain and the immune system (Irwin, 2002). Whilst little is known about how mental disorders such as depression may impact infectious and respiratory diseases, both cross-sectional and longitudinal studies have identified individual differences in physiological measures in those with depression, including autonomic, neuroendocrine, and immune function.

It is important to distinguish that the concept of 'severity' in medical conditions like COVID-19 is primarily determined by physiological markers such as viral load, symptom intensity, and clinical outcomes like hospitalization. In contrast, in mental health conditions such as conversion disorder (as classified in DSM-5), 'severity' pertains to the presence and impact of physiological symptoms that occur without identifiable medical or neurological causes. In these cases, the patient's subjective experience and psychological state play a significant role in symptom manifestation. Understanding this distinction is crucial when exploring how mental health disorders may influence the severity of COVID-19, as the interplay between psychological and physiological factors can differ substantially between these types of conditions.

Such relationships are complex, and likely to involve reciprocal and cascading interactions between disease severity, self-concept, coping, and other life stresses. One mechanism posited for this potential association is that certain mental disorders may reduce access and compliance with medical interventions (Carney, Freedland, Rich, & Jaffe, 1995). A physiological mechanism for the link between mental health disorders and infectious disease risk is the increased inflammatory response that occurs with the presence of physical and psychological stressors. Epidemiological studies report that greater psychological stress co-occurs with increased severity of illness with infectious diseases (Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997). For example, spousal caregivers of adults living with dementia (a proxy for increased psychological stress) had a weaker antibody response to influenza vaccination than age- and gender-matched controls (Kiecolt-Glaser, Glaser, Gravenstein, Malarkey, & Sheridan, 1996). A meta-analysis also revealed that depression, anxiety and stress disorders are associated with an increased risk of respiratory disease (Pedersen, Zachariae, & Bovbjerg, 2010).

In the context of Covid-19, researchers have found that psychiatric disorders (including anxiety, depression and stress-related disorders) diagnosed before the pandemic may be associated with an increased risk of becoming ill with the disease (Toubasi, AbuAnzeh, Tawileh, Aldebei, & Alryalat, 2021). The impact of mental health disorders on Covid-19 severity has not been explored. Research also shows that autistic individuals experienced significantly higher levels of stress, anxiety, and depressive symptoms during the pandemic, especially when coping strategies were maladaptive or uncertainty intolerance was high (Evers, Gijbels, Maljaars, Rumball, Spain, Happé *et al.*, 2023). Mental health disorders can impact individuals' thoughts and behaviors.

1.3. Optimism bias and Covid-19

Given the importance of mitigating behaviors on the spread and impact of coronavirus, individuals' subjective attitudes towards the pandemic and restrictions are also important to explore. The present study explores the impact of one such cognitive bias on Covid-19 severity. Optimism bias refers to the tendency to underestimate the risk some threat poses (Sharot, 2011) In the context of Covid-19, optimism bias might refer to individuals having the perception that their risk of contracting or becoming seriously ill with the virus is lower for them than others. Such a bias might influence the extent to which individuals adhere to mitigating behaviors (Wise, Zbozinek, Michelini, Hagan, & Mobbs, 2020), including hand washing and social distancing. Thus, optimism bias could increase the risk of becoming ill. Several studies have revealed that optimism bias regarding Covid-19 morbidity and mortality risk is present in multiple countries, including the UK, USA, Italy, Germany, France, Switzerland, China and Poland (Pascual-Leone, Cattaneo, Macia, Solana, & Tormos, 2021). Studies have also indicated that Covid-19 optimism bias persists across socio-demographic characteristics. Individuals were found to be more worried about the impact of the pandemic on others than themselves even if they had themselves been hospitalized with the virus. However, no studies have yet explored whether optimism bias about Covid increases the likelihood of hospitalization.

This aligns with the findings of Kuper-Smith and colleagues (Kuper-Smith, Doppelhofer, Oganian, Rosenblau, & Korn, 2021), who demonstrated that optimism bias regarding infection and transmission risks was widespread during the early stages of the pandemic and remained stable over time, possibly influenced by perceived personal control.

1.4. Integrating individuals' subjective experiences

Any link between mental health factors and Covid-19 severity may be illuminated by exploring these individuals' subjective experiences of being ill with the virus. Whilst two people may be similarly afflicted with the disease, their lived experiences may vary and depend on a number of socio-demographic, environmental or dispositional factors (Llewellyn, Ayers, McManus, Newman, Petrie, Revenson *et al.*, 2019). Sentiment analysis is a qualitative method typically used with large-scale social media text to explore the valence of attitudes towards particular topics, for marketing or political purposes. Since the technique is based on AI algorithms, it can be utilized for large-scale analysis, unlike qualitative alternatives which explore subjective experiences in a more in-depth way and are restricted to smaller sample sizes. Researchers have utilized sentiment analysis to explore experiences related to the pandemic. For example, being a woman increased the likelihood of a negatively rated description of lockdown experience in Australia. The present study explores whether having a mental health disorder impacts subjective experiences of being ill with Covid. This may inform how services might differentially support service-users with these conditions in a pandemic context or where face-to-face support is not possible.

While previous research has examined the impact of optimism bias during the COVID-19 pandemic, few studies have explored how this interacts with specific mental health and neurodiversity. This study is among the first to investigate how optimism bias, in combination with self-reported mental and neurodiversity disorders, may influence both the severity of illness and the subjective experience of being ill.

The current study investigates whether the presence of mental health and neurodiversity, including emotional disorders, autism, sleeping disorders, sexual disorders, cognitive disorders and optimism bias are associated with Covid-19 severity in individuals who tested positive for the disease. Following similar studies (Liang, Guan, Chen, Wang, Li, Xu *et al.*, 2020), whether the patient was hospitalized with Covid-19 is taken as a proxy for disease severity. Secondly, the current study investigates whether the presence of any of these mental health and neurodiversity impacts the subjective experiences of being ill with Covid-19 for such individuals, utilizing sentiment analysis. Since this research is exploratory, no hypotheses are made.

2. Methods

2.1. Ethics

This study was conducted in accordance with the BPS Code of Ethics and Conduct and was approved by the Ethics Sub-Committee of the Faculty of XXXXXX at XXXXX in London.

2.2. Participants

The data were collected between December 2020 and March 2021. A convenience sample of 400 adults (210 men [52%], 190 women [48%]), aged 18 to 64 years (M = 33.32, SD = 11.79), was recruited through the lead researcher's network and the online research platform XXXXXX. Participants were selected from members of the platform who met the inclusion criteria and signed up to a study advertised as "Psychological aspects and Covid-19". This sample size was chosen following a power calculation (α = .05), which suggested 224 participants would be needed to achieve β = .8. This calculation was based on effect sizes from similar studies (Liang *et al.*, 2020) and on the infection rates for Covid-19 in Europe. Inclusion criteria comprised being aged 18 – 65, English-speaking and having a previous positive test for Covid-19. Participants were not compensated. Sample characteristics are reported in Table 1.

Table 1 – *Sample demographics*

Characteristic	*n*	*%*
Ethnicity		
White	237	59.3
Asian	89	22.3
Multiracial	33	8.3
Black	26	6.5
Latin	15	3.8
Relationship status		
Married/Living with a partner	234	58.5
Single	137	34.3
Other	29	7.3
Continent		
Europe	235	58.8
Other	89	22.3
US	76	19.0

Education		
Undergraduate	137	34.3
Postgraduate	102	25.5
High school	76	19.0
Tech college	74	18.5
Unknown	9	2.3
Other	2	.5
Employment status		
Employed with wages	247	61.8
Other	69	17.3
Self-employed	58	14.5
Unemployed	26	6,5

N = 400

2.3. Procedure

Participants were given an information sheet that described the study as aiming to understand possible links between psychological factors and Covid-19 experience and severity. Once they had given informed consent, participants were emailed a link to the questionnaire measure which was hosted on JISC and St Mary‘s University website. It took participants an average of 15 minutes to complete the study. Afterwards they were thanked and fully debriefed.

2.3.1. Questionnaire measure

The survey was developed by the researchers specifically for the study, given no scale measuring the relevant psychological factors and Covid-19-specific variables existed. The survey included two validated instruments: the Perceived Stress Scale (PSS4) (Cohen, Kamarck, & Mermelstein, 1983), and three sub-scales of the Patient-Reported Outcomes Measurement Information System (PROMIS). The PSS4 (α = .84) is one of the most commonly used psychological instruments to measure stress perception. It is used to measure the extent to which situations in a person’s life are perceived as stressful. The items were designed to measure respondents’ feelings of unpredictability, uncontrollability, and being overburden.

The PROMIS® (Patient-Reported Outcomes Measurement Information System®) evaluates and monitors a person’s physical, mental, and social health (https://www.promishealth.org/). The PROMIS measures can be administered to both the general population and chronically ill individuals. PROMIS evaluates seven health domains (physical function, fatigue, pain interference, depressive symptoms, anxiety, and ability to participate in

social roles and activities). For this survey, measures of depressive symptoms *(α* = .96), anxiety (α = .95), and sleep disturbance (*α* = .94) were selected (Cella, Riley, Stone, Rothrock, Reeve, Yount *et al.*, 2010; Saffer, Lanting, Koehle, Klonsky, & Iverson, 2015) (Appendix 1). Items were binary and asked participants whether they suffered from the included mental disorders. Additionally, some items measured participants' comparative optimism bias, for example: "I felt like I had a higher chance of getting sick [with Covid] than others". Questions on optimism bias were informed by contemporary work assessing cognitive risk appraisals during COVID-19 (e.g., Kuper-Smith *et al.*, 2021), while the inclusion of perceived stress and intolerance of uncertainty aligns with predictors identified as critical in recent studies on autism and mental health outcomes during the pandemic (Evers *et al.*, 2023).

A final, free-text response item asked participants "how would you describe your experience with Covid-19". This qualitative question elicited naturalistic responses from participants that could be utilized in sentiment analysis (e.g., Taboada, 2016) to understand possible associations between self-reported mental health disorders and subjective experience of the disease.

2.3.2. Data analysis

Participants were asked to self-report whether they identified as having any of a range of mental health or neurodiversity conditions. No diagnostic verification was conducted, and responses reflect participants' own understanding of their conditions.

To investigate the relationship between mental health disorders and Covid-19 severity, logistic regression was used. That is, whether the mental health disorders considered increased the likelihood that a participant was hospitalized. The data were analyzed using SPSS version 28.

Sentiment analysis was conducted using Microsoft Excel add-in for Azure Machine Learning. This program utilizes a library of 5,097 negative and 2,533 positive words, each assigned a weak or strong polarity. Each text string is then compared to this library to assign each string a negative, neutral, or positive sentiment score. These sentiment outputs were then be utilized as a categorical outcome variable in a binary logistic regression analysis, to explore associations between self-reported mental health disorders and the subjective experience of Covid-19.

3. Results

3.1. Mental health and Covid-19 severity

Following previous studies (e.g., Liang *et al.*, 2020), hospitalization was used as a proxy for the severity of Covid-19 infection. Descriptive statistics (frequencies) for hospitalization and each mental health variable, as well as control variables are reported in Table 2.

Table 2 – *Descriptive statistics for mental disorders and Covid-19 hospitalization*

Variable	*n*	*%*
Hospitalization	141	35
Mental disorders		
Emotional disorders	188	47
Schizophrenia	19	5
Eating disorders	99	25
Addictive disorders	46	12
Obsessive-Compulsive disorders	44	7
Autism	20	5
Sleeping disorders	287	28
Other mental disorders	32	8
Sexual disorders	24	6
No mental disorder	138	35
Two or more mental disorders	149	37
Control variables/covariates		
Smoking	156	39

N = 400

To investigate whether the presence of mental health disorders is associated with Covid-19 severity, logistic regression models were fit to the data, with hospitalization as the binary outcome variable. Results of these models for each variable as a single predictor are reported in Table 3. Not having the condition was the reference category for each disorder and answering “No” was the reference category for the behavioral variables.

Each significant mental health condition and behavior was then entered into a multiple predictor logistic regression model simultaneously, as there was no theoretical or empirical basis for considering any of these disorders to be more important. Overall, the model was a good fit: the Likelihood ratio of was significant ($p < .001$), indicating that the model with predictors is better than the model without. The presence of an eating disorder was associated with increased likelihood of hospitalization (Tab. 3).

Table 3 – *Logistic regression model for hospitalization*

Variable	B	S.E	Wald χ^2	*df*	Exp (B)
Emotional disorders	.9	.8	1.4	1	2.5
Schizophrenia	-1.6	2.3	.50	1	.2
Eating disorders	2.5*	1.03	5.9	1	12.2
Addictive disorders	0.5	1.1	.2	1	.2
Obsessive-Compulsive disorders	1.7	1.3	1.80	1	5.5
Autism	45.4	896.8	.00	1	5.2
Sleeping disorders	1.6	.9	3.02	1	5.0
Optimism Bias	4.7*	2.9	2.3	1	109.95

N = 400
* Significant at α = .05

3.2. Sentiment analysis

To explore the impact of having a mental health disorder on the experience of illness with Covid-19, sentiment analysis was conducted. Participants' responses were coded as described and sentiment was computed as a categorical variable for further analysis (negative = 0, neutral = 1, positive = 2). Due to the nature of the experiences asked about, no responses were coded as positive. As a result, sentiment was categorized as neutral (1) or negative (0). Mental health disorders were included as predictor variables in a binary logistic regression analysis with sentiment as the categorical outcome variable. Table 4 displays the results of this model. The presence of autism significantly predicted sentiment, with autism being associated with a reduced likelihood of a negatively coded subjective sentiment.

Table 4 – *Binary logistic regression model for sentiment*

Variable	B	S.E	Wald χ^2	*df*	Exp(B)
Emotional disorders	-.3	1.1	.1	1	.7
Schizophrenia	-.4	1.1	.01	1	.7
Eating disorders	-.7	.7	1.3	1	.5
Addictive disorders	.1	.8	.01	1	.2
Obsessive Compulsive disorders	.1	.8	.03	1	1.1
Autism	-15.6	.6	632.5*	1	1.7
Sleeping disorders	.60	.6	1.1	1	1.8

N = 400
* Significant at α = .05

4. Discussion

4.1. Key findings

This study offers a novel contribution to the literature by integrating cognitive biases, specifically optimism bias, with self-reported mental health and neurodiversity in the context of COVID-19. Unlike previous work that has treated these factors in isolation, our mixed-method approach reveals not only clinical risk (hospitalization) but also subjective emotional responses, adding depth to existing findings.

This study investigated the connection between mental health disorders and hospitalization due to COVID-19, which we used as an objective indicator of disease severity based on clinical and physiological criteria. We recognize that, unlike mental health conditions where severity may be defined by subjective psychological experiences and the absence of medical evidence (as in conversion disorder), COVID-19 severity is determined by measurable physiological factors that necessitate hospitalization.

Additionally, the study employed sentiment analysis to explore the impact of mental health disorders on individuals' subjective experiences with Covid-19, marking one of the initial attempts to examine multiple disorders in this context.

The findings revealed that 66% of participants reported having at least one of the surveyed disorders, with 35% being hospitalized due to Covid-19. Significantly, individuals with eating disorders showed increased odds of hospitalization, indicating a potential correlation between these disorders and the severity of COVID-19 illness. This association could be due to the well-established impact of eating disorders on physical health, which may make it more challenging for individuals to combat infections and could potentially worsen their illness. However, it is important to note that our findings demonstrate a correlation and do not establish a direct causal relationship. Further research is necessary to determine whether eating disorders contribute causally to increased COVID-19 severity or if other confounding factors may be influencing this association. Additionally, the association may be influenced by comorbidities related to eating disorders, such as smoking, a known risk factor for Covid-19 severity.

The study also found that optimism bias increased the likelihood of hospitalization, aligning with existing literature indicating that individuals underestimating personal risk are less likely to adopt preventive behaviors. This implies that effective communication of personal risk may enhance the

success of mitigating behaviors. This is consistent with evidence from Kuper-Smith and colleagues (2021), who found that optimism bias can lead to underestimation of personal risk, which in turn may lower adherence to protective behaviors and thereby indirectly increase exposure.

Regarding subjective experiences, sentiment analysis revealed that individuals with autism had increased odds of expressing a positive sentiment about being ill with Covid-19. However, no other significant relationships were found between mental disorders and sentiment**.** While our findings indicate a more positive sentiment among individuals with autism, this may be better understood through the lens of intolerance of uncertainty and coping, which have been shown to modulate emotional response and internalizing symptoms among autistic adults during COVID-19 (Evers *et al.*, 2023).

Although only a small number of participants self-identified as autistic, we chose to retain this group in the analysis and title due to the distinct and statistically significant findings. These preliminary insights highlight an underexplored area – how individuals with autism may perceive and emotionally respond to illness – and warrant further investigation despite the limited sample size.

4.2. Limitations and future directions

Despite these insights, several limitations must be acknowledged. The prevalence of each disorder within the sample was only moderate, and future studies may benefit from targeting individuals with psychiatric disorders to ascertain the robustness of these findings in a larger sample. It is also important to acknowledge that all mental health and neurodiversity data in this study were self-reported. These conditions were not clinically confirmed, and thus, findings should be interpreted in light of the subjective nature of diagnosis. Future research using clinical assessments would strengthen the reliability of these associations. Moreover, our study did not explore in depth the psychosomatic interplay between psychological factors and physiological symptoms in COVID-19. Conditions like conversion disorder highlight how psychological stress can manifest as physical symptoms in the absence of medical or neurological evidence. While COVID-19 is primarily a physiological illness, patients' subjective experiences, including existential fears and stress responses, may influence disease perception and possibly even outcomes. Future research should consider a more comprehensive analysis of how psychological and

physiological factors interact in the context of COVID-19. This would involve a deeper investigation into whether mental health conditions could influence not only the subjective experience of illness but also physiological responses to the virus, highlighting the need for an integrated biopsychosocial approach.

Future work could also explore neurobiological correlates of optimism, such as the structural patterns in the anterior cingulate and medial prefrontal cortex identified by Lai and collaborators (Lai, Zhao, Li, Gong, & Wang, 2023), which may help explain why some individuals show greater resilience or optimism under stress.

A linear regression analysis found no association between the number of comorbidities and severity or sentiment. While not the focus of this paper, future studies could also explore this aspect further.

Future research might enhance the study's comprehensiveness by controlling for additional covariates known to affect Covid severity. The UnCoVer project, among others, may contribute valuable insights at the population level. A limitation arises from the inability to calculate Body Mass Index (BMI) due to participant input errors, suggesting the need for improved data collection methods.

The study's sentiment analysis, derived from a single free-entry question, may lack depth. Future investigations could employ more extensive qualitative methods, such as semi-structured interviews, to uncover nuanced experiences. The study's predominantly white, medium-income sample raises the possibility of bias, impacting the generalizability of sentiments expressed.

5. Conclusion

In conclusion, this study contributes valuable insights into the potential relationships between mental health disorders, optimism bias, and Covid-19 severity, as well as the subjective experiences of those affected. These findings, while informative, should be considered in light of the study's limitations. Future research with larger samples and more extensive qualitative analyses may refine our understanding, thereby informing tailored public health strategies, and support frameworks for individuals with mental health disorders in pandemic scenarios.

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APPENDIX 1: Survey structure

Q1 Did you tested positive for COVID?
- Yes
- No

Q2 The purpose of this study is to gain knowledge regarding your experiences during the pandemic in terms of psychological impact with the aim to provide the basis for future research. Therefore we would like to invite you to participate in our study surrounding psychological aspects and COVID-19
- I agree to take part in the above research

Q3 What is your main country of residence?

Q4 What is your age? (in years)

Q5 Please calculate your BMI and select one of these categories. Body Mass Index is a simple calculation using a person's height and weight. The formula is BMI = kg/m2 where kg is a person's weight in kilograms and m2 is their height in meters squared.
- below 18.5
- between 18.5 and 24.9
- between 25 and 29.9
- between 30 and 39.9

Q6 Have you had symptoms of COVID 19?
- Yes
- No

Q7 Do you suffer from any of the following mental health condition?
- Emotional disorders (anxiety, panic, depression)
- Schizophrenia
- Eating disorders
- Addictive disorders
- Obsessive compulsive disorder
- Cognitive disorders (e.g. dyslexia)
- Autism
- None of the above

Q8 Are you a smoker?
- Yes
- No

Q9 How many cigarettes do you smoke per day ? (enter 0 if you do not smoke)

Q10 Behaviors and probability (1) Thinking of an average person of your age and sex. Compare the probability that each of the following events will happen to you personally with the probability that each event will happen to this average person. (Please circle one response from 0 to 100) The probability for myself of…. Catching the COVID-19 Infection in the next future
Min: (0) - Max: (100)

Q11 Behaviors and probability (2) Thinking of an average person of your age and sex. Compare the probability that each of the following events will happen to you personally with the probability that each event will happen to this average person. (Please circle one response from 0 to 100) The probability for myself of….Transforming my daily life due to the COVID-19 in the long run (Slider)
Min: (0) - Max: (100)

Q12 In relation to the current COVID 19 pandemic....Do you change your surgical mask daily?
- Yes
- No

Q13 In relation to the current COVID 19 pandemic....Do you wash your hands/do you use alcohol-based hand rub after coughing or sneezing?
- Yes
- No

Q14 In relation to the current COVID 19 pandemic....Do you wash your hands/do you use alcohol-based hand rub when entering or leaving the household or any other building?
- Yes
- No

Q15 In relation to the current COVID 19 pandemic....Do you wash your hands/do you use alcohol-based hand rub after physical contact with individuals outside your home?
- Yes
- No

Q16 In relation to the current COVID 19 pandemic....Do you wash your hands/do you use alcohol-based hand rub after touching high contact surfaces (door handles, rails, money)?
- Yes
- No

Q17 In the last month, how often have you felt that you were unable to control the important things in your life (due to the COVID 19 pandemic)?
Min: (0) - Max: (100)

Q18 In the last month, how often have you felt confident about your ability to handle your personal problems (due to the COVID 19 pandemic)?
Min: (0) - Max: (100)
Q19 In the last month, how often have you felt that things were going your way (due to the COVID 19 pandemic)?
Min: (0) - Max: (100)

Q20 In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
Min: (0) - Max: (100)

Q21 In the past 7 days, I felt fearful
- Never
- Rarely
- Sometimes
- Often
- Always

Q22 In the past 7 days, I found it hard to focus on anything other than my anxiety
- Never
- Rarely
- Sometimes
- Often
- Always

Q23 In the past 7 days, my worries overwhelmed me
- Never
- Rarely
- Sometimes
- Often
- Always

Q24 In the past 7 days, I felt uneasy
- Never
- Rarely
- Sometimes
- Often
- Always

Q25 In the past 7 days, I felt worthless
- Never
- Rarely
- Sometimes
- Often
- Always

Q26 In the past 7 days, I felt helpless
- Never
- Rarely
- Sometimes
- Often
- Always

Q27 In the past 7 days, I felt depressed
- Never
- Rarely
- Sometimes
- Often
- Always

Q28 In the past 7 days, I felt hopeless
- Never
- Rarely
- Sometimes
- Often
- Always

Q29 In the past 7 days, my sleep was refreshing
- Not at all
- A little bit
- Somewhat
- Quite a bit
- Very much

Q30 In the past 7 days, I had problems with my sleep
- Not at all
- A little bit
- Somewhat
- Quite a bit
- Very much

Q31 In the past 7 days, I had difficulty falling asleep
- Not at all
- A little bit
- Somewhat
- Quite a bit
- Very much

Q32 In the past 7 days, my sleep quality was
- Very poor
- Poor
- Fair
- Good
- Very good