

Dissertation

COVID-19 and the development of phobic fears of disease

submitted by

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Statutory Declaration

I hereby declare that this thesis is my own original work and that I have fully acknowledged by name all of those individuals and organizations that have contributed to the research for this thesis. Due acknowledgement has been made in the text to all other material used. Throughout this thesis and in all related publications I followed the “Guidelines of the Medical University of Graz on Good Scientific Practice.

Graz, March 1st 2022

Patrick Nürnberger eh

Disclosures

This thesis served a basis for one scientific publication. I by myself acted as first and corresponding author. The data presented in the results of this thesis were part of this publication. As I wrote this manuscript, I included parts in this thesis, which is common practice according to the statutes of dissertation writing at the Medical University of Graz. Corresponding chapters are marked with an asterisk (*) and information is provided. I informed all co-authors about the publication of this thesis. The permission to reproduce illustrations and figures from own publications has been granted. All other illustrations used in the dissertation were granted by open-access or individual granting. The journal in which the paper was published (PlosOne) grants all rights to reproduce material.

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Abbreviations and Definitions

<i>ACE</i>	<i>Angiotensin Converting Enzyme</i>
<i>ACE2</i>	<i>Angiotensin Converting Enzyme 2</i>
<i>ANCOVA</i>	<i>Analysis of covariance</i>
<i>BAI</i>	<i>Beck's Anxiety Inventory</i>
<i>COVID-19</i>	<i>Coronavirus Disease 2019</i>
<i>DNA</i>	<i>Deoxyribonucleic Acid</i>
<i>EMA</i>	<i>European Medicines Agency</i>
<i>FFP2</i>	<i>Filtering Face Piece 2</i>
<i>IAS</i>	<i>Illness Attitude Scales</i>
<i>Kb</i>	<i>Kilobases</i>
<i>mRNA</i>	<i>Messenger RNA (Ribonucleic Acid)</i>
<i>NCIB</i>	<i>National Center for Biotechnology Information</i>
<i>N95</i>	<i>Not resistant to oil, filtering 95% of microbes</i>
<i>PCR</i>	<i>Polymerase Chain Reaction</i>
<i>RAS</i>	<i>Renin-Angiotensin System</i>
<i>RNA</i>	<i>Ribonucleic Acid</i>
<i>SARS-CoV2</i>	<i>Severe Acute Respiratory Syndrome-Coronavirus 2</i>
<i>SPQ</i>	<i>Specific Phobia Questionnaire</i>
<i>SSS</i>	<i>Social Support Survey</i>
<i>STAI</i>	<i>STAI State and Trait Anxiety Index</i>
<i>VOC</i>	<i>Variant of Concern</i>
<i>VOI</i>	<i>Variant of Interest</i>
<i>WHO</i>	<i>World Health Organization</i>
<i>WHO 5</i>	<i>WHO 5 Wellbeing Index</i>
<i>WI-IAS</i>	<i>Whiteley Index and Illness Attitude Scales</i>

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Figure 1:

Coronavirus origins. Coronavirus is the most prominent example of an emerging virus that has crossed the species barrier from wild animals to humans, like SARS and MERS. The origin of SARS-CoV-2 is also suspected to be from an intermediate animal host. The possibility of crossing the species barrier again for the fourth time cannot be ruled out. As printed in: Dhama K, Khan S, Tiwari R, et al. Coronavirus Disease 2019-COVID-19. Clin Microbiol Rev. 2020;33(4):e00028-20. Published 2020 Jun 24. doi:10.1128/CMR.00028-20. The use of this image is granted.

Figure 2:

Transmission Cycle of SARS CoV 2. As printed in Cascella M, Rajnik M, Aleem A, et al. Features, Evaluation, and Treatment of Coronavirus (COVID-19) [Updated 2021 Jul 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554776>. The use of this image is granted.

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Zusammenfassung

Hintergrund und Ziel: Seit Beginn des Jahres 2020 wird die Welt von einer Pandemie heimgesucht. Diese Pandemie der Erkrankung COVID-19 wird durch das SARS-CoV2 Coronavirus ausgelöst und sorgt neben den somatischen Komplikationen auch für eine Gefahr der mentalen Gesundheit der Betroffenen. In dieser Arbeit wird untersucht, warum eine Pandemie als Bedrohung angesehen wird und es werden biopsychosoziale Faktoren gesucht, welche Personen identifizieren können, die unter diesen Bedingungen spezielle biopsychosoziale Unterstützung benötigen.

Material und Methoden: Um unsere Fragen zu beantworten wurde einerseits eine Literaturrecherche betrieben, andererseits eine klinische Fragebogenstudie erstellt. In dieser Studie wurden 368 Personen eingeschlossen und biologische, psychologische und soziale Faktoren untersucht um prädiktive Faktoren für eine die mentale Gesundheit beeinträchtigende schwere Ausprägung der COVID-19 Angst herauszufinden. Dafür wurden durch den Autor erstellte Fragebögen kombiniert mit standardisierten, etablierten und validierten psychiatrischen Fragebögen, verwendet.

Ergebnisse: 162 /368 (44.0%) TeilnehmerInnen (33.3% männlich/66.6% weiblich) hatten keine oder nur geringe Angst vor COVID-19, 170/368 (46.2%) TeilnehmerInnen (23.6% männlich /76.4% weiblich) hatten moderate Angst vor COVID-19, und 45/368 (12.2%) TeilnehmerInnen (2.2% männlich /97.8% weiblich) hatten schwere Angst vor COVID-19. Weibliche TeilnehmerInnen zeigten häufig schwere Angst vor COVID-19 ($\chi^2= 18.47$, $df= 2$, $p<0.001$). Finanzielle Einbußen im Rahmen der COVID-19 Pandemie waren ebenfalls mit erhöhter Angst assoziiert [ANCOVA: levels of fear of COVID-19(financial loss x gender): $F(1, 363)= 22.853$, $p< .001$]. Auswirkungen hatte auch der Kontakt zu COVID-19-Infizierten. Männer hatten mehr Angst, je mehr Kontakt sie zu infizierten Personen hatten. Frauen hatten weniger Angst, je mehr Kontakt sie zu infizierten Personen hatten. [ANCOVA: levels of fear of COVID-19(contact x gender): $F(1,363)= 5.596$, $p= .019$]. Das Führen einer Beziehung zeigte sich ebenfalls als protektiver Faktor vor einer schweren Angst vor COVID-19 ($\chi^2=14.582$, $df= 6$, $p=0.024$). Ein multiples Regressionsmodell fand folgende Faktoren als Prädiktoren für eine schwere Angst vor COVID-19: weibliches Geschlecht, starke gesundheitsbezogene Ängste (WI-IAS), ein größeres Ausmaß von State und Trait Anxiety (STAI).

Conclusio: Eine Pandemie kann als direkte und indirekte Bedrohung für das Wohlbefinden einer Person angesehen werden. Individuen können mittel Angst, einer biologischen Antwort

auf Bedrohung, reagieren. Nachdem Angst mit einer Menge negativen Begleiterscheinungen vergesellschaftet ist und bei übermäßiger Ausprägung die Handlungsfähigkeit einschränken kann, ist es notwendig diejenigen Individuen herauszufiltern die eine hohe Wahrscheinlichkeit haben eine schwer Ausprägung der Angst vor einer Erkrankung zu entwickeln. Dies könnte eine biopsychosoziale Intervention zur Verbesserung der gesundheitsbezogenen Lebensqualität ermöglichen. Wir konnten einige prädiktive Faktoren finden die eine schwere Angst vor COVID-19 vorhersagen können. Die Ergebnisse könnten so helfen, betroffenen Personen die entsprechende biopsychosoziale Unterstützung anbieten zu können.

Abstract

Introduction: Since 2020 onward the world is suffering from a pandemic of a disease called COVID-19. This disease, caused by the SARS-CoV2 coronavirus is a respiratory infection that causes not only somatic health issues, but also challenges the mental health of those people who are affected. This paper investigates why this pandemic is seen as a threat that can cause severe fear of disease and searches for predicting biopsychosocial factors that may identify people who need biopsychosocial support in the course of a pandemic.

Methods: In order to answer our research questions literature research was performed. In addition to that, we performed an original research, including 368 participants. In our own research we investigated biological factors, mental health factors and social factors that may cause mental health threatening severe fear of COVID-19 by using author-compiled as well as standardized, well-established and well-validated psychometric questionnaires.

Results: 162 /368 (44.0%) participants (33.3% male/66.6% female) had almost no fear of COVID-19, 170/368 (46.2%) participants (23.6% male/76.4% female) had moderate fear of COVID-19, and 45/368 (12.2%) participants (2.2% male/97.8% female) had severe fear of COVID-19. Female participants more often showed higher levels of fear of COVID-19 ($\chi^2=18.47$, $df=2$, $p<0.001$). Moreover, financial losses due to the COVID-19 pandemic were associated with higher levels of fear of COVID-19 [ANCOVA: levels of fear of COVID-19(financial loss x gender): $F(1, 363)=22.853$, $p<.001$]. Furthermore, the level of fear of COVID-19 increased in male participants when they had more contact to people who were infected with COVID-19, while in contrast the level of fear of COVID-19 decreased in female participants when they had such contact [ANCOVA: levels of fear of COVID-19(contact x gender): $F(1,363)=5.596$, $p=.019$]. In addition to that, people who are in a relationship showed significant lower levels of fear than those who are not in a relationship ($\chi^2=14.582$, $df=6$, $p=0.024$). Multiple regression analysis revealed female gender, severe health anxiety (WI-IAS) and pre-existing higher levels of state as well as trait anxiety (STAI) as significant predictors of severe fear of COVID-19.

Conclusion: A pandemic can be seen as a direct and indirect threat to a person's wellbeing. An individual can react with fear, a biologic response to a threat. As fear has a lot of negative effects for the person who shows fear, it is crucial to identify those people in danger of developing severe fear of disease. We found certain biopsychosocial factors that can predict severe fear of COVID-19 and this knowledge might help to provide biopsychosocial support for those who need it.

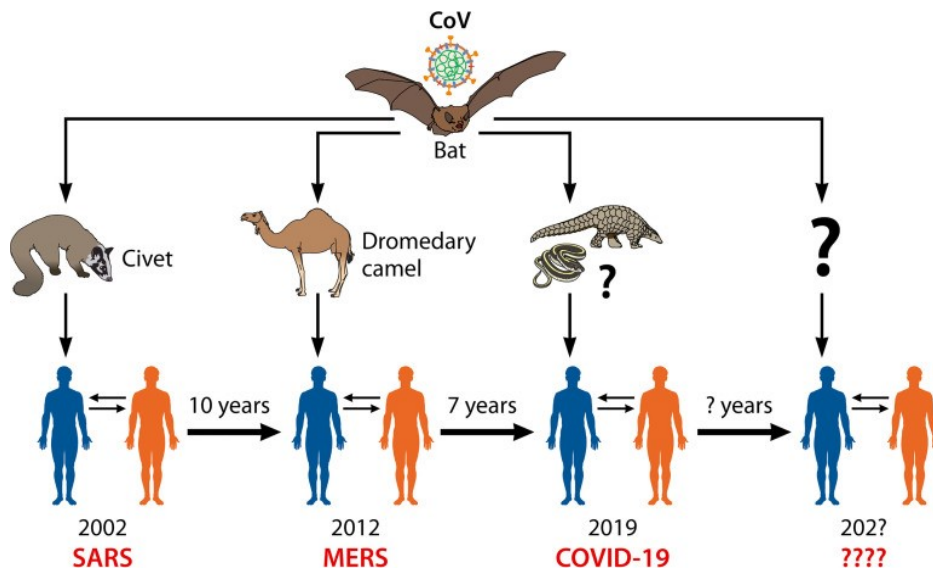
1. Introduction

1.1 SARS-CoV 2 and COVID-19

COVID-19 is a disease called Coronavirus-Disease 19 and was first discovered in the year 2019. Caused by the SARS-CoV2 virus (Severe Acute Respiratory Syndrome Coronavirus 2) it belongs to the family of corona viruses. Those coronaviruses accompany humans, as there are some of them. Many of them only cause mild symptoms (HCoV-229E, HCoV-NL63, HCoV-OC43, HCoV-HKU1) (2), mainly the common cold and do not show a serious threat to the somatic health of the diseased person. However, there are also types of coronaviruses that can cause serious complications such as pneumonia, respiratory failure or death. Newly evolving coronavirus variants show a threat to global health. (3) There are two previous coronavirus variants that caused severe problems during the past two decades are called SARS-CoV (Severe Acute Respiratory Syndrome Coronavirus) and MERS (Middle Eastern Respiratory Syndrome). They caused endemic problems with high mortality rates in Asia and the Middle East and smaller pandemic problems. Coronaviruses are often transmitted by animals and are thus called zoonotic infections (other examples being the Ebola virus disease or salmonellosis). In the case of SARS-CoV2 the suspected animal where the virus transmitted is the pangolin, in SARS-CoV the civet cat and in MERS the camel (see Fig. 1). However, other animals such as bats (that are often a reservoir of coronaviruses) have also been discussed and the true answer may never be found. The start of the pandemic, which started with the transmission from animal to human, was tracked to have been a live animal market in Wuhan, China. Wuhan is a metropolis in China with a well-established infrastructure, so the virus found an easy way from this market on around the globe (3). The disease caused by the SARS-CoV2 virus was named COVID-19 by the WHO (World Health Organization) on February 20th 2020 (2).

Before talking about mental health effects of COVID-19 and the COVID-19 pandemic a little elaboration on the virus, the disease and the somatic complications needs to be done in order to fully understand the whole picture of the COVID-19 pandemic.

Figure 1: Coronavirus origins. Coronavirus is the most prominent example of an emerging virus that has crossed the species barrier from wild animals to humans, like SARS and MERS. The origin of SARS-CoV-2 is also suspected to be from an intermediate animal host. The possibility of crossing the species barrier again for the fourth time cannot be ruled out. As printed in: Dhama K, Khan S, Tiwari R, et al. Coronavirus Disease 2019-COVID-19. *Clin Microbiol Rev.* 2020;33(4):e00028-20. Published 2020 Jun 24. doi:10.1128/CMR.00028-20. The use of this image is granted. (2)

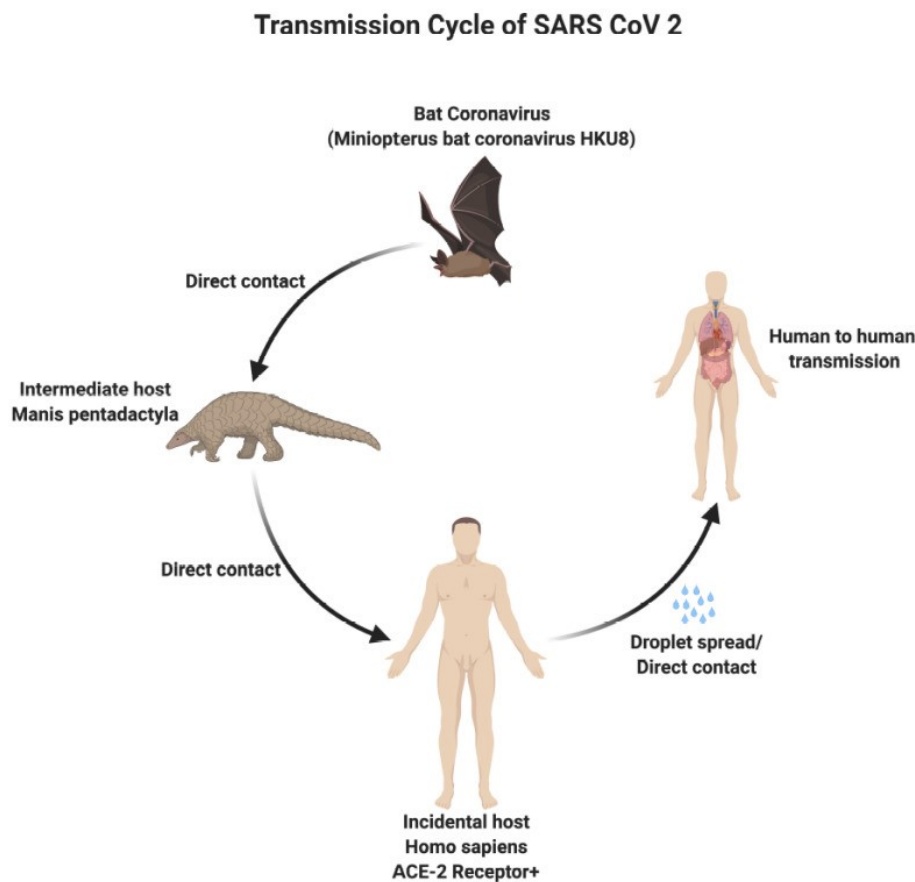


1.1.1 SARS-COV2 in detail

The SARS-COV2 virus was first described on December 12th 2019 and became a new entity, as it was genetically distinct to prior coronavirus variants. Those viruses are called coronaviruses because their protein structure resembles a crown, which means *corona* in Latin. Those viruses are RNA viruses (order: *Nidovirales*, family: *Coronaviridae*, subfamily: *Orthocoronavirus*; those are divided into *Alphacoronavirus*, *Betacoronavirus*, *Gammacoronavirus*, *Deltacoronavirus* (2). This must not be confused with the nomenclature done after the Greek Alphabet with variants within the SARS-CoV2 virus). Coronaviruses not only have an extensive range of natural hosts but also can affect different systems in the body, which leads to the fact that people show different symptoms. Like many other coronaviruses that can cause diseases in animals (horses, camels, cattle, swine, dogs, cats, rodents, birds, ferrets, inks, bats, rabbits, snakes etc.) and transmit from infected animals to humans, SARS-CoV2 can be transmitted from human to human after the transmission from the animal took place. SARS-CoV2 is a new entity and does not necessarily belong to any of

the subvariants of the Orthocoronavirus family, however, as there was the most matching genetic relation it was labeled as a member of the *Betacoronavirus* family. There are numerous different coronaviruses in animal hosts that have not yet been able to transmit to human beings. Unfortunately, live animal markets as they are popular in China promote the spread from animals to other animals (individual animals and from species to species) as well as the transmission from animal to humans. Furthermore, genetic analysis found that the SARS-CoV2 virus is a recombinant virus of a bat coronavirus and another coronavirus of unknown origin. As bats and humans do not often have close contact, it is easier for the virus to first transmit from the bat to another animal (which does not necessarily need to get sick from the virus) and from this animal on to humans. In the case of SARS-CoV2 the pangolin is the suspected intermediate host of the virus. Pangolins show a wide variety of viruses that they host, including coronaviruses (see Fig.2) (2).

Figure 2: Transmission Cycle of SARS CoV 2. As printed in Cascella M, Rajnik M, Aleem A, et al. Features, Evaluation, and Treatment of Coronavirus (COVID-19) [Updated 2021 Jul 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554776>. The use of this image is granted. (4)



1.1.2 SARS-CoV2 in humans

Infections with coronaviruses are seen often in human beings. Mostly they do not cause severe conditions, mostly common cold symptoms. However, with the outbreak of SARS-CoV we learned that there are also coronavirus variants that can be dangerous for human beings. Those variants, SARS-CoV, MERS and SARS-CoV2, cause severe respiratory tract conditions with possible lethal outcome as well as other somatic and psychiatric conditions. Apart from respiratory tract infection symptoms we observe diarrhea, stomachaches, altered mental states and neurotoxic phenomena such as ageusia and anosmia and many more. Being challenged with a completely new variant of a virus is difficult for the human immune system, as it is naïve to it and thus is not able to fight off the virus immediately as we often see it with other respiratory tract infections where humans are repeatedly infected by the same sort of virus from time to time which keeps the immune system keen on remembering this pathogen. Instead, it has to first learn about the virus and slowly start to fight it, which gives the virus enough time to spread and cause severe symptoms in the infected person. Once the virus has transmitted from animals to human beings, it can transmit from humans to other humans by droplet infection, direct contact and contact with infected materials or aerosols. In SARS-CoV2 the role of aerosol transmission has been discussed from the beginning on (2). The reason why SARS-CoV2 was more successful in become a pandemic virus with high impact may be due to its high transmissibility, lower pathogenicity and various manifestations, showing different clinical symptoms of different parts of the human body (5).

The Coronavirus is one example of a virus that has transmitted multiple times from animals to humans, thus crossing the so called species barrier about three times already now. First in SARS-CoV, then in MERS and now in SARS-CoV2. This again shows the danger of close contact to living and wild animals, as we see it in live markets in the East (2). The SARS-CoV2 genome is made out of a single-stranded RNA molecule (positive sense; +ssRNA) of 29.3Kb (kilobases). This makes it a very large genome for a RNA-virus. In comparison, the influenza genome is only about 13.5Kb (6).

The SARS-CoV2 virus attaches to the human ACE2 receptor of the body. This explains why the disease COVID-19 can present with such various clinical manifestations as the ACE2 receptor is found in many parts and organs of the human body: the lungs, the gastrointestinal tract, the liver, the kidneys, and blood vessels. ACE2 works as a negative regulator of the renin-angiotensin system (RAS) and thus as a counterpart of ACE (7, 5). ACE and ACEII play an important role in the transformation from angiotensin I to angiotensin II. There is a fine balance between those two and if this balance gets out of equilibrium certain effects

such as pro-inflammatory effects or vasoconstrictive effects may be seen. This can be the explanation why COVID-19 and SARS-CoV2 are associated with high inflammation or thromboembolic events. The SARS-CoV virus also binds to the ACE2 receptor, just as SARS-CoV2. However, the affinity of binding is up to 20 times less than in SARS-CoV2, which is an advantage for the SARS-CoV2 virus (6).

1.1.3 Symptoms and course of the disease COVID-19

The symptoms of COVID-19 usually start after an estimated median incubation time of 5.1 days and the majority of infected people will show symptoms within 11.5 days after first contact to the virus (4). The main symptoms that are caused by the SARS-CoV2 virus are fever or chills, sore throat, fatigue, muscle or joint aches, shortness of breath, fatigue, diarrhea, loss of smell and/or taste, nausea and vomiting and congested or running nose (8). All of those symptoms are also caused by other respiratory viruses as well as other infectious diseases, which makes symptoms often unspecific. At this point it needs to be said that the majority of COVID-19 infections are presented with mild or no symptoms (9).

Those symptoms also explain the main courses of a typical COVID-19 infection. Most people will suffer from common cold like symptoms such as headaches, sore throat and running noses. Some also or solely present with gastrointestinal problems such as stomach aches, vomiting or diarrhea (9).

In more severe courses people develop pneumonia and shortness of breath. Especially in COVID-19 we see that the infected people can destabilize rapidly and faster than seen in other types of respiratory infections or pneumonia. Also, oxygen desaturation is accepted and coped with longer than in other infections, the reasons for that are still unclear (9).

As the immune system responds with primarily cytokines and T-cells there is a possibility of hyperinflammation due to too many cytokines being released by the immune system. This is called a cytokine storm. Often this cytokine storm is at the beginning of an ARDS (acute respiratory distress syndrome) (9). This hyperinflammation with an ARDS, combined with other severe complications of COVID-19 such as thrombocytopenia, defective coagulation and microthrombi lead to organ failure and death. Especially in children, who are otherwise luckily rarely affected by severe complications of COVID-19, there is a high number of vasculitis seen (9).

When it comes to COVID-19 related topics the nomenclature and classification is not always consistent.

Certain somatic risk factors have been identified for making a severe course of the disease more likely. Those somatic risk factors include obesity, cardiovascular disease, chronic lung disease, kidney or liver disease, immune suppression (by disease or medication), cancer, diabetes, smoking and old age. Furthermore, male patients have a higher risk of developing severe courses of COVID-19 and higher mortality rates than female patients. Also differences can be seen between ethnic groups, where ethnic minority groups tend to have higher hospitalization and mortality rates than Caucasian patients (4).

1.1.4 Variants and mutations

As every virus the coronavirus makes mistakes while replicating. These mistakes are then seen as variants of the virus if its genome changes. If certain changes in the genome also change characteristics of the virus it can become more contagious or cause more severe courses of the disease COVID-19. There are certain Variants of Concern (VOCs) and of Variants of Interest (VOIs) listed, depending on how big the potential threat of those variants seems to public health. Variants of Concern show high potential threats to public health and those are called the Alpha lineage (B.1.1.7 lineage), the Beta lineage (B.1.251 lineage), the Gamma lineage (P.1. lineage) and the Delta lineage (B.1.517.2 lineage). The Alpha lineage was formerly known as the British variant, the Beta lineage the South African variant, the Gamma lineage the Brazil variant and the Delta lineage the Indian variant. To avoid linking lineages to certain countries the nomenclature was changed to Greek alphabet letters. Other Variants of Interest include the Epsilon lineage (B.1.427 and B.1.429 lineage), the Zeta lineage (P.2 lineage), the Eta lineage (B.1.525 lineage), the Iota lineage (B.1.526), the Theta lineage (P.3 lineage), the Kappa lineage (B.1.617.1 lineage) and the Lambda lineage (C.37).

At the time this paper is being written the Delta lineage (B.1.517.2) has become the leading variant in the world, being more contagious and causing more severe courses of disease as the wild type of the virus or the previous dominant variant, the Alpha lineage (B.1.1.7).

It is highly possible that we will see other important Variants of Concern and Variants of Interest in the future, as the virus keeps replicating and mutating as long as it is going around. Also the possibility of other future leading variants/lineages is given (4).

1.1.5 Testing for COVID-19

A variety of tests and test strategies have been developed since the outbreak of the SARS-CoV2 pandemic. The gold standard is seen to be real-time PCR (polymerase chain reaction) assay. As this assay is time consuming and usually only available in (specific) laboratories, antigen testing methods have been developed that are easy to use, fast to use and cheap. Even though these tests show lower levels of sensitivity they played an important role in fighting the pandemic, especially in the early months. Those tests are called molecular tests (4).

Apart from those tests there is serological testing available which measures antibodies in the blood of tested people. Even though antibody count is not accurate in predicting immunity or duration of immunity (as it does in other diseases such as hepatitis B) it is able to state whether a person has had contact to either the virus or a vaccine (COVID-19-antigen) or not (4).

Especially during the times before vaccines became available, testing was the only possibility to detect and quarantine infected people and keep the spread of the disease under control. As numbers of vaccinated people rise, testing becomes less important. However, as long as there is not a high enough percentage of people vaccinated, as it is the case in most of the world's countries at the time of writing, testing will still be an important tool in disease control (10).

1.1.6 Lockdowns

If the diagnosis of COVID-19 was stated, which usually meant a positive PCR-test, data (numbers) of positive tests was collected and the numbers of infected people were recorded worldwide. In developed countries this worked better than in developing countries, who often did not have the resources to cope with all the infected. However, once a certain point of infected people was reached, most countries fought the further rise of incidence numbers by using lockdowns. These lockdowns had various looks and even within one country one lockdown did not have the same shape as the other, but all followed the same principle: shutting down the traffic of people. Only things that needed to be done should be done such as work (if it was not possible to work from home) or grocery shopping. All other idle activities as well meeting friends or family was forbidden to keep incidence numbers under control. To some extent those lockdowns worked well. Especially in countries where those lockdowns were surveilled by authorities and police and military controlled the streets they were highly

effective. In Austria we saw from lockdown to lockdown that there was less effect, as some people were meeting without permission, having illegal parties and infecting each other. The socioeconomic and psychosocial effects of those lockdowns were enormous. First, there are financial aspects as many people lost their jobs or companies had to be liquidated. Especially in fields where people are needed to make money such as gastronomy or tourism the effects were tremendous. Second, the sentiment in the population changed, forming groups that were against the regime, often contributing to conspiracy theories. Third, the effects on the mental health of the people were not to be foreseen to the full extent. We will elaborate this aspect of the pandemic later on in detail (11, 12).

1.1.7 Therapy

The medical, pharmacological therapy of COVID-19 was found to be not easy. As many other respiratory diseases that are caused by viruses, the therapy of COVID-19 was for a long time a symptomatic therapy, meaning to treat complications the virus causes. In general, fluid intake, electrolyte balance and hemostasis are important. People with severe courses of disease should have their vital signs monitored. Laboratory checks should be done regularly, including blood count, metabolic panels, arterial blood gas analysis, coagulation, cardiac enzymes and inflammatory markers to early detect complications of COVID-19 such as thromboembolism, ARDS or organ failure. Offering oxygen is one of the most important parts in the therapy of COVID-19; depending on the severity of the course of disease this means low-flow oxygen, high-flow oxygen, non-invasive or invasive ventilation (13).

As research progressed different kinds of drugs were tested and used against the SARS-CoV2 virus. Starting with antiviral therapies, so therapies that inhibit viral replication or activation seemed to be the obvious way to start. For those attempts Remdesivir, Lopinavir, Ribavirin and Oseltamivir were used. However, study results showed conflicting evidence so that a wide-spread, first-line use of those medications was never seen (14, 13).

One of the next drugs that was used was Chloroquine/hydroxychloroquine. This medication was said to inhibit viral entry and to inhibit cytokine storm by downregulating the immune system. As in the antiviral drugs, no clear benefit was proven in studies (14).

The role of vitamin C and vitamin D to our immune system are still not fully understood. However, there have been trials that were looking to keep the infected people at high doses of both vitamins C and D. Further studies are still needed, but the prophylactic use of Vitamin D was proposed. We also see this being proposed by infectiologists in other diseases (14).

Later, immunomodulatory agents were tested. Immunoglobulin, convalescent plasma and antibodies such as eculizumab were used against COVID-19. Routine use was never proposed, however there seems to be a benefit for people with severe courses of disease (14).

Antiinflammatory agents such as cortisol were found to be beneficial in patients by stopping an overactivation of the immune system. In patients with severe courses of disease cortisol is proposed. For people with mild symptoms it does not seem to make any difference. However, those findings by many trials were also heavily discussed by experts and there is no general recommendation to use steroids. Other anti-inflammatory agents such as tocilizumab did not show beneficial results (14, 15).

So therapy of both noncritical-ill and critically-ill COVID-19 patients is not trivial. Somatic issues are complex, yet we need to understand all of them to further understand mental health complications as well. Around the world there are different strategies found, but no one medication has proven to be the best cure for anyone suffering from COVID-19. The most important therapy that healthcare may offer is symptomatic therapy in hospitals. This is why it is, and always was, of utmost importance to keep hospitals running and keep at least some sort of resource aside for further patients to come. We have witnessed how tragically this line can be crossed in many developed and developing countries, especially in the beginning of the pandemic. Countries that did not have any resources left and people were waiting in the streets in front of hospitals to seek medical help. This was not only seen in countries such as India or Brazil, but also in Western European countries such as Italy or France.

It was soon clear that only a efficient vaccination would be able to end this pandemic, without many more years to be wasted with living from lockdown to lockdown to avoid infections.

1.1.8 COVID-19 vaccines

We had to learn that we will not be able to fight the COVID-19 pandemic without vaccines. So from the beginning on researchers all around the globe were keen on creating vaccines

against COVID-19 and many vaccine candidates made it to admission. In Austria, at the time of writing, four vaccines against COVID-19 were admitted by the European Medicines Agency (EMA): BNT162b2/Comirnaty by BioNTech/FosunPharma/Pfizer, mRNA-1273/Spikevax by Moderna/NIAID, AZD1222/Vaxzevria (ChAdOx1nCoV-19) by University of Oxford/AstraZeneca and Ad26.COV2-S/JanssenVaccine by Janssen Pharmaceutical Companies (Johnson&Johnson). In other parts of the world different vaccines against COVID-19 were admitted (16, 17).

The vaccines Comirnaty and Spikevax belong to the modern types of vaccines called mRNA-vaccines (messenger RNA). Although this technology is not completely new and research was going on for decades, those two were the first vaccines of the mRNA-technology to be admitted in any country in the world. In mRNA-vaccines genetic parts are used so that the body builds immunity. In the case of these two vaccines antibodies against the spike-protein antigen of the SARS-CoV2 virus are built. Genetic pieces of the virus were artificially used to build antibodies against a viral protein. This rather new technology caused reasonless fear and insecurity in some people. But the new technique made it possible (due to previous years of research) to create a vaccine rather fast. Also, it offers the possibility to change the genetic structure in the vaccine quickly if a variant arises that cannot be prevented with the current vaccine anymore. Although there has never been any scientific reason to believe so and scientific research clearly demonstrated the opposite, a lot of people believed that the inserted mRNA of the virus might impact, influence or change the own human DNA (16).

The other two vaccines, Vaxzevria and JanssenVaccine both use a different technique. Here a non-replicating viral vector is used. A different (non-SARS-CoV2) virus of apes are used, genetically modified by inserting genetic information of the SARS-CoV2 virus so that they would cause the immune system to build antibodies against the SARS-CoV2 spike protein (16).

Especially Vaxzevria had a special course in the vaccination campaign in Austria. Even though the vaccine was proven to be working and safe, a lot of misinformation and fake news about Vaxzevria spread around the internet and social media. The unique feature of Vaxzevria was that it was a project that included the research part of a university, namely the Oxford University of England.

It took time until admissions were available for a broad spectrum of people (also including pregnant women, children et cetera). In early variants of the virus, the wild type or also the Alpha variant, experts thought that a vaccination rate of around 70% should be enough to stop the spread of the virus and to cause some sort of herd immunity. However, in later

variants, especially in the Delta variant which is the leading variant at the time of writing, a vaccination rate of around 90% of the population was stated to be necessary to reach something like herd immunity. No country of the world achieved this goal yet. However, there are some countries that managed to achieve an overall vaccination rate of 80% and were thus able to stop restrictions for their inhabitants. Many of those countries were Northern European countries that usually have high trust in medical authorities, again making this an important point in health care strategies and public health questions (10).

There are still vaccines in the evaluation process for being admitted (17).

1.1.9 COVID-19 endemic status

One of the goals of the vaccination program is to change the status of SARS-CoV2 from a pandemic to an endemic. We will not be living without the SARS-CoV2 virus in the near future as it seems. However, with the help of vaccines and repeating infections with the SARS-CoV2 virus chances are high that many people who had previous contact to the virus (with either the vaccination or the virus itself) will only develop mild symptoms such as common cold symptoms. This is what we see with reoccurring variants of respiratory tract infections from viruses such as parainfluenza or influenza virus. An endemic situation is when there is only a small geographical area affected and an immense spread outside this geographic area as we see it right now is not likely (18).

1.1.10 COVID-19 in numbers

Due to the fact that our modern medicine was able to help many people the COVID-19 pandemic was not able to cause as many fatalities as the biggest reported pandemics before, namely the plague of 1894 where about 12 million people died and the influenza pandemic of 1918 where about 50 million people died. At the time of writing (October 2021) about 4.55 million people died worldwide from COVID-19. We can only assume that the real number is a lot higher, as reporting in developing countries might not be as efficient as in developed countries (18, 10). The fact that the highest numbers are reported from mostly developed countries (that are by far not the countries with the most inhabitants worldwide), with the United States of America at the very top, might support this thought.

At the time of writing 219 million cases of COVID-19 were reported worldwide. Here again these are the verified COVID-19 infections, so there is also a high possibility that the real number will be a lot higher (10).

Also, the pandemic is still ongoing and due to a lack of success in the vaccination regime it may continue for some time, so it is yet unclear what the final numbers of cases and deaths will be. But scientists can state with certainty that without modern medicine the numbers of deaths would be as high or higher than those of the plague of 1894 and the influenza pandemic of 1918 (18, 10).

1.2 COVID-19 and mental health

In about 5-10 percent of COVID-19 patients neurological symptoms are described. Sometimes the SARS-CoV2 virus can even be found in cerebrospinal fluid. So we see that it might have somatic influence on the brain and nervous system as well as effects on mental health (12).

In previous pandemics impacts on mental health were seen. This time more people worldwide are affected by the threats of the SARS-CoV2 virus and the COVID-19 pandemic than ever before (11).

Studies show that up to 30%, so almost a third of all people that were infected with COVID-1, report signs of anxiety and depression. Moreover, in the general population 8% report that they suffer from more stress than in pre-pandemic times. Anxiety was found to be the most common symptom claimed by people (19). Exaggerating information on the media and misinformation spread on social media are factors that exacerbate levels of anxiety in the population. Especially in a topic as complex as the COVID-19 pandemic, where even experts often struggle to keep track of with all information and to make sense of them, people who are neither in the medical or scientific field have a hard time to absorb and process the huge amounts of complicated data and facts (11).

Apart from the general population mental health complications are also seen in medical staff. Some of those, especially those working in COVID-19 wards and intensive care units, were extremely challenged by the pandemic. Physically and mentally.

There are basically two important factors that have an impact on people's mental health. First, there is the threat that comes from the SARS-CoV2 virus. As we know, COVID-19 can have severe and fatal courses, so it is understandable that people are afraid of being

infected with the SARS-CoV2 virus. Second, there are the indirect threats and restrictions the pandemic brought. There was a lot of frightful news, as a matter of fact COVID-19 was omnipresent in the media at the beginning of the pandemic, to some extent it still is, and since emotionally-driven news work best, sometimes reporting a little too emotional than just presenting plain facts. Moreover, people were confronted with many restrictions during the time of the pandemic was performed. Social distancing was the thing to do. Many people did not have contacts for months, especially those who live alone were affected immensely by those struggles. But also those who do not live alone often had hard times at home as they and their roommates and partners were not used to that much time together which sometimes ended in conflicts (11).

1.2.1. Social Distancing

People coming together, especially indoors, are problematic when confronted with a virus that spreads via aerosols and droplets. At the very beginning of this pandemic scientists learned that close contact was followed by a high risk of infection. Especially in those situations were many people had close contacts – at home, nursing homes, cruise ships, indoor parties etc. a lot of so called ‘clusters’ were seen. Before people had the ability of getting vaccinated, such situation had the potential of becoming so called ‘superspreader-events’. This means that only one infected person would infect many others at a single time, in the gym, the restaurant or at work. Every time people came together closely, especially indoors, the possibility of a superspreader-event was given (18).

During the first few months of the pandemic many people had to stay at home. On the one hand many people were faced with quarantines and repeating quarantines, either because they were infected or they had contact to an infected person and were thus labeled as a ‘contact person’. On the other hand people were asked to keep social distance, only leave the place they live in if they have to go to work, for grocery shopping or for necessary errands. This means a lot of time was spent within the houses or apartments. While lockdowns were active, people were also not supposed to meet others outside. They were only supposed to go outside if they wanted to go for a walk, but again they needed to do that either on their own or with the person they were living with. They were not allowed, or not supposed, to meet their friends and families. Especially the older generation who have a higher risk of a severe course of COVID-19 suffered from this, because older people were not able to see their children or grandchildren for months. Of course there was a little relieve,

as technology makes it possible to stay in contact even with motion pictures, but everyone will understand that this is not the same and cannot replace real social interaction (18).

People were not able to engage in their hobbies, for those people who see their hobbies as compensation to stress and bad feelings this was a penalty. Religious institutions, gyms and basically everything that was not a grocery store, pharmacy or gas station was closed for weeks and months. It was impossible to do most sports that require gym equipment, a special surrounding or other participants. Many people compensated by starting individual outdoor exercises such as running or biking and some even built a home gym. But many did not do so and suffered a lack of exercise (20).

This lack of exercise, combined with other factors that the lockdowns and the pandemic brought such as watching more television, eating more, probably eating more unhealthy foods to compensate a lack of mental-wellbeing and thus gaining more weight lead to the fact that many people did gain weight during the pandemic and had a higher risk of being obese. Obesity in general is a huge issue worldwide and we learned that obesity is one of the main risk factors for a severe course of disease of COVID-19, so a vicious circle is built. Many studies claim that those weight gains and worsening of lifestyle was persistent, so it lasted longer than the lockdowns and will probably also last longer than the COVID-19 pandemic will last. Since we already have a global issue with obesity and obesity-related health problems this is something that might have a deep and lasting impact to global (somatic and mental) health. (20)

1.2.2 Personal protection equipment

It became soon necessary to protect yourself with protection equipment. For common people this mainly meant wearing face masks of different kinds. Starting off with surgical face masks the course of the pandemic and the new knowledge that was gained led to the introduction of masks that were less permeable such as FFP2 (filtering face piece 2) masks or N95 (not resistant to oil, filter 95% of particles) masks, which were basically the same with a different label. From time to time there was a change from having to wear only surgical masks to a FFP2/N95 and vice versa. Many people were annoyed and irritated by having to wear a mask in public if they went grocery shopping, had a doctor's appointment or had to pick up medication at the pharmacy. Also, many people had to wear them during work in the course of the pandemic, which seemed to be uncomfortable to many (18).

One step higher when it came to protective gear were people in the health care system. They did not only have to wear masks, mainly FFP2/N95 for the whole course of the pandemic, but if confronted with infected or possible infected people, which included many private practices, emergency departments, obstetrics departments, COVID-wards in hospitals, intensive care units and many more they had to wear a full body gear consisting of a hat, goggles (often combined with a face shield), a face mask, two or more layers of gloves and a full body protection suit. Being inside this complex of protection gear is very exhausting, as you cannot move freely, you are feeling hot, you often cannot see clearly if your goggles or face shield fogged and you have to be careful what you do and what you touch at any time. This was happening for short periods of time for the some and for long periods of time (for the duration of whole shifts that may have lasted for 8, 10, 12, 15 or 24 hours straight) for others. It is understandable that this kind of protective gear had an immense impact on the level of comfort those people felt in their work place. Combined with the stress the pandemic caused, this was one of the biggest challenges in health care and might still be (18).

There are many problems that follow if people wear personal protection equipment. First, appearances cannot be interpreted as you cannot clearly see if the person you are talking to is smiling, frowning or having other distinct facial expressions. This makes it difficult and sometimes impossible to correctly state the emotions of the person you are talking to. Second, speech is altered and impaired. People who cannot hear well or cannot hear at all and are depending on facial expressions or lip reading were confronted with special challenges. But also those who can hear struggled with the new kind of conversation. Third, apart from emotional expressions that might be missed or speech quality that might be impaired, important clinical manifestations of diseases such as cyanosis or icterus might be overseen and cause a potential health threat to the person wearing a mask (21).

Especially during the first months of the pandemic personal protection equipment was rare. Many people in health care had to wear their equipment for longer than they should have, if they had suitable personal protection equipment at all. This lack of personal protection equipment increased the level of stress of those people who had to work without personal protection equipment or with lacking personal protection equipment. Higher numbers of for example depressions were reported in those health care workers that were faced with a lack of personal protection equipment (22).

However, popular or not, personal protection equipment such as face masks showed to be effective in order to gain infection control and to keep the number of infected people low (23).

How effective the measures including personal protection equipment were showed the missing of an influenza wave in 2020/21. If compared to the season before there was a huge decline in numbers of influenza. In the European Region of the World Health Organization (WHO) a reduction of 99.8% of influenza detections was seen. This basically means that there was no real influenza season in the season of 2020/21. Similar findings were reported for other respiratory tract infections (23).

1.2.3 Fear and Anxiety

First off, fear and anxiety are often used interchangeably. Fear is often seen as a rather phasic state of a person, whereas anxiety is a more consistent state, thus more of a character trait of a person. But those definitions vary in different reports on the COVID-19 pandemic and one will find different definitions and interpretations of those terms. However, both fear and anxiety play important parts in the COVID-19 pandemic.

Fear is adaptive. This means that threats can change our fear and thus our responses. They are not innate and not fixed like reflexes. This also means that there is therapeutic possibility. Fear is crucial for our survival and thus serves important biological functions. Fear is used to force a reaction when someone is confronted with a threat. For example, if a person is confronted with a wild animal that is a potential threat to their live fear will force the person to either flee or fight. This forcing a response has been an important function for survival (24).

We can differentiate between real and subjective threats. The predator in the wild can definitely be seen as a real threat. Other threats that are only of theoretical nature and might never become a real threat to the person's life are called subjective threats. The problem is that the body and the mind do not differentiate between real and subjective threats and show the same responses (24).

Excessive fear include arousal, social isolation, somatization and, according to the Yerkes-Dodson-Law, decrease productivity and effectivity. All of those factors impair the person's quality of life and the decreased productivity and effectivity might further impact the person's work life and career (24–27).

In the COVID-19 pandemic we can see real threats such as possible infection with the COVID-19 virus and indirect threats than can be followed by the pandemic. Many people had job losses and financial losses. Most had to quit real social interaction for a long time. Those factors can be interpreted as real threats, too.

No matter if direct threat or indirect threat and no matter if this threat is real or subjective, the body reacts in the same way. So many people showed signs of fear in the course of the pandemic. In the long run this impairs the person's quality for life, which makes it necessary to find out who those people are that suffer most from fear and overwhelming fear of disease that might decrease productivity and effectivity. Also, the community's wellbeing decreases, if production and effectivity in the population sees a dramatic drop in a certain percentage of people (24).

1.2.4 Mental health complications on the general population

The numbers of reported stress, anxiety disorder, traumatization and depression since the start of the COVID-19 pandemic were higher than in pre-pandemic times. There are multiple factors that have been already discussed, including fear of the disease, restrictions in the course of the pandemic et cetera. The problem again is the huge number of people suffering from those side effects of the COVID-19 pandemic, making strategies for therapy and psychological interventions necessary. In developed countries this is given, however scientists will have to wait and see if the resources for psychological interventions are enough to deal with the masses of people that may be seeking psychological help in the near future. In developing countries, those psychological interventions are rarely seen. There is a problem with lacking psychological supply as well as with the stigma associated with mental diseases (28, 19).

Exaggerating headlines concerning COVID-19 and stories in the media, social media and other formal and informal channels aggravated those effects on mental health in the public.

1.2.5 Mental health complications on healthcare workers

As also mentioned in the previous chapters, healthcare workers were especially challenged by the pandemic. Not all of them, but those who work in COVID-19 affected areas definitely were. Quarantines of colleagues and too many patients lead to extra shifts, long working hours and those often in rough conditions, physically when wearing full body personal protection equipment and also mentally when dealing with the tragedies the pandemic caused (29, 30).

Similar to the general public, health care workers were faced with higher numbers of anxiety, depression, posttraumatic distress syndrome or stress. Some hospitals made sure that their health care workers would get psychological assistance if needed. But this is rather the exception than the rule. If we want to further keep our health care systems intact everything should be done to help those healthcare workers who suffered from the burdens this pandemic brought. Especially those in the areas directly confronted with COVID-19, often called the frontline workers, show high numbers of mental health issues and will probably need assistance to cope with their burdens (30, 29).

Many countries, including Germany and Austria, were confronted with protests from health care workers. Health care workers that were working on their personal limits already before the pandemic and as of the start of the pandemic those problems exacerbated and many had to quit their jobs because they did not have the personal resources to cope with the work environment anymore. Both named countries already see a shortage in health care professionals, as the demographic terms change because people are getting older and more people will need medical help in the years to come this was already a huge problem before the outbreak of the COVID-19 pandemic. Now, this pandemic burned out many who were active in health care and probably even made some people rethink about getting into health care, especially with protests about the bad conditions getting public. So the COVID-19 pandemic might also become an aggravator of the health care crisis and this makes it even more important to take care of those people who are in health care right now and to keep them physically and mentally able to work in their jobs (31).

1.3 Reasons and aims of this research project

The COVID-19 pandemic has immense consequences for people's somatic and mental health. In the previous chapters many factors were presented that might directly impact people's somatic health as well as their mental wellbeing and thus show its importance for public health. Especially if one thinks about the huge numbers of infected people worldwide with the pandemic still going on.

Not only is it crucial to detect those people who are especially affected by the effects of the pandemic and to offer biopsychosocial support of the kind they need, but also to learn more about how a pandemic works on our somatic and mental health in order to find and provide better strategies for future pandemics to come. We can be sure that the COVID-19 pandemic will not be the last pandemic our world will have to face, so all we can do is to be better

prepared next time in order to start with what is become more and more important in medicine: prevention.

Research Questions: In this research biopsychosocial factors that lead to overwhelming severe fear of COVID-19 are evaluated to find out which biological, social and psychological factors might predict severe fear of COVID-19 and those who might at least account to the development of developing overwhelming fear of disease.

1.4 Outline of a possible biopsychosocial model of fear of COVID-19

In order to create a possible biopsychosocial model of fear of COVID-19 certain factors (biological, psychological and social) that might increase fear of COVID-19 were evaluated. As for biological factors somatic risk factors were chosen. As for social factors financial losses during the COVID-19 pandemic, social support, previous contact with people who were infected with COVID-19 and sociodemographic factors were evaluated. For psychological factors state and trait anxiety, severe health anxiety, phobias and depression/mental-wellbeing were examined. All factors will be described in detail in the section 'Methods'. Figure 3 shows the possible biopsychosocial model with the examined factors in this research project.

Figure 3. shows the outline of the possible biopsychosocial model with the examined factors.



*** This figure was originally published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1) All rights are granted by the authors.

2. Materials and Methods

2.1 Ethics approval, informed consent and overview on the study*

Apart from the literature research done for this dissertation a research project was completed that used a battery of validated questionnaires. Author compiled questionnaires as well as well-established psychiatric questionnaires were used. They are going to be explained in detail in the following chapters.

The study was approved by the ethics committee of the Medical University of Graz, Austria (32-354 ex 19/20). All participants gave either written or digital (approval click) consent to the participation in the study.

Furthermore, a record at clinicaltrials.gov (ID: NCT04359121) was done.

Every participant was presented with a detailed informed consent (to be found in the attachments; is given to possible participants to inform them about the study) with all necessary information about the study and the participant's role in the study. Our inclusion criteria were age 19-90, willingness to participate in the study, accepting the informed consent. Exclusion criteria included age below 19 years or over 90 years, unwillingness to participate in the study, prior diagnosis of dementia or other cognitive impairment and positive testing (PCR-test) for COVID-19 prior to participating in the study.

2.2 Study population of the study*

368 participants were included in the study. 93/368 participants were male (25.3%) and 275/368 (74.7%) were female. It was aimed to get a well-balanced return rate considering gender, however women tended to show higher return rates which resulted in a higher rate of female participants. The mean age of our study cohort was 33.5 years (SD \pm 12.1). The participants were located in Austria and Germany. The study was performed between April 18th 2020 and April 5th 2021.

2.3. Procedure*

In order to create a biopsychosocial model about overwhelming severe fear of COVID-19 questionnaires that evaluate biological, psychological and social factors were examined. The factors and the respective questionnaires are explained in detail in the following chapters.

2.4 Author compiled questionnaires*

In the author compiled questionnaires we asked for sociodemographic data, use of social media consumption (how many different social media apps were used and for how many hours a day), financial losses or job losses due to the COVID-19 pandemic, previous social contact with people infected with COVID-19 and somatic risk factors. All author compiled questionnaires are attached.

a) Sociodemographic Data

Socioemographic Data included sex, gender, educational status, marital status.

To check for people's educational status we asked them about their educational background. The participants had to choose between those educations, from basic education to high level education: Compulsory School, Middle School, Apprenticeship, Secondary School and University.

In order to learn about the participants' marital status we asked them to give information about this status. They had to choose between in a relationship/married, single, widowed and divorced/separated.

To gain knowledge about the participants' household condition we asked about those conditions. The participants had to choose between living alone/single household, living with partner and household with children.

b) Use of social media

The participants were asked how many different social media platforms they used and were able to choose from the following social media platforms: Facebook, Instagram, WhatsApp, YouTube, Snapchat, Pinterest and TikTok. Moreover, we asked for how many hours a day

they were using those platforms. The participants were divided into groups using less than 4 and more than 4 different social media platforms.

c) Financial losses

For this factor participants were asked whether they suffered financial losses due to the COVID-19 pandemic or not.

d) Contact with people infected with COVID-19

Here we asked people if and for how long they had social contact with people who were infected with COVID-19.

e) Somatic risk factors

Participants were asked if they suffered any of the following risk factors: old age, obesity, asthma, cardiovascular disease, autoimmune disease, liver disease, cancer or preexisting medication that might impact the immune system. Those were the major risk factors for developing a severe course of COVID-19 according to the medical knowledge at the time of the creation of the questionnaire.

2.5 Psychometric questionnaires*

In order to ask for anxiety, phobias, depression/mental-wellbeing and severe health anxiety we used well-established and well-validated psychometric questionnaires. Due to copyright issues only those questionnaires are attached that are available via open access.

a) Amount of fear of COVID-19

To find out about the amount of fear of COVID-19 we used the Severity Measure for Specific Phobia adapted for COVID-19 (32). According to their Severity Measure for Specific Phobia the participants were divided into three groups. Group 1 – almost no fear of COVID-19, group 2 – some fear of COVID-19 without phobic characteristics and group 3 – strong fear of COVID-19 with potential phobic characteristics.

b) Anxiety

To measure primarily bodily symptoms of anxiety we used Beck's Anxiety Inventory (BAI) (33). This self-reporting inventory has a total maximum score of 63 and makes it possible to divide the participants into four groups. Group 1 – no to minimal physical symptoms of anxiety, group 2 - mild physical symptoms of anxiety, group 3 - moderate physical symptoms of anxiety and group 4 - severe physical symptoms of anxiety.

Then, in order to search for state and trait anxiety, so anxiety that is felt in the present situation as well as anxiety that can be seen as a character trait, we used the State-Trait Anxiety Inventory (STAI) (34). Both, the State Anxiety and the Trait Anxiety Scale use a 4-point Likert scale are also self-reported and consist of 40 questions. The higher the scores the higher the levels of state or trait anxiety were.

Looking for severe health anxiety we provided the participants with the Whiteley-Index (WI) (35) and the illness Attitude Scales (IAS) (35) that both look for severe health anxiety up to hypochondria. Both are self-reported. The WI uses a dichotomous scoring and the IAS a Likert scale. There is a manual that shows how the results are to be interpreted.

c) Specific Phobias

In order to learn about phobias in the participants they were presented with the Specific Phobias Questionnaire (36). This 5-point Likert Scale evaluates phobias and phobia-like fears.

d) Wellbeing/signs of depression

To evaluate wellbeing and to find signs of depression the WHO-5 Well-being Index (WHO-5) (37) was used. Higher scores in this questionnaire resemble higher levels of mental wellbeing, lower levels indicate signs of depression.

Apart from those psychiatric questionnaires the standardized Social Support Survey (SSS) (38) was used to measure levels of social support of the participants. Higher scores in this survey reflected higher social support.

Table 1 shows an overview on all examined questionnaires in respect for their biological, psychological or social factors.

Table 1. Overview on biological, psychological and social factors that were evaluated for this study

Biological	Somatic Risk Factors
Psychological	Severity Measure for Specific Phobia, Beck's Anxiety Inventory, State-Trait Anxiety Inventory, Whiteley-Index and Illness Attitude Scales, Specific Phobia Questionnaire, WHO-5 Wellbeing Index
Social	Social Support Survey, Financial Losses, Social Contact with Infected People, Social Media Use, Sociodemographic Factors

2.6 Statistical analyses*

The Descriptive Statistics in the study were presented as means and standard deviations. As already mentioned before in the presentation of the respective questionnaires, the level of fear of COVID-19 was measured with the Severity Measure of Specific Phobia (32) adapted for COVID-19.

In order to test if there are statistical significant differences between participants with different levels of fear of COVID-19 regarding their anxiety [state/trait anxiety (State-Trait Anxiety Inventory (34)), physical symptoms of anxiety (Beck's Anxiety Inventory (33)), severe health anxiety (Whiteley-Index and Illness Attitude Scales (35))], specific phobias (Specific Phobia Questionnaire (36)), mental wellbeing/signs of depression (WHO-5 Well-being Index (37)) and social support (Social Support Survey (38)) we performed two-way analyses of covariance (ANCOVAs, group x gender) with preceding Levene tests or box tests to check for homogeneity of variances. Age was used as covariate. Moreover, post-hoc tests were performed to further evaluate the results.

As the goal was to find significant predictors of severe fear of COVID-19 in order to be able to establish a biopsychosocial model of severe fear of COVID-19 we performed a multiple regression analysis of all of our biological, social and psychological factors. The depended variable was the level of fear of COVID-19 (Severity Measure of Specific Phobia (32)) and the examined predictors were: anxiety [state and trait anxiety (State-Trait Anxiety Inventory (34)), physical symptoms of anxiety (Beck's Anxiety Inventory (33)), severe healthy anxiety (Whiteley-Index and Illness Attitude Scales (35))], specific phobias (Specific Phobia Questionnaire (36)), mental wellbeing/signs of depression (WHO-5 Well-being Index (37)), general social support (Social Support Survey (38)), the use of social media, financial losses

that were caused by the COVID-19 pandemic and previous (direct) social contact with people infected with COVID-19.

*parts of this chapter have been published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1)

3. Results

Parts of the results were published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1). All parts that have been used are marked. All rights have been granted by the authors.

3.1 Fear of COVID-19*

COVID-19 as a disease and the COVID-19 pandemic show effects on the people who are affected by it. In current literature there is no doubt that COVID-19 and the COVID-19 pandemic has tremendous effects on the mental health of everyone who is affected by it (30, 29). Higher levels of stress, anxiety, phobia, posttraumatic distress syndrome and depression are seen in common people as well as in health care workers (who have been especially affected by the pandemic having had to work in the frontline) (19, 29, 28, 30).

3.1.2 Fear of COVID-19 according to own research*

According to the Severity Measure for Specific Phobia (32) adapted for COVID-19 the participants were split in three groups. The first group with almost no fear of COVID-19 had 162/368 participants, which is 44.02%. 54/162 participants of this group were male (33.3%) and 108/162 were female (66.6%). The second group with moderate fear of COVID-19 had 161/368 participants, which is 43.75%. 38/161 participants of this group were male (23.6%) and 123/161 were female (76.4%). The third group with severe fear of COVID-19 with potential phobic characteristics had 45/368 participants, which is 12.23%. 1/45 participants of this group was male (2.2%) and 44/45 were female (97.8%). It is notable that compared to male participants female participants showed more severe fear of COVID-19 ($\chi^2= 18.47$, $df= 2$, $p<0.001$).

3.2 Fear of COVID-19 and sociodemographic characteristics*

a) Educational background:

There were no correlations between level of education and the levels of fear of COVID-19 ($\chi^2 = 8.838$, $df = 8$, $p = 0.356$). (see Table 2)

Table 2. Level of Education and its Impact on Fear of COVID-19. **

		Level of Education					Total	
		Compulsory School	Middle School	Apprenticeship	Secondary School	University		
Fear of COVID-19	No or Almost No Fear	N	9	1	28	46	78	162
		%	52.9%	11.1%	46.7%	39.7%	47%	44.0%
	Moderate Fear	N	6	6	22	58	69	161
		%	35.2%	66.7%	36.7%	50%	41.6%	43.8%
	Severe Fear	N	2	2	10	12	19	45
		%	11.7%	22.2%	16.7%	10.3%	11.4%	12.2%
Total %			100%	100%	100%	100%	100%	100%

Marital Status/Relationship Status:

226/368 (61.4%) of the participants claimed that they were in a relationship or married, 130/368 (35%) were single, 3/368 (0.8%) were widowed and 9/368 (2.4%) were divorced/separated (see table 3). Being in a relationship made a difference concerning levels of fear of COVID-19. Those who are in a relationship showed significant lower levels of fear than those who are single, widowed or divorced/separated ($\chi^2 = 14.582$, $df = 6$, $p = 0.024$). (see Table 3) *

Table 3. Marital Status and its Impact on Fear of COVID-19**

			Marital Status				Total	
			In a relationship/ married	Single	Widowed	Divorced/ Separate d		
Fear of COVID- 19	No or Almost No Fear	n	111	48	0	3	162	
		%	49.1%	36.9 %	0.0%	33.3%	44.0%	
	Moderate Fear	n	96	58	3	4	161	
		%	42.5%	44.6 %	100%	44.4%	43.8%	
	Severe Fear	n	19	24	0	2	45	
		%	8.4%	18.5 %	0.0%	22.2%	12.2%	
	Total %			100%	100%	100%	100%	100%

Household conditions:

No significant differences were observed between household conditions and levels of fear of COVID-19 ($\chi^2=2.283$, $df=4$, $p=0.684$). (see table 4)

Table 4. Household Conditions and its Impact on Fear of COVID-19**

			Household Conditions			
			Living Alone/ Single Household	Living with Partner	Household With Children	Total
Fear of COVID-19	No or Almost No Fear	N	46	67	49	162
		%	43%	44.1%	45%	44.0%
	Moderate Fear	N	44	70	47	161
		%	41.1%	46%	43.1%	43.8%
	Severe Fear	N	17	15	13	45
		%	15.9%	9.9%	11.9%	12.2%
		Total %	100%	100%	100%	100%

3.3 Summary of the results of the psychometric questionnaires depending on the level of fear of COVID-19*

Table 5. shows a summary of the results (in means and standard deviations) of the well-established psychometric questionnaires of the participants (male and female) with almost no fear, moderate fear and severe fear of COVID-19.

Table 5. Means (\pm SD) of the psychometric questionnaires of male and female participants with almost no fear, moderate fear and severe fear of COVID-19. **

	FEAR OF COVID-19											
	ALMOST NO FEAR				MODERATE FEAR				SEVERE FEAR			
	Male (n=54)		Female (n=108)		Male (n=38)		Female (n=123)		Male (n=1)		Female (n=44)	
	Mean	SD(\pm)	Mean	SD(\pm)	Mean	SD(\pm)	Mean	SD(\pm)	Mean	SD(\pm)	Mean	SD(\pm)
Anxiety												
BAI	3.13	\pm 4.13	5.97	\pm 7.75	7.58	\pm 9.74	8.76	\pm 7.51	6.00	-	17.59	\pm 13.42
IAS	15.20	\pm 7.20	17.95	\pm 9.71	16.87	\pm 9.10	24.26	\pm 12.48	27.00	-	33.91	\pm 18.04
WI	1.65	\pm 1.31	1.75	\pm 1.97	2.13	\pm 2.40	3.07	\pm 2.71	5.00	-	4.80	\pm 3.68
STAI STATE	31.87	\pm 8.85	34.36	\pm 8.19	35.47	\pm 10.45	38.52	\pm 9.16	32.00	-	52.39	\pm 13.85
STAI TRAIT	31.19	\pm 7.14	37.03	\pm 9.96	34.79	\pm 10.35	39.45	\pm 9.86	33.00	-	51.41	\pm 13.53
Specific Phobia												
SPQ	.20	\pm .17	.37	\pm .31	.34	\pm .26	.48	\pm .33	.02	-	.83	\pm .72
Signs of Depression												
WHO-5	32.81	\pm 16.51	37.19	\pm 18.64	37.05	\pm 19.39	44.16	\pm 17.06	44.00	-	62.45	\pm 23.60
Social Support												
SOCIAL SUPPORT	81.92	\pm 15.22	80.47	\pm 16.38	77.98	\pm 15.79	80.01	\pm 15.51	93.42	-	68.45	\pm 24.42

Legend:

BAI: Beck's Anxiety Inventory

IAS: Illness Attitude Scales

Social Support: Social Support Survey

SPQ: Specific Phobia Questionnaire

STAI State: State-Trait Anxiety Inventory

STAI Trait: State-Trait Anxiety Inventory

WHO: WHO-5 questionnaire of wellbeing

WI: Whiteley-Index

*Parts of this chapter have been published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1). All rights have been granted by the authors.

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3.4 Biopsychosocial risk factors for severe fear of COVID-19*

3.4.1 Biological risk factors*

For this category participants were asked if they had any risk factors concerning their somatic health. Those factors were the factors that were supposed to be the main risk factors for developing a severe course of COVID-19 at the time the study was planned. Those factors included old age, obesity, asthma, cardiovascular disease, autoimmune disease, liver disease, cancer or medication that impacts the immune system.

To form groups we split the participant into those who did not have any risk factors, those who had 1 risk factor and those who had 2 or more risk factors. 228/368 of the participants (62%) claimed they did not have any somatic risk factors, 97/368 participants (26.2%)

claimed that they had 1 risk factor and 43/368 participants (11.7%) claimed that they had more than 2 somatic risk factors.

Somatic risk factors did not have any impact on the levels of fear of COVID-19 [ANCOVA: fear of COVID-19 (somatic risk factors): $F(2, 361) = 2.658, p = .071$; fear of COVID-19 (gender): $F(1, 361) = 19.295, p < .001$; fear of COVID-19 (somatic risk factors x gender): $F(2, 361) = 1.446, p = .237$. Age as a covariate had no significant impact ($F(1, 361) = 0.652, p = .420$).]*

3.4.2 Mental health factors*

1) Previous anxiety and severe fear of COVID-19

a.) State anxiety

The STAI-State (34) was used to elaborate and detect state anxiety. There is a gender independent significant difference between participants with different levels of fear of COVID-19. Those who scored higher in levels of fear of COVID-19 also scored higher in the STAI State. So participants with higher levels of fear of COVID-19 showed higher levels of state anxiety. [ANCOVA: STAI State (fear of COVID-19): $F(2, 355) = 5.55, p = .004$; STAI-State (gender): $F(1, 355) = 5.89, p = .016$; STAI State (fear of COVID-19 x gender): $F(2, 355) = 1.64, p = .195$. Age as a covariate had a significant impact ($F(1, 355) = 4.48, p = .035$).]*

b.) Trait anxiety

The STAI-Trait (34) was used to elaborate and detect pre-existing anxiety as a personal trait (trait anxiety). There is a gender independent significant difference between participants with different levels of fear of COVID-19. Those who scored higher in levels of fear of COVID-19 also scored higher in the STAI Trait. [ANCOVA: STAI-Trait (fear of COVID-19): $F(2, 355) = 3.14, p = .045$; STAI-Trait (gender): $F(1, 355) = 6.68, p = .010$; STAI-Trait (fear of COVID-19 x

gender): $F(2, 355) = 0.870$, $p = .420$. Age as a covariate had a significant impact ($F(1, 355) = 5.902$, $p = .016$).]*

c.) Physical symptoms of anxiety during the COVID-19 pandemic

The BAI (33) is a questionnaire that looks for physical symptoms of anxiety. When looking at physical symptoms of anxiety we find a gender independent significant difference between participants with different levels of fear of COVID-19. Those who scored higher in levels of fear of COVID-19 also scored higher in the BAI. [ANCOVA: BAI (fear of COVID-19): $F(2, 361) = 5.87$, $p = .003$; BAI (gender): $F(1, 361) = 2.56$, $p = .110$; BAI (fear of COVID-19 x gender): $F(2, 361) = 0.85$, $p = .43$. Age as a covariate had a significant impact ($F(1, 361) = 5.87$, $p = .003$).]*

d.) Severe health anxiety

The WI-IAS (35) is used to detect pre-existing severe health anxiety up to hypochondriac tendencies in participants with and without severe fear of COVID-19.

When looking for severe health anxiety we found that there is a gender independent significant difference between participants with different levels of fear of COVID-19. So participants who scored higher in their levels of fear of COVID-19 showed more symptoms of severe health anxiety. [ANCOVA: Whitely-Index (fear of COVID-19): $F(2, 355) = 6.356$, $p = .002$; Whitely-Index (gender): $F(1, 355) = 0.059$, $p = .809$; Whitely-Index (fear of COVID-19 x gender): $F(2, 355) = 1.012$, $p = .365$. Age as a covariate had no significant impact ($F(1, 355) = 1.332$, $p = .249$).]*

Moreover, a significant difference between participants with almost no fear of COVID-19 and fear of COVID-19 concerning the IAS questionnaire was observed. The higher the score in the level of fear of COVID-19 was, the higher the scores in the IAS. [ANCOVA: IAS (fear of COVID-19): $F(2, 361) = 5.58$, $p = .004$; IAS (gender): $F(1, 361) = 1.81$, $p = .180$; IAS (fear of COVID-19 x gender): $F(2, 361) = 1.35$, $p = .261$. Age as a covariate had no significant impact ($F(1, 361) = 0.796$, $p = .373$).]*

*Parts of this section has been published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1). All rights have been granted by the authors.

2.) Specific phobias and severe fear of COVID-19

When looking at specific phobias in general during the COVID-19 pandemic we found a gender independent significant difference between participants with different levels of fear of COVID-19. Those who scored higher in levels of fear of COVID-19 also showed higher tendency for specific phobias during the COVID-19 pandemic. [ANCOVA: Specific Phobia Questionnaire (sum of all subcategories of phobia) (fear of COVID-19): $F(2, 360) = 4.063$, $p = .018$; SPQ (gender): $F(1, 360) = 8.696$, $p = .003$; SPQ (fear of COVID-19 x gender): $F(2, 360) = 1.597$, $p = .204$. Age as a covariate had no significant impact: ($F(1, 360) = 0.964$, $p = .405$).]*

Concerning phobias for medical procedures (e.g. needle-sting) there is no significant difference between people with low fear of COVID-19 and high fear of COVID-19. [ANCOVA: SPQ Medical Phobia (fear of COVID-19): $F(2, 360) = 0.946$, $p = .389$; SPQ Medical Phobia (gender): $F(1, 360) = 5.998$, $p = .015$; SPQ Medical Phobia (fear of COVID-19 x gender): $F(2, 360) = 1.457$, $p = .234$. Age as a covariate had a significant impact ($F(1, 360) = 5.694$, $p = .018$).]*

3.) Mental wellbeing/signs of depression and fear of COVID-19

The WHO-5 Well-being Index (WHO-5) (37) questionnaire is used to detect wellbeing/signs of depression. In this study we used it to evaluate levels of wellbeing/signs of depression in participants with and without fear of COVID-19.

Concerning mental wellbeing/signs of depression there is a gender independent significant difference between participants with different levels of fear of COVID-19. The higher the COVID-19 fear was, the lower the WHO-5 mental wellbeing scores were and thus people with higher scores of levels of fear of COVID-19 are more likely to also show signs of depression. [ANCOVA: WHO-5 (fear of COVID-19): $F(2, 361) = 3.58$, $p = .029$; WHO-5

(gender): $F(1, 361) = 1.75, p < .187$; WHO-5 (fear of COVID-19 x gender): $F(2, 361) = 0.49, p = .611$. Age as a covariate had a significant impact ($F(1, 361) = 13.01, p < .001$).]*

4.) Psychosocial factors and fear of COVID-19

a.) General social support and fear of COVID-19

The Social Support Survey (SSS) (38) was used to find out whether participants with different levels of fear of COVID-19 have different levels of social support.

According to the Social Support Survey (SSS) there is no significant difference in their general social support between people with different levels of fear of COVID-19. [ANCOVA: Social Support Survey (fear of COVID-19): $F(2, 359) = 0.59, p = .553$; Social Support Survey (gender): $F(1, 359) = 1.98, p = .161$; Social Support Survey (fear of COVID-19 x gender): $F(2, 359) = 1.39, p = .249$. Age as a covariate had no significant impact ($F(1, 359) = 0.28, p = .596$).]*

b.) Social contact with people infected with COVID-19 and fear of COVID-19

In this section it was elaborated if participants know people in their surrounding that were infected with COVID-19. We split the groups into those who did not know people infected with COVID-19 and those who know people infected with COVID-19 in their surrounding. 208/368 people (56,5%) claimed they did not have any known contacts, whereas 160/368 people (43,5%) claimed that they know people in their surroundings that were infected with COVID-19.

The results of the ANCOVA show that the levels of fear of COVID-19 were dropping in female participants if they had contact with people who were infected with COVID-19. The results for male participants showed opposite effects – the more contact male participants had with people who were infected with COVID-19 the higher their levels of fear of COVID-19 were.

[ANCOVA: fear of COVID-19(contact): $F(1, 363) = 1.659, p = .199$; fear of COVID-19 (gender): $F(1,363) = 18.819, p < .001$; fear of COVID-19 (contact x gender): $F(1,363) = 5.596, p = .019$]. Age as a covariate had no significant impact ($F(1, 363) = 0.364, p = .547$).]*

c.) Financial losses due to COVID-19

Participants were asked if they had to suffer financial losses during and because of the COVID-19 pandemic. 275/368 (74,7%) participants claimed they did not have any financial losses, 93/368 (25,3%) people claimed that they had significant financial losses due to COVID-19.

A significant difference between people with no financial losses and people with financial losses concerning their levels of fear of COVID-19 was observed. Those who had no financial losses showed lower levels of fear of COVID-19. [ANCOVA: fear of COVID-19 (financial loss): $F(2, 363) = 4.948$, $p = .027$; fear of COVID-19 (gender): $F(1, 363) = 22.853$, $p < .001$; fear of COVID-19 (financial loss x gender): $F(1, 363) = 2.953$, $p < .087$. Age as a covariate had no significant impact ($F(1, 363) = 0.020$, $p = .887$].*

d.) Use of social media

137/386 (37,3%) participants claimed they used not more than 4 different social media platforms and 231/368 (53,7%) participants claimed that they used more than 4 different social media platforms in the last month.

No significant differences between participants who use less social media and those who use more social media concerning their levels of fear of COVID-19 were observed. [ANCOVA: fear of COVID-19 (social media): $F(1, 363) = 0.321$, $p = .571$; fear of COVID-19 (gender): $F(1, 363) = 20.460$, $p < .001$; fear of COVID-19 (social media x gender): $F(2, 363) = 0.090$, $p = .764$. Age as a covariate had no significant impact ($F(1, 363) = 0.015$, $p = .904$].*

*Parts of this section have been published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1). All rights have been granted by the authors.

3.4 The biopsychosocial model of fear of COVID-19*

As our study aimed to determine a biopsychosocial model of fear of COVID-19 and to find predicting factors for the development of severe fear of COVID-19 we calculated a multiple regression model in order to find those predicting factors.

The calculation of the regression model showed an R² of 43.5% and revealed state anxiety (STAI-State), trait anxiety (STAI-Trait), health anxiety (IAS) and female gender as significant predictors of fear of COVID-19 (Severity Measure for Specific Phobia). All other examined variables (including: bodily symptoms of anxiety (BAI), specific phobias (SPQ), mental wellbeign/signs of depression (WHO-5), social Support (Social Support Survey), age, social media use, financial losses due to COVID-19, social contact with people who were infected with COVID-19, somatic risk factors) were not significant.*

Table 6. shows the multiple regression model of fear of COVID-19.**

Model	Regression coefficient		Beta	T	P
	B	Std.-Error			
(Constante)	-.595	.271		-2.201	.028
Gender	.165	.064	.119	2.560	.011
Age	.001	.003	.024	.487	.627
BAI	.004	.004	.055	.819	.413
WHO-5	.002	.002	.053	.783	.434
IAS	.009	.004	.183	2.402	.017
STAI-STATE	.024	.004	.450	5.452	.000
STAI-TRAIT	-.010	.005	-.180	-2.040	.042
WI	.022	.016	.094	1.356	.176
SPQ	-.295	.162	-.227	-1.815	.070
Phobia from medical procedures (SPQ)	-.062	.138	-.047	-.449	.654
Social support	.001	.002	.041	.797	.426
Use of social media	.056	.058	.044	.963	.336
Contact with people who were infected with COVID-19	-.040	.054	-.033	-.743	.458
Somatic risk factors	.041	.055	.033	.744	.458
Financial losses	.118	.061	.085	1.926	.055

- a. Depending Variable: Severity measure for specific phobia (32) (adapted for fear of COVID-19)

Legend:

BAI: Beck's Anxiety Inventory (33)

IAS: Whiteley-Index (35)

Severity Measure for Specific Phobia (32)

Somatic risk factors: obesity, old age, cardiovascular disease, autoimmune disease, cancer, medication that impacts the immune system, liver disease

SPQ: Specific Phobia Questionnaire (36)

SSS: Social Support Survey (38)

STAI: State-Trait Anxiety Inventory (STAI) (34)

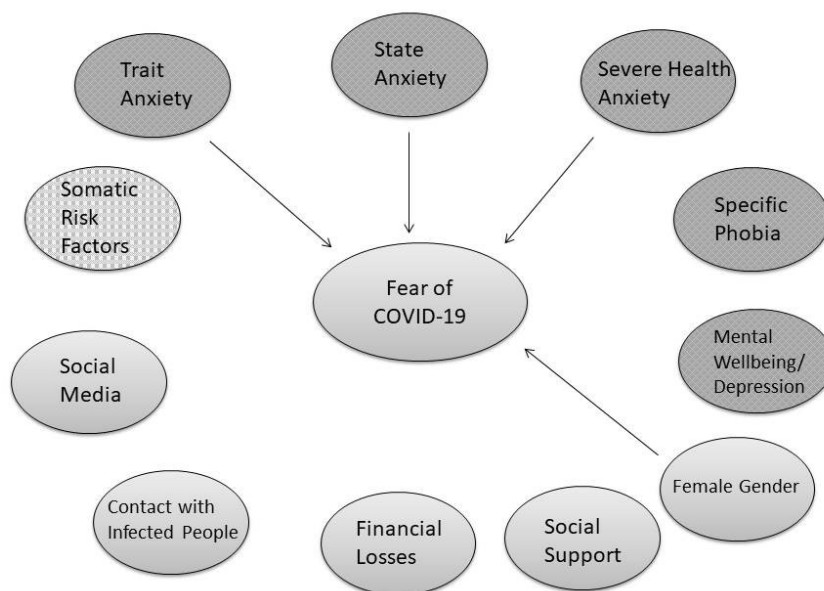
WHO-5: WHO-5 Well-being Index (37)

WI: Whiteley-Index and Illness Attitude Scales (35)

*Parts of this chapter have been published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1). All rights have been granted by the authors.

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Figure 4. shows the biopsychosocial factors that are predictors for severe fear of COVID-19.***



*** This figure was originally published in Nürnberger P, Lewinski D von, Rothenhäusler H-B, Braun C, Reinbacher P, Kolesnik E et al. A biopsychosocial model of severe fear of COVID-19. PLoS One 2022; 17(2):e0264357 (1). All rights have been granted by the authors.

4. Discussion

4.1. *The world was not prepared for a pandemic*

Health care systems around the world are confronted with many challenges concerning the somatic health of people who suffer from the novel coronavirus disease COVID-19. But apart from all those massive impacts on people's somatic health it also challenges the mental health of those infected with COVID-19 and those affected by the pandemic. So basically every human being around the world might be in danger of suffering mental health issues due to the COVID-19 pandemic, directly by the virus or indirectly by the threats and measures the pandemic brings to the public (18).

The world has been challenged with pandemics before. Two of the largest pandemics were the influenza pandemic of 1918 and the plague 1894 with millions of infected people and deaths worldwide. Researchers can be sure that if modern healthcare did not have the possibilities of modern medicine that the damages of the SARS-CoV2 pandemic would be massively higher than they already are with everything healthcare can bring into battle. However, the world did not see a huge pandemic in the past few centuries. Although there have been smaller pandemic situations, all of those have gotten under control rather fast. (18)

In the case of the SARS-CoV2 pandemic the characteristics of the virus and the disease helped to promote a fast outbreak around the globe. Not only is the virus highly contagious, thus infects many people, but it is also not always presented with severe courses and many people do not develop any symptoms at all. Those asymptomatic infected people still infect many others, not even knowing that they possibly could do that. This is a massive advantage for a virus. If you compare it to a virus that is highly contagious, but also causes severe courses in almost all cases health authorities are able to detect the infected people fast and can isolate them. We have seen this for example in various Ebola virus outbreaks in Africa. But in SARS-CoV2 the detection of infected is not easy, even at times not possible if the infected show no symptoms (4, 39).

The testing strategies since the outbreak of the pandemic helped to detect many people, even those who were asymptomatic. However, a lot of testing was performed by antigen testing, a test that has potential errors. And, the human factor is immense. If the sample is not collected correctly (as it would be in a professional setting, for example in a doctor's office) the risk of receiving a false negative result is very high. Out of practicability many of

those tests were thought to be performed by the tested person themselves, even at home without any supervision. This opens a lot of possibility for false negative results (by swindle or by accident by not knowing better) (40, 41).

In addition to those testing strategies contact tracing was performed. This means that those people who had contact with people who were found to be infected with the SARS-CoV2 virus were contacted and isolated. Especially at the beginning of the pandemic this was done rigorously, however authorities soon learned that they do not have enough capacities so it often took many days until those people who were infected or those who had contact with the infected people were noticed by the authorities and quarantined, giving them days to infect other people and to make contact tracing even more difficult. As measures were reduced and it was possible to do more things in your leisure time again this contact tracing became extremely difficult and lost importance (42, 43).

So those two factors, testing and contact tracing, helped to identify some of the infected people. But it was impossible to find all infected people. This is the problem with asymptomatic or oligosymptomatic patients. If the virus would cause more severe courses of the disease COVID-19 and most people would get very sick or die it would be easier to keep track of the infectious events (44).

Apart from the challenges the health authorities had to face to keep track of the infection rates it also soon became a real challenge to care for all the people in need of medical help. Hospitals were flooded with patients suffering from COVID-19 (44). At the beginning of the pandemic little was known about the disease, which made it even more difficult to tackle it. But next to the missing knowledge about the disease COVID-19 hospital staff worldwide had the problem of not being prepared to care for many unexpected patients. In the beginning personal protection equipment became a rarity in many countries of the world. High prices were seen in the global markets for personal protection equipment such as masks or gloves. Worn-off personal protection equipment or insufficient personal protection equipment lead to unsatisfied and more stressed employees and increased the risk of being infected due to the lack of protection. Again, this aggravated the already difficult staff situation in many countries, because the already often short staff saw further shortages due to sick leaves and quarantines. Those were not only short term shortages, as many infected people struggled with the effects of COVID-19 later known as long-COVID syndrome (or post-COVID syndrome) and were not able to come back to their jobs for weeks, months or, in some cases, at all since they suffered the disease. As there already often was a tense situation

concerning staff in the health care system this was worsened by the SARS-CoV2 pandemic (44).

Apart from missing staff and personal protection equipment some hospitals were also confronted with shortages of other needed medical equipment such as ventilators or in many countries even the most basic treatment for COVID-19: oxygen supply (45).

In total, in respect of manpower (staff) and equipment (personal protection equipment as well as other needed medical equipment) nearly no country in the world was prepared for a pandemic like this. At least most countries started to prep personal protection equipment (44).

Another important issue during the course of the pandemic was that people who needed medical help often did not seek this medical help in the hospitals and private practices. Many of those were afraid to get infected with the SARS-CoV2 virus while being in a doctor's waiting room or the emergency department. There was a significant drop in all major diseases, including cardiovascular diseases such as strokes and myocardial infarction. There is no reason to believe that those cases really decreased during that period of time, so researchers must assume that there was under-diagnosis and under-treatment during that time. Many minor events, minor strokes or even minor myocardial infarction can lead to only minor destruction in the brain or the myocardium. If patients were impaired in those organic functions before, the effect was maybe not that big, however the diagnosis is missing. If you take people in retirement homes in Austria they are usually hospitalized quickly by the staff that works there. However, during COVID-19, fearing outbreaks of SARS-CoV2 in the respective homes, some healthcare professionals (staff in retirement homes, doctors in private practices etc.) were more restrictive in sending people to hospitals. This changed quickly, however, during the first few weeks and months of the pandemic some diagnostic tools such as computed tomography were used very restrictively in the United States (possibly also in other countries), leading to decreasing numbers in diagnosis (46). Many people were waiting for a long time until they went to an emergency department, hoping that their aches and pains would dissolve themselves. In some cases they did. But in some cases they came to the hospital rather late and thus in those cases that came to the emergency department more damage and more severe courses of the diseases were seen. (46–48)

Healthcare systems need to learn as many lessons as possible from this pandemic. It showed that the scientific world is fast, modern medicine is able to do a lot for people who have infectious diseases and within a year from the outbreak of the pandemic a vaccination was available. This was indeed very fast, only possible because so many researchers

around the world worked together for the same cause. There will be a next pandemic, it is not a question if as rather when. So we need to take as many information as possible from this pandemic, which is not over by the way, to be better prepared for a future pandemic. This includes not only strategies for the challenges of people's somatic health and supply management in the health care system but also preventive measures when it comes to mental health issues and therapeutic measures for all those people suffering from mental health issues due to the pandemic. We are still learning about the long-term effects on mental health of this pandemic, which slowly become visible but are probably not fully understandable at this point in time.

4.2. Mental health issues due to the COVID-19 pandemic

If one takes a look at current scientific literature one finds that mental health issues are on the rise due to the COVID-19 pandemic. This means that people are affected by the COVID-19 pandemic and suffer mental health issues either by a direct impact of the SARS-CoV2 virus or by the effects of the pandemic and pandemic management. Neurological and psychiatric complications are not unknown in the course of viral diseases and they are seen from time to time (49). Especially during other coronavirus disease outbreaks as the SARS-CoV pandemic and the MERS pandemic a certain amount of patients were found to suffer neurological and psychiatric complications. It is not surprising that scientists also see those neurological and psychiatric complications (49) in the SARS-CoV2 pandemic in the course of the disease COVID-19. The severity of the course of the disease in the respective patients, if they had to be hospitalized or even taken to an intensive care unit, did not always function as an indicator for possibilities of developing neurological or psychiatric complications. (50, 51) In older critical ill patients it is common to see altered mental status and following mental health issues during or after critical care therapy. However, in COVID-19 those effects were often seen in rather young patients, which is another hint that it is also caused by the disease itself, the threat it brings and not just by its surrounding factors such as hypoxia, sepsis, polypharmacy, sedatives and underlying masked neurocognitive, degenerative disease (49). There are indications that SARS-Cov2 might have neurotropic effects and is thus able to cause to neurological and psychiatric effects. It is known that neurons express ACE2 and this might also explain one symptom that is often observed in COVID-19 – anosmia (52).

One of the biggest problems here is the enormous amount of people that are or have been infected by the SARS-CoV2 virus and may have developed mental health issues. It is not yet

possible to say how many people will have negative impacts on their lives due to a SARS-CoV2 infection (53).

Apart from that, even more people are affected by the pandemic and all the measures and restrictions that came with the pandemic. They were often not able to see their loved ones for months, had to isolate themselves, avoid social interaction and were probably anxious and afraid of all the real and possible threats of this pandemic. It was a completely new situation for everyone and some people may have found it easier to find coping mechanisms than other (53).

Of course patients with preexisting psychiatric disorders have to be taken into account. Those patients claim that their symptoms have worsened during the course of the pandemic (53).

But also the general public including those people who have never had a psychiatric condition or diagnosis before suffered. Posttraumatic distress syndrome was seen in many people who were hospitalized due to COVID-19 (54). Sleeping problems, anxiety, depression and stress were on the rise (49). There has been a mixture of threats around more or less all the time. First of all the direct threat by the SARS-CoV2 virus, before vaccinations were available anyone could have gotten infected with the virus and developing COVID-19. But not only the risk of being sick was a problem, many also feared that they could infect other people in their surroundings, maybe those people who have more risk factors for developing a severe course of COVID-19 and they would have felt guilty if anything happened to them. Similar psychological effects were seen in the SARS-CoV crisis (49). Second there was this indirect threat due to all the measures and restrictions that came with the pandemic. Many people did not feel safe if they went shopping, they did not feel safe when they were allowed to go on with more or less normal lives again after numbers of infected people have dropped during summer (at least in many European countries). The first weeks of the pandemic were memorably, where everyone stayed at home, most people started prepping for the worst and no one really knew how many people will be infected during the first wave of the pandemic. Third, there was a permanent noise that caused a theoretical threat, and this one was media coverage. The amount of media coverage on COVID-19 and the SARS-CoV2 virus was immense, to some extent it still is. People did not hear much about anything else on the news and this did not change for weeks and months. New statistics, new numbers and new information on the virus and the disease were presented (55, 56). COVID-19 was omnipresent. For many people worldwide it was difficult to find some time to get your thoughts away from this topic. Also, as scientific knowledge takes time to be created, much

of the media coverage included assumptions and tragic highlights of the pandemic. Probably there has not been enough done to offer psychological assistance to those people who need it. Most of those will have to cope on their own. Many will be able to do that and carry on with their normal life, but there will be some that might have to deal with all the mental health complications that came up for a longer period of time. (57–60)

Then there are the health care workers. With hard work and engagement those were the people who kept health care systems working. Without the unstoppable strength and mentality of health care workers worldwide the pandemic would have caused even more damage. We have seen some hospitals and health care systems breaking down under the pressure of the amount of infected people needing medical help, in developing as well as in developed countries. No one was prepared for something as big as this. Those health care workers, being everyone who worked in the hospitals were devoted for the cause. No matter how tough the situation was already before the COVID-19 pandemic, and many countries have to deal with staff shortages in hospitals, they kept working. In the beginning, France and Italy even infected and sick health care workers kept on working in the hospitals in order to keep the hospitals working. Especially the ones in the front lines, the emergency departments, the COVID-19 wards and the intensive care units had the biggest burden. Whereas other parts of hospitals even got to take breaks from time to time, as normal procedures were either stopped completely or kept at minimum, the ones at the front line often had to keep on working with COVID-19 patients every day during the pandemic. There were rare breaks. This permanent workload in combination with all the stress that the COVID-19 pandemic brought to those front line wards and departments alone is a huge challenge. Let alone being in full body personal protection equipment for the whole day, during every shift you work, having to deal with personal tragedies of the patients you are taking care of and then on top not being able to see any of your friends or family in order to cope and maybe to talk about all the things that occupy your mind. Taking all those factors into account it is no surprise that health care workers also saw a rise in numbers of sleeping problems, stress and even depression (61–63).

One and a half years after COVID-19 was titled a pandemic we see some hospitals in central Europe having to close wards, because there is not enough staff available anymore to keep everything going. The COVID-19 pandemic made many health care workers quit their jobs, because they were burnt-out and could not stand the burdens of the job anymore (62–64, 61).

It might be that some of those people also quit their jobs because they developed mental health issues and did not find an opportunity to find help and to overcome those issues caused by the pandemic. This also is true for everyone outside the health care system, but especially those people in the health care system probably did not get enough psychological assistance that they would have needed in order to cope with all the struggles that came with the pandemic (63, 61, 62).

4.3 Fear of COVID-19

Fear is an important factor in the COVID-19 pandemic. As the pandemic is seen as a threat, people may react with their biological response to a threat: fear (65, 66).

In our own study we were looking for the amount of fear of COVID-19 that people presented. By using the Severity Measure for Specific Phobia we were able to divide the participants into three groups – those with almost no fear of COVID-19, those with moderate fear of COVID-19 and those with severe fear with potential phobic characteristic of COVID-19. There were 162/368 (44.02%) people in the group with almost no fear of COVID-19, 161/268 (43.75%) people in the group with moderate fear of COVID-19 and 46/368 (12.23%) people in the group with severe fear of COVID-19.*

When looking at gender differences in the respective groups we found 54/162 (33,3%) male and 108/162 (66,6%) female participants in the group with almost no fear of COVID-19, 38/161 (23,6%) male and 123/161 (76,4%) female participants in the group with moderate fear of COVID-19 and 1/45 (2,2%) male participant and 44/45 (97,8%) female participants in the group with severe fear of COVID-19. Female participants showed more severe fear of COVID-19 than male participants ($\chi^2= 18.47$, $df= 2$, $p<0.001$). *

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4.4 Fear of COVID-19 and sociodemographics

In the public discourse one was often confronted with the statement that different levels of education may have an impact on the behavior during the pandemic. This was the reason why we were looking at the fact if education had an impact on the levels of fear of COVID-19. We did not find any significant impacts of different levels of education for the development of higher levels of fear of COVID-19. This means that it does not matter if one had lower or higher education when it comes to the development of fear of COVID-19.

We found that marital status had an impact on the level of fear of COVID-19. Being in a relationship was found to be a factor that is associated with lower levels of fear of COVID-19. As discussed in previous chapters, the measures and restrictions may have been worse for people being alone. During many months people were not allowed to meet people, especially not people they do not know or do not live with, so people who were alone had problems finding a new partner as dating was a difficult process during the times of the pandemic. Many studies found that love and relationships had difficulties during the times of the pandemic, so everyone was affected – the ones in relationships and the ones who were not in relationships at that time. But especially those who were not in a relationship suffered more from being lonely (67, 68).

Apart from being in a relationship or not we were interested if it made a difference if people were living alone or with someone else. Interestingly, even though those who were not in a relationship and thus were lonelier showed higher levels of fear of COVID-19, it did not make a difference if people were living alone or with someone else. Household conditions did not have any impacts on the levels of fear of COVID-19.

4.5 A biopsychosocial model

Biopsychosocial models are valuable methods to describe different factors that have an impact on a person. By looking at many different factors from different approaches, namely biological factors, psychological factors and social factors a bigger picture of the patient is drawn. In the sense of a holistic approach in medicine it is important to not focus solely on the biological factors, but also to implement a person's psyche and mental health represented by psychological and social factors that may have an impact on the overall health, somatic and mental health, of that respective person. (69)

To complete our study we first took a look at what may be the mental health issues that people around the world will have to deal with during the pandemic. For our goals we chose severe fear to be one of the key elements of mental health issues in the pandemic and so we focused on what causes this fear of a disease, fear in a pandemic and what might be predicting factors in order to offer preventive measures for the future, but also to care for all those people in need of biopsychosocial assistance during the COVID-19 pandemic.

In our biopsychosocial model we found that female gender, severe health anxiety as well as state and trait anxiety were predictive factors for the development of severe fear of COVID-19. These factors are able to predict severe fear of COVID-19.

First of all it is interesting to note that those people who have preexisting increased anxieties, thus seem more vulnerable to fear and anxiety in a situation that causes a threat like the COVID-19 pandemic. This means that everyone suffering from trait anxiety is at high risk of suffering from the burdens of the COVID-19 pandemic, or a future pandemic in that sense, and may need special attention.

Also, those people who suffer from severe health anxiety up to hypochondria have a high risk of developing severe fear of COVID-19. So it also makes sense to take special care of those people suffering from severe health anxiety and offer biopsychosocial support.

Those biopsychosocial factors that act as predictors might help to preselect people from a cohort that may be in danger of developing severe fear of COVID-19 and thus need special biopsychosocial support. Of course more about this topic will be learnt in the course of the aftermath of this pandemic, but we already found some factors when planning preventive measures for future pandemics. Also, this knowledge may be helpful to provide biopsychosocial support for those who will need it after this pandemic.

4.6 A gender difference

In our research we found that it made a difference if people had contact with people who were infected with COVID-19 or not. But, interestingly we found a significant gender difference in this part of the study. Male participants showed higher levels of fear of COVID-19 if they had more or longer contact with people who were infected with COVID-19. Women showed lower levels of fear of COVID-19 if they had more or longer contact with COVID-19.

What can we make of this information? We learned that female gender is a predictor for the development of higher levels of fear of COVID-19. However, female people who have more

contact with people who are infected with COVID-19 react with lower levels of fear of COVID-19. Male participants who show lower levels of fear of COVID-19 in general show higher levels of fear of COVID-19 when they have more contact with people who are infected with COVID-19.

It is yet not understood why women show more fear in the COVID-19 pandemic than men. Probably the fact that women tend to show higher levels of fear in general than men leads to the fact that they also show higher levels of fear when it comes to COVID-19. (70, 71)

What can we learn from this fact for this pandemic and future pandemics?

As we are still in an ongoing pandemic and a future one will follow for sure, it is of utmost importance to gain knowledge like this, especially with a focus of gender differences, in order to make better decisions for the future. Looking at the impacts of a pandemic with respect of different genders is important.

4.7 A social media pandemic

Fear needs a catalyst. Mass fear is only possible if many people have the ability to talk to one another. In past pandemics this was not possible, as information took a long time to pass borders, especially continental borders. In modern times this happens very fast. Something happens in the United States of America? Seconds later social media users may see a social media posting appearing on their phones in Europe. Minutes later we probably see the first newspaper headline in our newsfeed. The way news spread is at speed levels never seen before, at many times more or less in real time. This is good, if there is news that needs to be spread fast in order to keep people from taking damage. A tsunami warning would be a good example. This would give people the ability to go to a safe place and save their lives. However, many news that are consumed by people are not in their best interest, but rather in the interest of the media that publishes it. This is why we see so many clickbait headlines – every click counts and brings money. Furthermore, as there is a tremendous need to publish fast some media companies just copy and paste news they see somewhere else without checking if the content is real. Not because they do not want to do so, but research takes time and journalists often do not have enough time in breaking news, as they need to publish immediately. If they take their time for research, most people will have read the article on some other media companies site and will not be interested to click the well-researched link

again. This is not true for articles that are not breaking-news, here we still see that many people want well-researched content. But in breaking-news, “faster is better” (72–74).

The fact that some journalists sometimes do not do proper research, and the consumers of the news sometimes do not do it as well, opens gates for misinformation and fake news. If there is a colorful, shouting headline some people will likely click it and many people often believe what they read, especially if it comes from a source they would normally see as trustworthy (74, 72, 73).

All of this is a general problem of our recent times, but it especially formed the sentiment of the COVID-19 pandemic. As said before, COVID-19 was all over the news and media some companies were fighting for consumers. Many consumers were “hungry for news”, as they were insecure and did not know what was going to happen and consumed hours and hours of news. This repeating appearance of news, mostly not encouraging news, definitely had an impact on the general sentiment in the public (73, 72, 74).

Also people with few or no professional medical qualification were able to proclaim their thoughts. In the course of the pandemic we saw many people who never had any sort of medical or public health education talking about virus-related issues, vaccinations, measures and lockdowns. Sometimes, those people tried to convince others that their view of the world is the right one and that all the experts are not right. Especially social media offers great opportunities, as people, at times politicians or influencers, may reach thousands or even millions of people and spread their wildest thoughts and ideas and, in the end, also convince many people of those ideas (72, 75, 73, 74).

But, to every downside there is an upside. Social media may also be used in order to measure and observe the sentiment in the public. This can be useful in pandemic control (76).

Interestingly, we did not find a connection between a lot of social media use and the level of fear of COVID-19 in this study. However, there are also hints in literature that this might still be the case, so probably more research needs to be gained concerning this topic. (65, 77, 78)

4.8 A “fake pandemic” with real fear

Some conspiracy theories are out there. They explain the world in easy ways, no matter if it brings answers about the moon landing, Roswell aliens or more recently the COVID-19 pandemic. Those conspiracy theories have more to do with fear than one might see at first glance (79, 80).

In a complex world conspiracy theories offer answers that easy to understand and seem relatable to many people. If you talk about COVID-19 as a disease, SARS-CoV2 as a virus and vaccines as the weapon to fight the pandemic you would need a lot of knowledge and expertise to really understand and reproduce ideas about those topics. And, given the fact that the immune system, viral reproduction, intensive care medicine and vaccinations themselves are not trivial matters, it is not easy to collect and gain this kind of needed knowledge. And this only includes basic knowledge about those topics, not even considering all the new scientific information and improvement that is seen on a daily basis. Even for experts it is difficult during times of a pandemic, where hundreds of new scientific papers are published every day, to keep track of the ongoing scientific progress (79–81).

So how should someone who is not familiar with the medical world be ever able to keep up with those topics? That is why experts are important to communicate about new scientific knowledge and to propose how to act in a pandemic.

In real life there are many people who do not trust experts and authorities, people who think they know it better. In times where everyone has their own digital networks it is easy to find people who also do not believe in the system and want to react. Those people try to find answers. And they do. The pandemic is fake, is what was often proclaimed. It is only there to enslave all the people worldwide, or to make some people richer or to get more surveillance over the many, or to create a big reset and so on and so forth. Examples as they are omnipresent, those were just some examples as they were often heard in public discourse. Often completely senseless, far-fetched, but, and this is important, easy to understand. The function of the human immune system is not easy to understand, the fact that someone wants to gain world order and to enslave humanity might be (80, 79, 81).

Many social media companies banned fake news and conspiracy theories, even if it is hard to keep track. Believing in conspiracy theories does not only cause theoretical complications, but very real ones as well. People who believe in those conspiracy theories about COVID-19 are very unlikely to get vaccinated, often even engage in anti-vaccination programs. This is

problematic, because as researchers know the world needs a high percentage of vaccinated people in order to keep new, and especially new severe, infections under control and to finally stop this pandemic and lead it to an endemic status (81, 79, 80).

All in all conspiracy theories have an important function. They serve easy answers to people who are afraid and lost in a world they do not understand. As we have seen already fear is an important factor in the pandemic and thus conspiracy theories are a way of coping with fears. From a psychological point of view they make perfect sense. If it is about a theoretical false moon landing this does not cause much harm, because well, it is in the past. It may even be entertaining. But in the course of a pandemic those conspiracy theories are a threat and cause real damage. By decreasing numbers of people who are willing to be vaccinated they show a serious danger to people's health by creating a fake pandemic full of false information (79–84).

4.9 Limitations

To answer all of the questions that arise when it comes to how to fight the COVID-19 pandemic and how to deal with all somatic and mental health complications that arise more scientific knowledge is needed. Luckily, every day new scientific information is published and the picture of COVID-19 is getting bigger. Apart from more needed knowledge and research this section should make aware that also our original research had its limitations. The study population was limited and a better spread of age groups and also ethnic groups may have been beneficial, so all the results need to be read in account with those limitation. Fear and mental health issues in general play an important role in the COVID-19 pandemic. Both are very complex, so it is essential to do more research on those topics. Moreover, as the study was planned not much about biomarkers and somatic factors of the disease COVID-19 was non, this is why the study that this dissertation is based on focused mainly on the psychological and social factors of a biopsychosocial model. As biological factors and biomarkers are important for understanding a complete biopsychosocial model, further research in this area is necessary. Considering the return rate there was a higher rate in female participants, which resulted in a not equally balanced gender difference in return rates. A certain bias may be seen in the geographical and spread, as most participants were living in Central Europe (Austria, Germany).

4.10 Conclusion

The COVID-19 pandemic is a complex construct. Medical issues, psychological issues, political issues – the list is seemingly endless. The world was not prepared for a pandemic like this and yet it is unclear how much we will learn from this pandemic in order to be better prepared for future ones.

Apart from focusing on somatic health issues in the course of the disease COVID-19 medical experts worldwide soon had to learn that there were enormous mental health complications following the new coronavirus. The huge variety of different factors that were discussed here show perfectly how complex this construct of COVID-19 as a pandemic and a threat to people's mental health is. Those mental health problems are directly connected to the SARS-CoV2 virus by being caused by the disease COVID-19 but also indirectly connected to it, as many mental health problems are caused by the pandemic and all of its measures and restrictions. "The outside world and other people became a threat". This changed our thinking, also our way of addressing people. Handshakes are not so in vogue anymore as they used to be. Bodily contact in general felt very strange for a long time for many people and with strangers probably still does for many people. This change in our interpersonal acting and this latent threat to be infected by the SARS-CoV2 virus and thus having to socially isolate definitely had its impact on our psyche as a social being (85–88).

That there is a huge impact on people's mental health is out of question. What is still unanswered is if and how all of those affected people will be provided with help and biopsychosocial support. Researchers must assume that many probably will not be lucky enough to receive the support they would need. This makes it so important to find out who is especially in danger of developing severe mental health issues. For this research we focused on fear, as fear plays an important role in a pandemic with threats around every corner (89).

By detecting predictive factors that will cause severe fear of COVID-19, an important puzzle piece was found to better understand mental health issues caused by the COVID-19 pandemic and also to find better ways to fight those mental health issues. Those factors can identify people who will likely develop severe fear of COVID-19 and thus are in special danger of suffering psychologically. By knowing who those people are it gets easier to identify them and to help them.

All in all we have learned a lot about COVID-19, the pandemic and its impact on mental health. However, at the time of writing the world is in one and a half years after the start of the pandemic and this pandemic is still ongoing. So more knowledge is being collected every

day and many things are yet to be discovered. How this pandemic will be managed is not yet possible to predict. But hopefully scientific findings will have an impact in the fight against the COVID-19 pandemic.

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6. Attachments

Only those questionnaires are attached that are available open-access on the internet (copyright-free) or that were author-compiled. It was not possible to include the other questionnaires due to copyright.

WHO – FRAGEBOGEN ZUM WOHLBEFINDEN

Die folgenden Aussagen betreffen Ihr Wohlbefinden in den letzten zwei Wochen. Bitte markieren Sie bei jeder Aussage die Rubrik, die Ihrer Meinung nach am besten beschreibt, wie Sie sich in den letzten zwei Wochen gefühlt haben.

In den letzten zwei Wochen...	Die ganze Zeit	Meistens	Etwas mehr als die Hälfte der Zeit	Etwas weniger als die Hälfte der Zeit	Ab und zu	Zu keinem Zeitpunkt
... war ich froh und guter Laune	5	4	3	2	1	0
...habe ich mich ruhig und entspannt gefühlt	5	4	3	2	1	0
...habe ich mich energisch und aktiv gefühlt	5	4	3	2	1	0
... habe ich mich beim Aufwachen frisch und ausgeruht gefühlt	5	4	3	2	1	0
... war mein Alltag voller Dinge, die mich interessieren	5	4	3	2	1	0

Version 1.0 vom 27.03.2020

**PatientInnen- bzw. TeilnehmerInneninformation¹ und
Einwilligungserklärung
zur Teilnahme an der klinischen Studie**

Corona, COVID-19 und die Entwicklung von phobischen Krankheitsängsten

Sehr geehrte Teilnehmerin, sehr geehrter Teilnehmer!

Wir laden Sie ein an der oben genannten klinischen Studie teilzunehmen. Die Aufklärung darüber erfolgt in einem ausführlichen ärztlichen Gespräch.

Ihre Teilnahme an dieser klinischen Studie erfolgt freiwillig. Sie können jederzeit ohne Angabe von Gründen aus der Studie ausscheiden. Die Ablehnung der Teilnahme oder ein vorzeitiges Ausscheiden aus dieser Studie hat keine nachteiligen Folgen für Ihre medizinische Betreuung.

Klinische Studien sind notwendig, um verlässliche neue medizinische Forschungsergebnisse zu gewinnen. Unverzichtbare Voraussetzung für die Durchführung einer klinischen Studie ist jedoch, dass Sie Ihr Einverständnis zur Teilnahme an dieser klinischen Studie schriftlich erklären. Bitte lesen Sie den folgenden Text als Ergänzung zum Informationsgespräch mit Ihrem Arzt sorgfältig durch und zögern Sie nicht Fragen zu stellen.

Bitte unterschreiben Sie die Einwilligungserklärung nur,

- wenn Sie Art und Ablauf der klinischen Studie vollständig verstanden haben,
- wenn Sie bereit sind, der Teilnahme zuzustimmen und
- wenn Sie sich über Ihre Rechte als Teilnehmer an dieser klinischen Studie im Klaren sind.

Zu dieser klinischen Studie sowie zur Patienteninformation und Einwilligungserklärung wurde von der zuständigen Ethikkommission eine befürwortende Stellungnahme abgegeben.

1. Was ist der Zweck der klinischen Studie?

Die Coronakrise hat die Welt fest im Griff. Seit dem Ausbruch eines neuartigen Coronavirusstammes im Dezember 2019 sieht sich die Welt mit einer neuartigen, durch diesen Virus hervorgerufenen Erkrankung namens COVID19 konfrontiert. In dieser

¹ Wegen der besseren Lesbarkeit wird im weiteren Text zum Teil auf die gleichzeitige Verwendung weiblicher und männlicher Personenbegriffe verzichtet. Gemeint und angesprochen sind – sofern zutreffend – immer beide Geschlechter.

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Untersuchung werden die durch Corona hervorgerufenen Ängste und Befürchtungen mittels Fragebögen erhoben. Angst vor Corona ist eine natürliche, nachvollziehbare Reaktion. Diese Angst kann manchmal jedoch auch übergroß werden und dann die Lebensqualität der Betroffenen stark einschränken. Zur Einordnung der spezifischen Ängste vor Corona werden mit Fragebögen die persönliche Angstneigung, die generelle Ängstlichkeit vor Erkrankungen, die generelle Angst in anderen Angst auslösenden Situationen und die Stimmung untersucht. Auch erhoben werden aktuelle und frühere körperliche und seelische Erkrankungen, die dzt. Lebenssituation unter Corona und die soziale Unterstützung. Im Rahmen dieser Befragung werden verschiedene Bevölkerungsgruppen untersucht: 1.) ÄrztInnen, 2.) Pflegepersonal, 3.) ambulante und stationäre Krankenhauspatienten ohne COVID-19 Infektion mit internistischen Grunderkrankungen, 4.) ambulante und stationäre Krankenhauspatienten mit psychischen Erkrankungen 5.) Allgemeinbevölkerung. Darüber soll der Einfluss künftiger Therapien oder Impfmöglichkeiten gegen Corona auf das Angstepfinden untersucht werden. Sollte daher ein Impfstoff gegen Corona verfügbar werden, werden Sie erneut gebeten dieselben Fragebögen auszufüllen, um die Veränderung des Angstepfindens wissenschaftlich untersuchen zu können.

2. Wie läuft die klinische Studie ab?

Folgende Maßnahmen werden ausschließlich aus Studiengründen durchgeführt:

Diese klinische Studie wird in Zusammenarbeit der Universitätsklinik für Innere Medizin/LKH Graz und der Universitätsklinik für Psychiatrie und psychotherapeutische Medizin/ LKH Graz durchgeführt. Es werden insgesamt ungefähr 1000 Personen daran teilnehmen.

Mit Fragebögen werden die Angst vor Corona, die persönliche Angstneigung, die generelle Ängstlichkeit vor Erkrankungen, die generelle Angst in anderen Angst auslösenden Situationen, die Stimmung und die empfundene soziale Unterstützung erfragt. Auch erhoben werden aktuelle und frühere körperliche und seelische Erkrankungen und die dzt. Lebenssituation unter Corona.

Ihre Teilnahme an dieser klinischen Studie ist 2 x erforderlich. Nach der ersten Befragung werden Sie, sobald ein Impfstoff gegen Corona verfügbar wird, ein zweites Mal gebeten werden dieselben Fragebögen noch einmal auszufüllen, um die Veränderung des Angstepfindens wissenschaftlich untersuchen zu können. Bei jeder Teilnahme sind 7 Fragebögen auszufüllen und die Bearbeitungszeit beträgt jeweils circa 30 Minuten.

Für die zweite Befragung werden Ihnen die Fragebögen mit der Post zugesandt und Sie können diese Fragebögen dann zu Hause ausfüllen und auf postalischem Weg an die Studienleitung zurücksenden.

Betrifft die teilnehmenden Gruppen der PatientInnen: Ihre Behandlung wird durch die Studie nicht verändert.

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3. Worin liegt der Nutzen einer Teilnahme an der klinischen Studie?

Es ist möglich, dass Sie durch Ihre Teilnahme an dieser klinischen Studie keinen direkten Nutzen für Ihre Gesundheit ziehen. Erkenntnisse dieser Studie werden aber wertvolle Informationen bzgl. der Entstehungsbedingungen von Angst vor Infektionserkrankungen liefern. Diese Erkenntnisse können so möglicherweise mithilfe Therapieprogramme für künftige ähnliche Situationen zur Milderung von Angst zu entwickeln.

4. Gibt es Risiken, Beschwerden und Begleiterscheinungen?

Bis auf den zeitlichen Aufwand durch das zweimalige Ausfüllen der Fragebögen von jeweils circa 30 Minuten ist von keinen negativen Begleiterscheinungen auszugehen.

5. Zusätzliche Einnahme von Arzneimitteln?

Im Rahmen dieser Studie ist keine zusätzliche Einnahme von Medikamenten vorgesehen.

6. Hat die Teilnahme an der klinischen Studie sonstige Auswirkungen auf die Lebensführung und welche Verpflichtungen ergeben sich daraus?

Eine Teilnahme hat keine Auswirkungen auf Ihre Lebensführung.

7. Was ist zu tun beim Auftreten von seelischen Begleiterscheinungen?

Sollten im Verlauf der klinischen Studie übermäßige Gefühle von Angst vor Corona auftreten können Sie den Studienarzt und seine Mitarbeiter unter [REDACTED] bzw. die Ambulanz [REDACTED] Medizin unter [REDACTED] kontaktieren.

8. Wann wird die klinische Studie vorzeitig beendet?

Sie können jederzeit auch ohne Angabe von Gründen Ihre Teilnahmebereitschaft widerrufen und aus der klinischen Studie ausscheiden.

Betrifft die teilnehmenden Gruppen der PatientInnen: Ein Ausscheiden aus der Studie führt zu keinerlei Nachteilen für Ihre weitere medizinische Betreuung!

Ihr Studienarzt wird Sie über alle neuen Erkenntnisse, die in Bezug auf diese klinische Studie bekannt werden und für Sie wesentlich werden könnten, umgehend informieren. Auf dieser Basis können Sie dann Ihre Entscheidung zur **weiteren** Teilnahme an dieser klinischen Studie neu überdenken.

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Es ist aber auch möglich, dass Ihr Studienarzt entscheidet, Ihre Teilnahme an der klinischen Studie vorzeitig zu beenden, ohne vorher Ihr Einverständnis einzuholen. Die Gründe hierfür können sein:

- a) Sie können den Erfordernissen der klinischen Studie nicht entsprechen.
- b) Ihr Studienarzt hat den Eindruck, dass eine weitere Teilnahme an der klinischen Studie nicht in Ihrem Interesse ist.

9. Datenschutz

Bei den Daten, die über Sie im Rahmen dieser klinischen Studie erhoben und verarbeitet werden, ist grundsätzlich zu unterscheiden zwischen

- 1) jenen personenbezogenen Daten, anhand derer Sie direkt identifizierbar sind (z.B. Name, Geburtsdatum, Adresse, Bildaufnahmen...),
- 2) pseudonymisierten (verschlüsselten) personenbezogenen Daten, bei denen alle Informationen, die direkte Rückschlüsse auf Ihre Identität zulassen, durch einen Code (z. B. eine Zahl) ersetzt bzw. (z.B. im Fall von Bildaufnahmen) unkenntlich gemacht werden. Dies bewirkt, dass die Daten ohne Hinzuziehung zusätzlicher Informationen und ohne unverhältnismäßig großen Aufwand nicht mehr Ihrer Person zugeordnet werden können und
- 3) anonymisierten Daten, bei denen eine Rückführung auf Ihre Person nicht mehr möglich ist.

Der Code zur Verschlüsselung wird von den verschlüsselten Datensätzen streng getrennt und nur an Ihrem Prüfzentrum aufbewahrt.

Zugang zu Ihren nicht verschlüsselten Daten haben der Prüfarzt und andere Mitarbeiter des Studienzentrums, die an der klinischen Studie oder Ihrer medizinischen Versorgung mitwirken. Die Daten sind gegen unbefugten Zugriff geschützt. Zusätzlich können Beauftragte von in- und/oder ausländischen Gesundheitsbehörden und jeweils zuständige Ethikkommissionen in die nicht verschlüsselten Daten Einsicht nehmen, soweit dies für die Überprüfung der ordnungsgemäßen Durchführung der klinischen Studie notwendig bzw. vorgeschrieben ist.

Auch für etwaige Publikationen werden nur die verschlüsselten oder anonymisierten Daten verwendet.

Sämtliche Personen, die Zugang zu Ihren verschlüsselten und nicht verschlüsselten Daten erhalten, unterliegen im Umgang mit den Daten der Datenschutz-Grundverordnung (DSGVO) sowie den österreichischen Anpassungsvorschriften in der jeweils gültigen Fassung.

Im Rahmen dieser klinischen Studie ist keine Weitergabe von Daten in Länder außerhalb der EU vorgesehen.

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Sie können Ihre Einwilligung zur Erhebung und Verarbeitung Ihrer Daten jederzeit widerrufen. Nach Ihrem Widerruf werden keine weiteren Daten mehr über Sie erhoben. Die bis zum Widerruf erhobenen Daten können allerdings weiter im Rahmen dieser klinischen Studie verwendet werden.

Aufgrund der gesetzlichen Vorgaben haben Sie außerdem, sofern dies nicht die Durchführung der klinischen Studie voraussichtlich unmöglich macht oder ernsthaft beeinträchtigt, das Recht auf Einsicht in die Ihre Person betreffenden Daten und die Möglichkeit der Berichtigung, falls Sie Fehler feststellen.

Sie haben auch das Recht, bei der österreichischen Datenschutzbehörde eine Beschwerde über den Umgang mit Ihren Daten einzubringen (www.dsb.gv.at).

Die voraussichtliche Dauer der klinischen Studie ist bis [REDACTED]. Die Dauer der Speicherung Ihrer Daten über das Ende der klinischen Studie hinaus ist durch Rechtsvorschriften geregelt. Falls Sie Fragen zum Umgang mit Ihren Daten in dieser klinischen Studie haben, wenden Sie sich zunächst an Ihren Prüfarzt. Dieser kann Ihr Anliegen ggf. an die Personen, die beim Sponsor oder am Studienzentrum für den Datenschutz verantwortlich sind, weiterleiten.

Der Datenschutzbeauftragte des Prüfzentrums (Medizinische Universität Graz) ist erreichbar unter [REDACTED]. Der Datenschutzbeauftragte in den Krankenanstalten der KAGEs ist unter [REDACTED] erreichbar.

10. Entstehen für die Teilnehmer Kosten? Gibt es einen Kostenersatz oder eine Vergütung?

Durch Ihre Teilnahme an dieser klinischen Studie entstehen für Sie keine Kosten. Es gibt keinen Reisekostenersatz und keine Vergütung.

11. Möglichkeit zur Diskussion weiterer Fragen

Für weitere Fragen im Zusammenhang mit dieser klinischen Studie stehen Ihnen Ihr Studienarzt und seine Mitarbeiter gern zur Verfügung. Auch Fragen, die Ihre Rechte als Patient und Teilnehmer an dieser klinischen Studie betreffen, werden Ihnen gerne beantwortet.

Name der Kontaktperson: [REDACTED]

Ständig erreichbar unter: [REDACTED]

12. Einwilligungserklärung

Name des Patienten in Druckbuchstaben:

Geb.Datum: Code:

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Ich erkläre mich bereit, an der klinischen Studie **„Corona, COVID-19 und die Entwicklung von phobischen Krankheitsängsten“** teilzunehmen.

Ich bin von Herrn/Frau ausführlich und verständlich über mögliche Belastungen und Risiken sowie über Wesen, Bedeutung und Tragweite der klinischen Studie und die sich für mich daraus ergebenden Anforderungen aufgeklärt worden. Ich habe darüber hinaus den Text dieser Patientenaufklärung und Einwilligungserklärung, die insgesamt 7 Seiten umfasst, gelesen. Aufgetretene Fragen wurden mir vom Studienarzt verständlich und genügend beantwortet. Ich hatte ausreichend Zeit, mich zu entscheiden. Ich habe zurzeit keine weiteren Fragen mehr.

Ich werde den ärztlichen Anordnungen, die für die Durchführung der klinischen Studie erforderlich sind, Folge leisten, behalte mir jedoch das Recht vor, meine freiwillige Mitwirkung jederzeit zu beenden, ohne dass mir daraus Nachteile für meine weitere medizinische Betreuung entstehen.

Beim Umgang der im Rahmen dieser Studie erhobenen Daten werden die Bestimmungen der Datenschutzgrundverordnung und die nationalen Gesetze (DSG, AMG, MPG) beachtet. Alle Personen, die auf Grund ihrer beruflichen Tätigkeit Zugang zu diesen Daten haben, sind - unbeschadet anderer gesetzlicher Verpflichtungen - gemäß Datenschutzgrundverordnung und nationaler Gesetze (DSG, AMG, MPG) an das Datengeheimnis gebunden.

Nach der Datenschutzgrundverordnung und den nationalen Gesetzen (DSG, AMG, MPG) sind „personenbezogene Daten“ Angaben über Studienteilnehmer/-innen, durch die deren Identität bestimmt oder bestimmbar ist. Unter „indirekt personenbezogenen Daten“ verstehen die Datenschutzgrundverordnung und die nationalen Gesetze (DSG, AMG, MPG) Daten, deren Personenbezug derart ist, dass die Identität der Studienteilnehmer/-innen mit rechtlich zulässigen Mitteln nicht ermittelt werden kann.

Ich stimme zu, dass meine im Rahmen und zum Zweck dieser Studie ermittelten personenbezogenen Daten (Name, Anschrift, Alter, Angaben über die Gesundheit,) verarbeitet werden und in indirekt personenbezogener (pseudonymisierter bzw. verschlüsselter) Form durch die Studienmitarbeiter ausgewertet werden.

Mir ist bekannt, dass zur Überprüfung der Richtigkeit der Datenaufzeichnung Beauftragte der zuständigen Behörden und der Ethikkommissionen Einblick in die Daten nehmen dürfen.

Mir ist auch bekannt, dass ich meine Zustimmung zur Datenverwendung ohne Angabe von Gründen und ohne nachteilige Folgen für meine medizinische Behandlung jederzeit widerrufen kann, wobei ein Widerruf grundsätzlich die Unzulässigkeit der weiteren Verwendung der Daten bewirkt, sofern nicht andere gesetzliche Vorschriften oder überwiegende berechnete Interessen die Datenverwendung weiterhin zulässig machen.

Um die Richtigkeit der Datenaufzeichnung zu überprüfen, dürfen zuständige Behörden beim Studienarzt Einblick in meine personenbezogenen Krankheitsdaten nehmen.

Die Bestimmungen des Datenschutzgesetzes in der geltenden Fassung werden eingehalten.

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Eine Kopie dieser Patienteninformation und Einwilligungserklärung habe ich erhalten. Das Original verbleibt beim Studienarzt.

.....
(Datum und Unterschrift der Patientin / des Patienten)

.....
(Datum, Name und Unterschrift des verantwortlichen Arztes)

Fragebogen Ängste in Zusammenhang mit dem Coronavirus/COVID-19

Sehr geehrte Teilnehmerin, sehr geehrter Teilnehmer!

Danke, dass Sie sich die Zeit und Mühe nehmen an dieser Studie teilzunehmen. Ziel dieser Studie ist es, mithilfe von Fragebögen die Entstehung von Angst und Phobien im Zusammenhang mit der Coronavirus/COVID-19-Krise zu untersuchen. Angst vor Corona ist eine natürliche, nachvollziehbare Reaktion. Diese Angst kann manchmal jedoch auch sehr groß werden und dann die Lebensqualität der Betroffenen stark einschränken. Zur Einordnung der spezifischen Ängste vor Corona werden mit Fragebögen die persönlichen Angstneigung, die generelle Ängstlichkeit vor Erkrankungen, die generelle Angst in anderen Angst auslösenden Situationen und die Stimmung untersucht. Auch erhoben werden aktuelle und frühere körperliche und seelische Erkrankungen, die derzeitige Lebenssituation unter Corona und die soziale Unterstützung.

Ein besseres Verständnis der Ängste könnte künftig auch effektivere Präventionsmaßnahmen ermöglichen. Die Auswertung erfolgt selbstverständlich absolut anonym. Eine Teilnahme basiert auf freiwilliger Basis. Um eine bessere Auswertung zu ermöglichen, erfolgt einmalig zum Zeitpunkt der Aufnahme eine Dokumentation soziodemographischer Merkmale (Geschlecht, Alter, Familienstand, höchster Schulabschluss, beruflicher Status etc.) in einem gesonderten Fragebogen.

Sollte ein Impfstoff gegen COVID-19 entwickelt und verfügbar werden, werden wir Ihnen noch einmal die gleichen Fragebögen zur Beantwortung vorlegen, um Veränderungen im Angstverhalten einordnen zu können.

Um die Anonymisierung zu wahren, aber dennoch eine Verbindung der Fragebögen vor dem eventuellen Vorhandensein eines Impfstoffs gegen Corona/COVID-19 und nach der Verfügbarkeit eines solchen Impfstoffs herstellen zu können, bitten wir Sie ein für Sie persönliches Kennwort festzulegen. Unsere Empfehlung wäre: **Geburtsdatum der Mutter** (Im Format dd/mm/yyyy) **plus erster Buchstabe der Straße in der Sie wohnen** – Beispiel: 10.07.1959A

(Für unser Beispielkennwort wird es einen Hinweis in der zweiten Befragungsrunde geben)

Ihr persönliches Kennwort: _____

Bitte kreuzen Sie die zutreffende Spalte an

Kontakt mit einer COVID 19 positiven Person	Gar nicht	1-10min	10-30min	30-60min	über 60min
Wenn Sie in den letzten Monaten nahen Kontakt mit einer COVID19 positiven Person hatten, wie lange hat dieser Kontakt in etwa gedauert?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sportliche Betätigung während der Coronakrise	Gar nicht	1-10min	10-30min	30-60min	über 60min
Wie lange haben Sie in der letzten Woche täglich im Schnitt mit Sport verbracht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wieviel Zeit haben Sie in der letzten Woche im Schnitt pro Tag außerhalb der Wohnung mit Gehen/Spazieren verbracht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Nachrichten über Corona	Trifft absolut zu	Trifft eher zu	Kein Einfluss	Trifft eher nicht zu	Trifft absolut nicht zu
Mein Nachrichtenkonsum zum Thema Coronavirus hat sich durch die Krise vermehrt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Der Konsum von Nachrichten zum Thema Coronavirus hat meine Sorgen bezüglich Corona verstärkt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Zeitliche Angaben zum Konsum von Nachrichten	Gar nicht	1-10min	10-30min	30-60min	über 60min
Wieviel Zeit haben Sie täglich mit Nachrichten/Recherche zum Thema COVID19 im Internet im Schnitt verbracht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wieviel Zeit haben Sie täglich mit Nachrichten zum Thema COVID19 im TV/Radio im Schnitt verbracht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wieviel Zeit haben Sie täglich mit Nachrichten zum Thema COVID19 in Printmedien (Zeitung/Zeitschriften) im Schnitt verbracht?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Fragen zu Risikofaktoren	Ja	Nein
Leiden Sie an Asthma?	<input type="checkbox"/>	<input type="checkbox"/>
Leiden Sie an Herz-Kreislauferkrankungen?	<input type="checkbox"/>	<input type="checkbox"/>
Ist ihr Alter über 65?	<input type="checkbox"/>	<input type="checkbox"/>
Leiden Sie an einer Autoimmunerkrankung?	<input type="checkbox"/>	<input type="checkbox"/>
Leiden Sie an Übergewicht?	<input type="checkbox"/>	<input type="checkbox"/>
Haben Sie eine onkologische Erkrankung (Krebs)?	<input type="checkbox"/>	<input type="checkbox"/>
Nehmen Sie Medikamente die ihr Immunsystem beeinträchtigen?	<input type="checkbox"/>	<input type="checkbox"/>
Haben sie in ihrem engen Verwandtenkreis Personen die zur Risikogruppe gehören?	<input type="checkbox"/>	<input type="checkbox"/>
Hat Sie das Vorhandensein von Risikofaktoren bei Ihnen oder ihnen nahestehenden Verwandten in ihren Handlungen während der Krise beeinflusst?	<input type="checkbox"/>	<input type="checkbox"/>
Leiden Sie an einer Lebererkrankung?	<input type="checkbox"/>	<input type="checkbox"/>

Meidung sozialer Kontakte	Trifft absolut zu	Trifft eher zu	Kein Einfluss	Trifft eher nicht zu	Trifft absolut nicht zu
Die Ausgangsbeschränkungen/die Selbstisolation war sehr belastend für mich.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aufgrund von Corona habe ich versucht, so gut es geht den Kontakt zu anderen Menschen zu meiden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Haben Sie gelegentlich eine HandyAPP verwendet (Tracking), um Kontakte mit COVID-19-Infizierten anzuzeigen?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Soziale Medien	0-1	1-2	2-3	3-4	4+
Wieviele verschiedenen soziale Medien nutzen Sie? (WhatsAPP, Instagram, Facebook, Pinterest, TikTok, Snapchat o.ä.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wieviele Stunden pro Tag nutzten Sie im Schnitt soziale Medien während der Coronakrise? (Angabe in Stunden)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Nutzen Sie folgende soziale Medien?	Ja	Nein
Facebook	<input type="checkbox"/>	<input type="checkbox"/>
Instagram	<input type="checkbox"/>	<input type="checkbox"/>
Whatsapp	<input type="checkbox"/>	<input type="checkbox"/>
TikTok	<input type="checkbox"/>	<input type="checkbox"/>
Pinterest	<input type="checkbox"/>	<input type="checkbox"/>
Snapchat	<input type="checkbox"/>	<input type="checkbox"/>
Youtube	<input type="checkbox"/>	<input type="checkbox"/>

	Trifft absolut zu	Trifft eher zu	Kein Einfluss	Trifft eher nicht zu	Trifft absolut nicht zu
Der Einfluss von sozialen Medien hatte einen großen Einfluss auf meine Einstellung in Bezug auf die Coronakrise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Onlineauftritte von Personen mit großer Reichweite („Influencer“) beeindruckten mich und diese Personen beeinflussen mich stark.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Beeinträchtigung der beruflichen Tätigkeit durch Corona					
	Ja	Nein			
Haben Sie durch die Coronakrise Ihren Job verloren/sich arbeitslos melden müssen?	<input type="checkbox"/>	<input type="checkbox"/>			
Haben Sie Kurzarbeit in Anspruch genommen?	<input type="checkbox"/>	<input type="checkbox"/>			
Haben Sie sich vor der Coronakrise an ihrem Arbeitsplatz wohlfühlt?	<input type="checkbox"/>	<input type="checkbox"/>			
Hat Sie die Coronakrise in ihrem Wohlbefinden am Arbeitsplatz beeinträchtigt?	<input type="checkbox"/>	<input type="checkbox"/>			
	Keine	Wenig	Mittel	Stark	Sehr stark
Wie stark waren ihre finanziellen Einbußen durch die Coronakrise?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>