COVID-19-related anxiety predicted by three different psychological behaviors; Health anxiety, Disgust sensitivity and Intolerance of uncertainty.

Sara Ahmad & Vanessa Sved

Örebro universitet

Abstract

The aim of this study was to examine whether three different psychological predictors; Health anxiety (SHAI), Disgust sensitivity (DS-R) and intolerance of uncertainty (IUS-12) could predict COVID-19-related anxiety in students at Orebro University, Sweden. It was hypothesized that there would be a significant relationship between the three psychological behaviors and pandemic-related anxiety. An online survey, consisting of both standardized and non-standardized questionnaires, was constructed. The survey was completed by 199 participants, aged between 19-48 (M = 25.14 and SD = 5.35) from Orebro University, Sweden through Limesurvey. A correlation revealed that Health anxiety and Disgust sensitivity were significantly correlated with COVID-19-related anxiety. The regression analysis revealed that there was a significance between the three psychological behaviors and COVID-19-related anxiety. In conclusion, Health anxiety, Disgust sensitivity and intolerance of uncertainty, could indeed be associated with COVID-19-related anxiety in the students.

Keywords: *Health anxiety, Disgust sensitivity, Intolerance of uncertainty, Pandemic, COVID-19*

Supervisor: Martien Schrooten

Psychology III - Bachelor's degree course

Spring term 20

COVID-19-relaterad ångest förutsedd genom tre olika psykologiska beteenden; Health Anxiety, Disgust sensitivity och Intolerance of uncertainty

Sara Ahmad & Vanessa Sved

Örebro Universitet

Sammanfattning

Syftet med studien är att examinera huruvida tre olika psykologiska beteenden; Health anxiety (SHAI), Disgust sensitivity (DS-R) och Intolerance of uncertainty (IUS-12) kan förutse COVID-19-relaterad ångest i studenter på Örebro Universitet. Det hypotiserades att det skulle finnas en signifikant relation baserat på tidigare studier. En online enkät, med både standardiserade och icke-standardiserade frågeformulär, konstruerades. Antal deltagare som kompletterade enkäten genom Limesurvey var 199 studenter mellan åldrarna 19–48 (M = 25.14 och SD = 5.35) från Örebro Universitet. Genom en korrelationsanalys kunde man se att både Health anxiety och Disgust sensitivity var signifikant korrelerade med COVID-19-relaterad Pandemi. Avslutningsvis, en multipel regressionsanalys visade att Health anxiety, Disgust sensitivity och Intolerance of uncertainty var signifikant relaterat med COVID-19-relaterad ångest i studenterna.

Nyckelord: *Health anxiety, Disgust sensitivity, Intolerance of uncertainty, Pandemi, COVID-19*

Handledare: Martien Schrooten

Psykologi III - Kandidatkurs

VT20

COVID-19-Related Anxiety Predicted by Three Different Psychological Behaviors

Coronavirus disease (COVID-19), is according to World Health Organization (World Health Organization [WHO], 2011), a highly infectious disease that was first detected December 2019 in Wuhan city, Hubei province, China (Global Infectious Diseases and Epidemiology network [GIDEON], 1992). At the beginning of the outbreak, all of those who were infected had been exposed to a seafood market. This infection was declared a pandemic by WHO early march, 2019. Clinical findings have reported that cough, respiratory distress and pneumonia are the most common cases associated with the infection. In some cases, health problems such as vomiting, diarrhea and rhinorrhea have been reported. Majority of those who become infected will eventually recover without any treatment, however those who are of an older age or those with other diseases such as diabetes or respiratory problems, have higher risks of developing more severe symptoms (WHO, 2011). The fatality rate in COVID-19 is lower compared to the fatality rate of SARS. (Gideon, 1992).

According to the Public Health Agency of Sweden (2015), it was decided that neither towns nor cities in Sweden are going to be put into lockdown (Public Health Agency of Sweden, 2015). Comparatively to other countries, there are recommended hygiene practices that should be followed in order to minimize the risk of spreading the infection to others (Public Health Agency of Sweden, 2015). Safety behaviors such as, maintaining good physical distance, refraining from travel, washing your hands for at least 20 seconds and to avoid touching your face should also be practiced.

Pandemic-related Anxiety

Anxiety disorders are described as concerns about one's future and which can result in avoidance of situations that could be seen as triggering (American psychiatric association [APA], 2013). Thirty percent of almost all adults suffer from anxiety at least once in their lives. Compared to regular emotions of anxiety and nervosity those who suffer from anxiety disorders

tend to feel elevated levels of anxiety and fear. Anxiety involves both somatic and cognitive symptoms. For example, individuals might experience feelings of pain due to not being able to deal with threats (Peter & Bot, 2009) and common responses to these feelings are most likely through acts of denial, ignorance and despair. Furthermore, anxiety is also characterized by the fear of losing control and concerns about oneself (Schoen & Holtzer, 2017).

Pandemics, which are adverse life events, have been reported to cause higher levels of anxiety disorders in individuals (Miloyan et al. 2018). Examples on life events that are perceived as adverse are those who cause illnesses or death. Moreover, increased anxiety tends to be an outcome of too much focus on adverse events that might occur in the future. Thus, speculations of becoming infected with COVID-19 might make individuals become more anxious. Anxiety in relation to pandemics has also previously been linked to adapting precautious behaviors such as better hygiene and distancing from others (Wheaton et al. 2012). It is explained to be caused by too much worrying which is linked to anxiety. Furthermore, those who in general suffer from anxiety might apply extreme safety behaviors in order to reduce the risk of becoming infected compared to others (Brand et al. 2013).

Excessive media coverage can result in both positive behaviors, such as being more careful with hygiene to minimize the spread of the infection, and negative behaviors, such as avoidance and fear (Wheaton et al. 2012). Media coverage can also lead to information being spread more rapidly on the internet thus more people getting information about the current situation. One major problem with media in relation to pandemics is that individuals who are healthy to begin with may assume that they are infected as a result of over analyzing signals, such as dizziness, which in turn can cause higher anxiety.

Past Research on Predictors of Pandemic-related Anxiety

Health anxiety, disgust sensitivity and intolerance of uncertainty are all psychological behaviors that has been used in previous research to predict past pandemic-related anxieties

(Wheaton et al 2012; Taha, Matheson & Cronin et al. 2014). Therefore, an assumption that COVID-19-related anxiety can be predicted by these psychological factors can be made. This is also the reason to why including these three predictors is both appropriate and important in order to examine anxiety levels related to COVID-19. This is still a relatively new infection which means that there are not many studies written about how these behaviors can predict COVID-19-related anxiety. Hence, majority of the previous studies on pandemic-related anxiety that will be mentioned throughout this study are going to be based on pandemics that has occurred in the past, for example, H1N1 and SARS, but also illnesses in general.

Health anxiety is characterized as perceiving one's own health worse than what it is in reality, in other words, they believe that they are more ill than what they actually are (Blakey & Abramowitz, 2017). These beliefs cause the person to be distressed and anxious. Disgust is an emotion which is characterized by both evasion from situations and patterns of withdrawal, and the main function of this emotion is to assure that the individual is kept distant from all kinds of contamination risks (Deacon & Olatunji, 2007). Intolerance of uncertainty is characterized by how much an individual is able to tolerate situations that they perceive as ambiguous (Taha, Matheson & Cronin et al. 2014). This predictor has, in previous studies, been linked to increased levels of anxiety and worry. The authors explained that intolerance of uncertainty is a central predictor to how an individual might judge a situation that could be threatening and how to handle it.

Health anxiety and disgust sensitivity

Both health anxiety and disgust sensitivity has been mentioned through past research, be predictors of pandemic-related anxiety. For example, the findings, of one study, suggested that both health anxiety and disgust sensitivity were significant predictors to H1N1-related anxiety (Wheaton et al. 2012). The authors explained that increased levels of health anxiety in this case was probably due to the amount of information in relation to the outbreak. Too much media

exposure can result in individuals perceiving the risk of becoming infected greater than it actually is. Findings about disgust sensitivity can be seen in another study which states that higher levels of disgust sensitivity in individuals was associated with higher levels of pandemic related fears (Deacon & Olatunji, 2007). Responses to disgust tend to be high in contamination-related anxiety disorders which are explained to reflect both fear and anxiety emotions. Another article concluded that health-related anxiety was significantly associated with disgust sensitivity and the authors explained that when individuals become exposed to health risk-induced stimuli they tend to experience higher levels of anxiety (Fan & Olatunji, 2013).

In a study about health anxiety it was reported that one of the subscales in the short version of the health anxiety inventory (SHAI); *Illness likelihood,* was significantly predicted by *the responsibility/threat estimation* subscale (Wheaton et al. 2010). Similarly, to anxiety disorders, health anxiety was explained to also be characterized by the emotions of fear and anxiety regarding threatening situations. Furthermore, concern in relation to imagining future illnesses was significantly associated with health anxiety in an article about illness-related future thinking (Sansom-Daly et al. 2014). Health anxiety was also concluded to be significantly associated with irrational beliefs about health. It was explained that those who have higher levels of health anxiety tend to have dysfunctional beliefs about illnesses where they assume that the illnesses are more common than they in reality are (Fulton et al. 2010). However, there are also contradicting results about health anxiety which was found in a study about the Zika virus which had its outbreak between 2015 and 2016. It was reported that health anxiety was not a predictor of Zika-related anxiety (Blakey & Abramowitz, 2017) The authors suggest that the results could be due to the Zika virus being a discrete virus unlike other virus outbreaks such as H1N1 and SARS.

Intolerance of uncertainty

According to a past study, Intolerance of Uncertainty predicted anxiety in the participants during the peak of the H1N1 pandemic (Taha, Matheson & Cronin et al. 2014). Findings showed that lower levels of control and coping resulted in higher levels of pandemic-related anxiety. High levels of anxiety are, according to the authors, consequences of both threatening situations and high levels of intolerance of uncertainty. In another study about the swine-flu pandemic, elevated levels of anxiety were associated with higher levels of intolerance of uncertainty in situations that were deemed stressful or less controllable (Taha et al. 2014). Intolerance of uncertainty was also reported to act as a moderator in an article that examined the relationship between the variables Health anxiety and Catastrophic health appraisals (Fergus & Valentiner, 2011). The authors concluded that health anxiety was significantly associated with Catastrophic health appraisals only when the level of intolerance of uncertainty was elevated.

Aim and Purpose

The primary aim of this study is to examine whether the predictors; Health anxiety, Disgust sensitivity and Intolerance of Uncertainty, can predict COVID-19-related anxiety in students at Orebro University. Based on previous research on how pandemic-related anxiety is related to the psychological factors there is a strong possibility that COVID-19-related anxiety can also be predicted by the same predictors. This paper is going to be an extension of a previous study made on the swine flu pandemic that occurred 2009. (Wheaton et al. 2012).

The hypothesis for this paper is that there is a relation between the psychological factors and COVID-19-related anxiety. The research question that is going to be explored through this study is; *Is COVID-19-related anxiety associated with more health anxiety, intolerance of uncertainty, and disgust sensitivity among Swedish university students?*

Method

Cross-sectional correlational questionnaire survey design

This study was conducted with a quantitative method because the questionnaires, both standardized and unstandardized, were used to measure the different variables. The independent variables were intolerance of uncertainty, health anxiety and disgust sensitivity and the dependent variable was COVID-19-related anxiety.

Participants

The participants were recruited through a Facebook group "Dom kallar oss studenter" (16 338 members) that belongs to Orebro University. Participation was voluntary and based on informed consent. By using Facebook groups, the participants could choose whether they wanted to participate in the study or not. There was no set age-limit and all genders could participate. Those who reported being non-students were excluded. Of the initial sample (n = 525), only the completed surveys (n = 235) were used in the analysis. In addition to that, 36 participants were removed because of not fulfilling the inclusion criteria which were that they had to be at least 18 years of age and also be students. The final sample size consisted of 199 students, aged 19-48 and consisted of 156 (78.39 %) women and 43 (21.61%) men. The mean age was 25.14 years old (SD = 5.35).

Ethical considerations

All ethical requirements of the Department of Psychology at Orebro University were fulfilled. This study implemented all four main principles required; information, consent, confidentiality and utilization in order for this study to be ethical (Vetenskapsrådet, 2002). Information about the four main principles was given to the participants at the start of the questionnaire. For example, the participants were provided with information about the survey before giving consent and they were also told that some of the questions were sensitive. The participants were also given information about the purpose of the study, that the participation was voluntary and that they could end the survey at any moment without any consequences. They were informed that the data would be presented at a group level only and that all the answers

would be both anonymous and treated with confidentiality. If they chose to quit the survey, their answers would not be used. Beside demographic questions about age, gender and whether or not they were student, no other information was collected that could identify individual participants.

Measures

The self-report measures that were included in the online survey are three standardized questionnaires; short health anxiety inventory (SHAI), disgust scale-revised (DS-R) and short version of intolerance of uncertainty scale (IUS-12) furthermore, non-standardized questionnaire, COVID-19 inventory which is based on a swine flu inventory scale was included. The purpose of the measures was to see whether health anxiety, disgust sensitivity and intolerance of uncertainty in the students could predict COVID-19-related anxiety. English versions of all measures were used. Four demographic questions were asked at the beginning of the survey; age, gender, educational status and also whether they worked alongside their studies or not.

The first measure in the online survey, after the demographic questions was the COVID-19 inventory in order to make them base their thoughts around the COVID-19 situation and how they have perceived things the past two weeks in relation to it. After the COVID-19 inventory, the rest of the measures were arranged in this order; Short version of health anxiety (SHAI), Short version of Intolerance of Uncertainty (IUS) and last Disgust scale-revised (DS-R). Due to the length of the complete survey (around 10-15 minutes), disgust scale-revised was put last as it might stimulate the most interest from participants and motivate them to complete the survey.

COVID-19 Inventory

The swine flu inventory (SFI) is a 10-item scale that was developed by Wheaton et al. (2012) in order to evaluate the concerns of the participants about the spread of the virus and their thoughts on the likelihood of them or others becoming infected ($\alpha = .85$). In order to measure the aim of this particular paper, the SFI scale was reformulated into a COVID-19 inventory scale.

The words swine flu and US in all of the items were changed into COVID-19 and Sweden respectively.

The participants were asked to base their answer around their past two weeks. A five-point scale ranging from *very little* (0) to *very much* (5) was used, with a total scale score of 50. Examples on questions from the inventory are "If you did become infected with COVID-19, to what extent are you concerned that you will be severely ill?" and "How likely is it that someone you know could become infected with COVID-19?".

It was decided that Item 6 "How much exposure have you had to information about COVID-19?" in the scale was not going to be included in the computed total score and also excluded from all the analyses. The authors who created this scale, Wheaton et al. (2012), discovered that the internal consistency was much lower when it was included in the analysis and the same conclusion was made based on this papers' internal consistency. For the remaining nine items, the total score changed from a total score of 50 to a total of 45 and the sample had an acceptable Cronbach's alpha of .694.

Short Health Anxiety Inventory (SHAI)

SHAI is a self-report questionnaire that consist of 18 questions with a total score of 54, which aims to examine health anxiety in individuals by measuring concern about one's perceived health, overall bodily sensations and fear of illness (Salkovskis et al. 2002). The questions have a scale ranging from 0 to 3 with the statements such as; *I do not worry about my health*, *I occasionally worry about my health* to *I spend most of my time worrying about my health.* Example on questions were "ability to resist though of illness", "picturing self-being ill" and "relieved if doctor says nothing is wrong". The Cronbach's alpha value for this sample was .854 which means that it is very reliable.

Disgust scale-revised (DS-R)

Disgust scale-revised (DS-R) is a scale that consist of 27 questions that aims to measure stimuli that can evoke feelings of disgust in relation to things such as food, animals, body products, death (Olatunji et al. 2007). The revised scale contains 13 true or false questions (scored 0 or 1) where three of the questions are reversed and 14 questions with a three-point scale to determine whether the participants perceived the items as *not disgusting at all*, *slightly disgusting* or *very disgusting* (scored 0, 0.5 or 1). The maximum total score for this scale is 27. The subscale with true or false questions contained statements such as; "It would bother me tremendously to touch a dead body", "I would go out of my way to avoid walking through a graveyard" and "It would not upset me at all to watch a person with a glass eye take the eye out of the eye socket". The items with the three point subscale had questions such as; "You see bowel movement left unflushed in a public bathroom", "Your friend's pet cat dies and you have to pick up the dead body with your bare hands" and "You are about to drink a glass of milk when you smell it is spoiled".

The first subscale was excluded due to low internal consistency. The subscales were at first combined and together a Cronbach's alpha of .1 was obtained. Because of this, the two subscales were measured separately. The second subscale generated a Cronbach's alpha above the acceptable range whilst the first subscale generated a Cronbach's alpha extremely below the acceptable range which is why it was excluded from the latter analyses. Cronbach's Alpha for the second subscale in this sample was .770.

The short version of the Intolerance of Uncertainty scale (IUS-12)

The short version of the intolerance of uncertainty scale is a two factor 12-item measure where the two factors are inhibitory IU and prospective IU. The aim of this scale is to measure the level of intolerance of uncertainty. (Botessi et al. 2019). In IUS-12, the questions are measured on a scale ranging from 1 to 5 where 1 is *Not true at all* and 5 is *Always true* with a total score of 60. The scale contains Questions such as; "Unforeseen events upsets me greatly", "I

always want to know what the future has in store for me" and "I should be able to organize everything in advance". The Cronbach's alpha for IUS-12 in this sample was .893.

Procedure

An online survey was designed through an online tool called LimeSurvey. At the beginning of the survey, the participants received general information about what was going to be examined, information about COVID-19 and also information about the ethical considerations and what they mean. They were informed that they could end the survey at any time without consequences and that their answers would not be included in the analysis if they did. They also received information about the amount of questions (80 question) in the survey and how long it would approximately take to complete (10-15 minutes). The participants were asked about their, age, gender, educational status and if they were working alongside studies their studies. There was no time limit on the survey and participants could take a break and continue at a later time point if they wished but they could not skip any questions while completing the questionnaire. They could not go back to the previous measure if it had already been already answered. The survey was introduced through the Facebook group "Dom kallar oss studenter" on 6th of April 2020 and was closed on 10th of May 2020. During this time the survey was posted several times in order to attract more students to participate in the study. Data for the current study was extracted on the 10th of May 2020.

Statistical analyses

To analyze the responses from the participants that completed the survey a statistical software, called IBM Statistical Package for Social Sciences (SPSS), was used. The descriptive, such as gender, age and educational status were analyzed first. Some of the individuals that participated were not students, therefore, select file was used to exclude them from all future analysis. None of the scales violated assumptions of normality, through testing homoscedasticity, results showed that the items were normally distributed. Furthermore, no multicollinearity was

detected thus VIF values were on the low spectrum. Skewness and kurtosis of the scales in this study were both at acceptable scores. The internal consistency was calculated by conducting an analysis for Cronbach's alpha for each one of the four measures. Pearson's correlations were calculated to look at the associations between the COVID-19 measure and the three other measures. After that a regression analysis was conducted where intolerance of uncertainty, disgust and health anxiety were set as the independent variables for COVID-19-related anxiety.

Results

Both a correlational analysis and a multiple regression analysis were conducted in order to examine the aim of this study; can three different psychological behaviors predict COVID-19-related anxiety. The first table, table 1, represents all the relevant descriptives; mean, standard deviation and range, but also Cronbach's alpha which was calculated in order to analyze the internal consistency of all measures.

Table 1

Descriptives for all scales; COVID-19, SHAI, IUS-12 and DS-R

	M	*SD*	Range	α
COVID-19	24.60	5.03	9–35	.693
SHAI	15.55	7.32	3–43	.854
IUS-12	25.77	7.43	11–49	.893
DS-R (2)	7.59	1.93	3–12	.770

Note: COVID-19 Inventory, *SHAI* Short Health Anxiety Inventory, *IUS-12* Intolerance of Uncertainty Short Version, *DS-R (2)* Disgust Sensitivity-Revised (subscale 2).

Zero-order correlations were conducted to see whether there were any associations between the COVID-19 inventory scale and the three predictors, SHAI, IUS-12 and DS-R. As seen in Table 2, both SHAI and DS-R (2) were found to be significantly associated with COVID-19. Furthermore, all predictors significantly correlated with each other. The intolerance of uncertainty scale was not significantly correlated but the *p*-value was at an appropriate level. Hence, it was decided that it could be included in the final regression analysis.

Table 2

Zero-Order Correlations for COVID-19 and the predictors; SHAI, IUS-12 and DS-R

	COVID-19	SHAI	IUS-12	DS-R (2)
COVID-19	1	.32**	.13#	.19**
SHAI	.32**	1	.33**	.24**
IUS-12	.13#	.33**	1	.22**
DS-R (2)	.19**	.24**	.22**	1

Note: *COVID-19* Inventory, *SHAI* Short Health Anxiety Inventory, *IUS-12* Intolerance of Uncertainty Short Version, *DS-R* (2) Disgust Sensitivity-Revised subscale 2.

** $p < .01$.

$.05 < p < .1$.

A multiple regression analysis was conducted, presented in Table 3, in order to see whether the three psychological behaviors could predict COVID-19-related anxiety in the students. Overall, COVID-19-related anxiety was significantly predicted by; Health anxiety, Intolerance of Uncertainty and Disgust sensitivity. Collectively, they accounted for 11.7% ($R^2 = .117$, $p < .001$) of the variance in COVID-19. *P*-values, in table 3, revealed that both SHAI and DS-R were significantly related to COVID-19-related anxiety. IUS-12 was found to fall within

the expected direction due to intolerance of uncertainty being closely related to feelings of worry which is also common in anxiety.

By further looking, the ANOVA test was significant which indicates that at least one of the predictors can explain variance in the COVID-19-related anxiety, $F(3,195) = 8.644$, $p < .001$. Health anxiety uniquely explained 7.2% of the variance in COVID-19-related anxiety and partial correlation revealed that it was the only significant predictor, *Part-R* = .269, p = <.001. DS-R (2) and IUS-12 were not significant predictors on their own. DS-R (2) explained 1.3% of the variance whilst IUS-12 explained less than 1% of the variance. The overlapping variance between the three predictors was 3.2%.

Table 3

Multiple regression analysis COVID-19 and the predictors; SHAI, IUS-12 and DS-R

Variable	R^2	β	p
Final Model	.117		<.001
SHAI		.322	<.001
IUS-12		.134	.059
DS-R (2)		.190	.007

Note: SHAI Short Health Anxiety Inventory, *IUS-12* Intolerance of Uncertainty Short Version, *DS-R* (2) Disgust Sensitivity-Revised subscale 2.

Discussion

The primary aim of this study was to examine whether the predictors; health anxiety, disgust sensitivity and intolerance of uncertainty, could predict COVID-19-related anxiety in students at Orebro University. The research question*; Is COVID-19-related anxiety associated*

with more health anxiety, intolerance of uncertainty, and disgust sensitivity among Swedish university students? was answered by conducting a multiple regression analysis. Prior to any statistical analysis, the authors of this paper hypothesized that the three psychological behaviors would indeed predict COVID-19-related anxiety. The regression analysis revealed that Health anxiety, Intolerance of Uncertainty and Disgust sensitivity were related to COVID-19-related anxiety. Comparable findings have been found in previous research on anxiety in relation to illnesses and past pandemics. This paper is an extension of a paper written by Wheaton et al (2012) and one of our objectives was to see whether comparable findings could be found when applied to a different pandemic such as COVID-19. The paper by Wheaton. et. al (2012) revealed that both health anxiety and disgust sensitivity were significant predictors of Swine flu-related anxiety.

Overall, health anxiety in relation to situations that can be perceived as threatening to one's health, such as illnesses, has been confirmed to cause higher level of anxiety in individuals (Wheaton et al. 2010; Sansom-Daly et al. 2014; Fulton et al. 2010). Health anxious individuals believe that they are more ill than what they actually are which can cause elevated anxiety levels (Blakey, & Abramowitz, 2017), which makes this psychological behavior a suitable predictor in determining COVID-19-related anxiety levels.

Disgust sensitivity is also reasonable predictor in this case because it is mainly an emotion based around making sure that the individual is kept distant from all contamination risks which is a fundamental behavior in threatening situations such as this pandemic (Deacon & Olatunji, 2007). Furthermore, fear of becoming contaminated by a pandemic has been related to higher anxiety levels in individuals who suffer from high disgust sensitivity (Fan & Olatunji, 2013, Deacon & Olatunji, 2007).

Intolerance of uncertainty was not one of the predictors in Wheaton et al.'s (2012) article which inspired this paper, but the authors of this paper included it because previous research has

reported that it could be related to anxiety (Taha, Matheson & Cronin et al. 2014). However, the overall findings from the correlation analysis and multiple regression analysis showed that intolerance of uncertainty was not as strong of a predictor to Pandemic-related anxiety as the other two predictors. According to previous research, individuals who suffer from high levels of intolerance of uncertainty has been found to be associated with elevated levels of both worry and anxiety (Taha et al. 2014 ; Taha, Matheson & Cronin et al. 2014) For example, it was explained that situations that cannot be controlled could result in higher anxiety. COVID-19, which increasing rapidly throughout the world is considered to be a situation that cannot be controlled, thus, high intolerance of uncertainty in individuals might be related to more anxiety. In conclusion, the aim was to see whether COVID-19-related anxiety in students was associated with; health anxiety, disgust sensitivity and intolerance of uncertainty and through this study an association was observed.

Strengths and Limitations

One of the major strengths within this study was the instruments used to assess whether health anxiety, disgust sensitivity and intolerance of uncertainty can possibly predict COVID-19 related anxiety or not. By opting for standardized questionnaires to measure these predictors the construct validity is more likely to be high in comparison to creating a new questionnaire. These questionnaires have been used and tested numerous times before in countless of studies which means that they can be trusted to measure what is intended to be measured. The non-standardized questionnaire SFI was found to have a high reliability in measuring concerns about the swine flu pandemic. In order to measure COVID-19-related anxiety, the SFI scale was reformulated. There is a possible risk where the reliability and validity of the measure could be affected as a consequence, however, the authors speculated that it would be better to reformulate an already existing questionnaire to fit our aim than developing a new one from scratch. This speculation has not been tested so we do not know whether there is a difference in the reliability and validity

or not. The time frame in which this paper was created was also too short to create a completely new questionnaire customized to COVID-19, especially because the aim was to examine anxiety in relation to the outbreak of the pandemic. The authors of this paper assumed that anxiety levels would decrease over time which could yield in different results. Moreover, if a new questionnaire was to be developed a pilot study had to be required in order to see whether it would actually measure what was intended to be measured but the timeframe was restricted. Another strength within this study is that there are no to very few studies, at this point in time that has examined COVID-19-related anxiety in conjunction to the three predictors in the midst of the outbreak.

Although there are some great strengths within this study there are also some limitations that should be considered. One limitation is that there were too few participants taking part in the survey. The number of participants could be due to the selection effects that were used, such the survey being in English, many could have chosen not to participate in the survey based on their comprehension of the English language which could have caused a different result in the end. If the survey was in Swedish, more students would be able to partake in the survey, such as students who are immigrants or students with language disabilities, which could result in a more representative sample. Another selection effect was that the survey was only intended to be answered by students at Orebro University. Assuming that this study was instead conducted in several more universities throughout Sweden the number of participants would increase. Moreover, the results would better represent the students in Sweden. The timeframe in which this study was conducted is one of the main contributions to why there were too few participants and why no age-group was used. If the timeframe was longer, different age-groups would have been looked into in order to see whether the responses would differ. We assume that older individuals, for example, might already suffer from higher anxiety levels and that a pandemic such as COVID-19 might elevate the anxiety levels further.

Albeit these limitations, hopefully, this study can be deemed useful to be used in future research of pandemic-related anxieties during an outbreak as study that can be looked back on for better understanding

Future research and conclusion

A suggestion for future research would be to widen the population to other individuals in the society instead of only using students. By understanding how different individuals might become affected by a pandemic such as COVID-19 in terms of health anxiety, intolerance of uncertainty and disgust sensitivity, it might be easier to implement necessities and precautionary measures in order to protect the individual from elevated levels of these psychological behaviors. The perceptions of those who work in the medical field would be really interesting to examine because they probably have a much higher risks of becoming infected due to working closely with COVID-19 patients which may yield other findings. Medical field workers are expected to work during pandemics which differs compared to students which, in Sweden, could stay at home because the universities decided to switch to digital lectures. We assume that medical field workers would apply more precautious methods to their everyday life because they might feel at a higher risk compared to others. For example, we speculate that if the government would be more prepared to combat pandemics with larger quantities of proper face masks and protective suits for the hospitals, the anxiety levels might not be as elevated in the medical workers.

Another suggestion for future research is to examine gender differences in how pandemic-related anxiety differ between men and women. It would be interesting to see gender differences would compare in threatening situation such as COVID-19.

In conclusion, this paper was initially created to see whether health anxiety, disgust sensitivity and intolerance of uncertainty could predict COVID-19-related anxiety. One of the objectives was to contribute to more information and understanding on how these psychological behaviors behave in situations such as a pandemic that can result in severe illness or death.

Hopefully, the knowledge from this paper can help understanding what precautions measures should be used in order to ensure that pandemic-related anxiety stay at lower levels in the future.

References

American psychiatric association (2013) *Anxiety disorders.* American psychiatric association. https://www.psychiatry.org/patients-families/anxiety-disorders/what-are-anxiety-disorders

Blakey, S. M., & Abramowitz, J. S. (2017). Psychological predictors of health anxiety in response to the zika virus. *J Clin Psychol Med setting, 24,* 270-278. doi:10.1007/s10880-017-9514-y.

Botessi, G., Noventa, S., Freeston, H. M., & Ghisi, M. (2019). Seeking certainty about Intolerance of Uncertainty: Addressing old and new issues through the Intolerance of Uncertainty Scale-Revised. *PLoS One.*14 (2). doi: 10.1371/journal.pone.0211929

Brand, J., McKay, D., Wheaton, M. g., & Abramowitz, J. S. (2013). The relationship between obsessive compulsive beliefs and symptoms, anxiety and disgust sensitivity, and Swine Flu fears. *J Obsessive Compuls Relat Discord, 2,* 200-206. doi: 10.1016/j.jocrd.2013.01.007

Carleton, N., Norton, P. J., & Asmundson, G. J. G. (2007). Fearing the unknown: A short version of the intolerance of uncertainty scale. *Journal of anxiety disorders, 21,* 105-117. doi: doi.org/10.1016/j.janxdis.2006.03.014

Deacon, B., & Olatunji, B. O. (2007). Specificity of disgust sensitivity in the prediction of behavioral avoidance in contamination fear. *Behavior research and therapy, 45,* 2110-2120. doi: 10.1016/j.brat.2007.03.008

Fan, Q., & Olatunji, B. O. (2013). Individual differences in disgust sensitivity and health-related avoidance: Examination of specific associations. *Personality and individual differences,55,* 454-458. doi: 10.1016/j.paid.2013.04.007

Fergus, T. A., & Valentiner, D. P. (2011). relationship between catastrophic health appraisals and health anxiety. *Cognitive Therapy and Research, 35,* 560-565. doi: 10.1007/s10608-011-9392-9

Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning. (Vetenskapsrådet 2002) http://www.codex.vr.se/texts/HSFR.pdf

Fulton, J. J., Marcus, D. K., & Merkey, T. (2010). Irrational health beliefs and health anxiety. *Journal of clinical psychology, 67,* 527-538. doi: 10.1002/jclp.20769

Global Infectious Diseases and Epidemiology network (1992). *Infectious diseases*. Gideon online. https://web.gideononline.com/web/epidemiology/

Helsen, K., Van den Bussche, E., Vlaeyen, J. W. S., & Goubert, L. (2013) Confirmatory factor analysis of the dutch intolerance of uncertainty scale: comparison of the full and short version. *journal of behavior therapy and experimental psychiatry, 44(1),* 21-29. doi: 10.1016.j.jbtep.2012.07.004

Miloyan, B., Bienvenu, O. J., Brilot, B., & Eaton, W. W. (2018). Adverse life events and the onset of anxiety disorders. *Elsevier sciencedirect journals, 259,* 488-492. doi: 10.1016/j.psychres.2017.11.027

Olatunji, B. O., Williams,N. L., Tolin, D. F., Abramowitz, J. S., Sawchuk, C. N., Lohr, J. M., & Elwood, L. S. (2007). The disgust scale: Item analysis, Factor structure, And suggestions for refinement. *Psychol Assess, 19*(3), 281-297. doi: 10.1037/1040-3590.19.3.281.

Peter, E., & Bot, H. (2009). Containing anxiety in the wake of the H1N1 influenza pandemic: documents as sedative agents. *Nursing Inquiry, 16,* 273-274. doi: 10.1111/j.1440-1800.2009.00477.x

Public Health Agency of Sweden (2015). *FAQ about COVID-19.* Folkhälsomyndigheten. http://www.folkhalsomyndigheten.se

Salkovskis, P. M., Rimes, K. A., Warwick, H. M.C., & Clark D. M. (2002). The health anxiety Inventory: development and validation of scales for the measurement of

health anxiety and hypochondriasis. *Psychological Medicine; cambridge, 32*(5), 843-853. doi: 10.1017/S0033291702005822

Sansom-Daly, U. M., Bryant, R. A., Cohn, R. J., & Wakefield C. E. (2014). Imagining the Future in health anxiety: the impact of rumination on the specificity of illness-related memory and future thinking. *Anxiety, Stress & Coping, 27* (5), 587-600). doi: 10.1080/10615806.2014.880111

Schoen, C. B., & Holtzer, R. (2017). Differential Relationships of Somatic and Cognitive Anxiety with Measures of Processing Speed in Older Adults. *Neuropsychol Dev Cogn B Aging Neuropsychol Cogn, 24*(5), 481-495. doi: 10.1080/13825585.2016.1226247

Taha, S., Matheson, K., & Anisman., H. (2014). H1N1 Was Not All That Scary: Uncertainty and Stressor Appraisals Predict Anxiety Related to a Coming Viral Threat. *Stress Health, 30(2),* 149-157. doi: 10.1111/bjhp.12058.

Taha, S., Matheson, K., Cronin, T., & Anisman., H. (2014). Intolerance of uncertainty, appraisals, coping,and anxiety: the case of the 2009 H1N1 pandemic. *British Journal of Health Psychology, 19,* 592-605. doi: 10.1111/bjhp.12058

Wheaton, M. G., Abramowitz, J., & Berman, C. N. (2012). Predictors of Anxiety in Response to the H1N1 (Swine Flu) Pandemic. *Cognitive Therapy and Research, 36,* 210-216. doi*:* 10.1007/s10608-011-9353-3

Wheaton, M. G., Berman, C. N., Franklin, J. C., & Abramowitz, J, (2010). Health Anxiety: Latent Structure and Associations with Anxiety-related Psychological Processes in a Student Sample. *J Psychopathol Behav Assess, 32,* 565-574 doi:10.1007/s10862-010-9179-4

World Health Organization (2011) *Coronavirus disease (COVID-19) Pandemic.* World Health Organization. https://www.who.int