Context-dependent responses to the spread of COVID-19 among national and international students during the first lockdown

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Original Research

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Context-Dependent Responses to the Spread of COVID-19 Among National and International Students During the First Lockdown: An Online Survey

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Abstract

Background: Restrictions to minimize social contact was necessary to prevent the spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus but may have impacted individuals' mental well-being. Emotional responses are modulated by contextual information. Living abroad during the coronavirus disease 2019 (COVID-19) pandemic may have boosted the feeling of isolation as the context is unfamiliar.

Objectives: This study compared the psychological impact of social distancing in national students (living in a familiar context) versus international students (living in an unfamiliar context).

Methods: During March/April 2020 (first lockdown in the Netherlands), 850 university students completed an online survey. Structural equation modeling (SEM) was conducted to compare how students' responses to the virus were predicted by health anxiety, emotional distress, and personal traits.

Results: Compared with national students, international students showed higher levels in 4 identified factors (COVID-19-related worry, perceived risk of infection, distance from possibly contaminated objects, distance from social situations). The factors were mainly predicted by health anxiety across international students, while emotional distress and individual traits (eg, intolerance of uncertainty) played a role across national students.

Conclusions: In the familiar context, individual characteristics (traits) predicted the responses to the virus, while the unfamiliar context drove individuals' health-focused responses. Living in a foreign country is associated with psychological burdens and this should be considered by universities for more pronounced social support and clear references to health-related institutions.

In December 2019, a new virus started spreading from a Chinese province and, within 4 mo reached almost all the countries of the world. The virus in question is called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and causes the coronavirus disease coronavirus disease 019 (COVID-19). Its health consequences could be devastating and potentially deadly for many individuals, especially when no vaccination was available. To prevent the further spread of the virus, many governments worldwide decided to restrict the liberties of their citizens greatly. Citizens were asked to stay home; they were only allowed to leave their houses to buy food or other necessities, while all other non-essential shops were closed, as were all places where individuals would meet and socialize. The permission to visit shops for essential items created a dilemma: while people were being urged to stay home, the availability of shops made it necessary to venture out. This dilemma resulted in both avoidance and hoarding behaviors, where individuals would avoid going to shops as much as possible, but when they did, they would stock up on items in case the restrictions became even more severe. The restrictions taken by the various European countries slightly varied, but in all countries, individuals were asked to keep physical distance and reduce social contacts, which suggested spending more time at home (home-office, remote studying) and being more socially isolated.[1] Most countries even restricted freedom to move almost entirely and ordered temporary school and business closures (lockdown). However, individuals showed a large variability in their compliance with these restrictions.[2,3] Unclear remains whether the individuals' compliance with the restrictions as well as their emotional responses to the virus might be influenced by the degree of familiarity about the rules of the country in which they live.

[1]Please note that we did not consider virtual contact in this study. However, virtual contact has not found as buffer for loneliness[1].

Social isolation and social contact are crucially implicated in the etiology and resiliency of mental disorders, respectively.[4–6] Social connections have been found to buffer against mental health pathologies as they may attenuate the adversity of stressful situations.[6] In contrast, having too few social contacts seems to facilitate the onset of mental health issues or worsen the prognosis after treatments.[5,6] Previous pandemics (Ebola virus, SARS) have been demonstrated to have a deteriorating impact on mental health, especially when associated with strict containment measures.[4] Likewise, the outbreak of the SARS-CoV-2 virus was perceived by many as a very stressful situation, which may have been linked to being isolated, next to the anxiety of contracting the virus[5] Additionally, individuals also greatly differed in their fear of contamination, which was considered a risk factor for intense health and social anxiety.[7] For instance, obsessive-compulsive disorders (OCD), particularly in combination with fear of contamination before the COVID-19 pandemic, were predictive of increased contamination symptomatology during the pandemic.

Mental illness can result from the interaction between biological (eg, genetic) or psychological (eg, personality traits) factors and the aversiveness of the environment.[8] For instance, trait anxiety has been related to a higher risk of developing anxiety disorders or depression.[9,10] In the case of the COVID-19 pandemic, recent studies showed that the first lockdown was associated with a higher prevalence of anxiety[11] and a reduction in mood[12,13] at the population level. However, it is still unclear how the interaction among biological, psychological, and environmental factors may lead to mental illness. There is evidence for certain personality traits' role in mediating how individuals react to environmental changes. Anxious personalities are prone not only to respond to aversive situations more intensely[14] but also to avoid numerous situations which may (or may not) be aversive, and such avoidance is performed rigidly and conservatively.[15,16] The rigid use of avoidance has been implicated in the etiology and maintenance of anxiety disorders as the individual's anxiety toward the situation is strengthened rather than diminished.[15] It is conceivable that such rigid avoidance is due to a chronic search for safety. Anxious individuals often exhibit a reduced ability to recognize safety and, therefore, can feel threatened in many situations.[17] The capacity to identify safety can be further reduced by aversive contexts or stressful situations[18]; as such, these stressful situations elicit even greater avoidance.[19]

Indeed, it has already been shown that individual risk factors such as intolerance of uncertainty[20,21] or concerns for physical symptoms, ie, anxiety sensitivity,[22] were crucially involved in the safety responses to the COVID-19 pandemic. These studies found that concerns for physical health and health anxiety predicted safety responses to the virus (measured by means of questionnaires). In line with this, Taylor and colleagues[23] demonstrated that worries about the dangerousness of the virus were the most important factor mediating the subjective stress associated with the current situation. Furthermore, Concerto and colleagues[13] observed that depressive temperament could worsen the effects of the COVID-19 pandemic on the mental health of young adults. However, the role of intolerance of uncertainty remains unclear as this personality trait did not strongly predict subjective fear of COVID-19 (it was only a trend level, or only in combination with anxiety sensitivity[21]). Together these studies[20,22,23] suggest that fear or anxiety of the virus and symptoms related to obsessive-compulsive disorders were crucial in emotional responses to the SARS-CoV-2 virus.

During 2020, our lives were catapulted into an uncertain and unpredictably threatening situation. This state of uncertainty could have had a particularly profound impact on young people, given that they are naturally in a life phase that is rife with future uncertainties.[24–26] The virus, or the threat it posed, was highly unpredictable due to the inability of humans to identify it with certainty. According to previous research, unpredictable threats lead to a continuous search for safety and a sustained feeling of fear, also defined as anxiety.[27,28] However, a distinction between fear and anxiety does exist; fear has been defined as a response to an imminent and concrete threat, while anxiety is a future-oriented response toward possible but not concrete threats.[27] Based on the unpredictability of the virus, its threat can be perceived as more aversive than an inherently identifiable or tangible threat.[29,30] The responses to such threats can be modulated by contextual information meaning that the context can be informative about the presence and the imminence of the threat.[31–33] In the case of COVID-19 pandemic, national governments provided the necessary guidance to deal with the threat, but individuals demonstrated a great variance in their adherence to such recommendations.[2,3] Moreover, living abroad may be considered as living in an uncertain context as it suggests a reduced knowledge about the host nation's government, greater isolation and less confidence in the situational characteristics.[34] In the stressful and uncertain situation of the pandemic, living aboard seemed to lead to reduced mental health.[35]

This study investigated the role of context, defined as living abroad vs in the country of birth, in the emotional and behavioral responses to the spread of the SARS-CoV-2 virus. It was assumed that individual levels of anxiety, intolerance of uncertainty, and fear of contamination would predict the emotional and behavioral responses to the COVID-19 pandemic and the related lockdown measures. We focused on young adults, differentiating between international and national students. Reasons for selecting young adults are as follows; first, undergraduate students may experience more uncertainty about the situation due to transitioning to a new academic environment and studies suggest that they exhibit a greater incidence of anxiety and depression than the general population.[24,25,36] Second, the brain of young adults may be more vulnerable, especially under circumstances of constant threat and stress.[37,38] Third, international students may have experienced even more uncertainty in the situation as they resided in a foreign country with unfamiliar rules and potentially a different language. Moreover, international students may have experienced greater isolation than national students, given the distance from their families, and often dealing with communication difficulties due to differing time zones.

Methods

Participants

All participants were undergraduate students of the Erasmus University Rotterdam and recruited through an advertisement on an Internet platform (ie, which Internet platform). The study was approved by the Ethics Committee of the Psychology, Education and Child Studies Faculty of the Erasmus University Rotterdam in accordance with the declaration of Helsinki and followed the standards for conducting Web-based surveys (CHERRIES[39]). All participants gave written informed consent. Psychology students received course credits for their participation.

Table 1. Overview of sociodemographic variables and mental health questionnaires, separated for national and international students

	national	*international*	*comparisons*
Gender	459 ♀, 145 ♂	199 ♀, 35 ♂	$\chi(1) = 8.19$, $p = 0.004$
Age (*SD*)	21.53 (3.82)	21.32 (4.09)	$F(1,846) = 0.51$, $p = 0.474$
Questionnaires			
BDI (*SD*)***	10.58 (8.18)	13.49 (9.58)	$F(1,848) = 19.73$, $p < 0.001$
IU (*SD*)***	61.34 (19.52)	67.84 (21.82)	$F(1,848) = 17.84$, $p < 0.001$
STAI X2 (*SD*)***	42.67 (8.67)	45.43 (9.28)	$F(1,820) = 16.70$, $p < 0.001$
STAI X1 (*SD*)***	43.56 (11.23)	49.15 (12.15)	$F(1,848) = 40.66$, $p < 0.001$
ASI (*SD*)*	17.75 (12.57)	20.05 (14.56)	$F(1,848) = 5.22$, $p = 0.023$
SHAI (*SD*)***	15.59 (7.71)	18.61 (9.16)	$F(1,848) = 23.58$, $p < 0.001$
FoC (*SD*)	11.85 (9.08)	13.18 (9.95)	$F(1,848) = 3.52$, $p = 0.061$
BVS (*SD*)***	16.48 (7.42)	19.45 (7.88)	$F(1,845) = 26.46$, $p < 0.001$

One thousand fifty-six individuals filled out the online survey. For the analyses, 205 participants were excluded: 203 participants did not complete the survey, 1 participant took 3 sec to finish the survey (lowest quartile), and 1 participant took over 19 h (the highest quartile) to fill in the survey. One participant completed the survey twice, therefore, we considered only the first submission excluding the second one. For the analyses, we considered 80.49% of these participants meaning that the final sample consisted of 850 participants (658 females, and 12 nonspecified; mean age, 21.47; SD, = 3.89; range, 17-66 y). Approximately one-third of participants ($N = 240$) indicated a nationality other than Dutch and were, therefore, labeled as internationals (for descriptive statistics, see Table 1).

Questionnaires

Emotional and Behavioral Responses to the Covid-Pandemic

COVID-Inventory. To create COVID-related items, we took the Swine Flu Anxiety Items[40] and the Ebola Fear Inventory,[41] adapting the questions to the current situation. In addition, we developed 6 items on avoidance and hoarding behaviors. The items are shown in Table 2 and were rated from 1 (*not at all*) to 5 (*very much*). The Cronbach's alpha for these items is 0.85 (CI 95%: 0.83, 0.87), indicating a relatively good internal consistency.

Individual Risk Factors (Predictors)

Beck Depression Inventory (BDI-II[42]). The BDI-II is a diagnostic tool consisting of 21 items examining the strength of depressive symptoms experienced in the past 2 wk, with response options ranging from 0 (*not experienced*) to 3 (*very strongly*). For each individual, a sum score was calculated across the 21 items, the individual's strength of depressive symptomatology. The Cronbach's alpha of this questionnaire within the current sample is 0.90 (CI 95%: 0.89, 0.91).

Intolerance of Uncertainty Scale (IUS[43]). This questionnaire assesses how individuals perceive aversive uncertain situations, specifically, the behavior, or the feeling in response to an uncertain situation. Participants were asked to evaluate 27 items on a 5-point Likert scale ranging from 1 (*not at all characteristic of me*) to 5 (*highly characteristics of me*). The Cronbach's alpha of the IUS in our sample is 0.95 (CI 95%: 0.95, 0.95).

State-Trait Anxiety Inventory (STAI[44]). This questionnaire includes 2 sub-scales, 1 measuring the anxiety level at the present moment

Table 2. Items for the COVID-inventory

1	To what extent are you concerned about Corona virus?
2	To what extent do you believe that Corona virus could become a "pandemic" in the E.U.?
3	How likely is it that you could become infected with Corona virus?
4	How likely is it that someone you know could become infected with Corona Virus?
5	How quickly do you believe contamination from Corona Virus is spreading in the E.U.?
6	How much exposure have you had to information about Corona virus?
7	If you did become infected with Corona virus, to what extent are you concerned that you will be severely ill?
8	To what extent has the threat of Corona virus influenced your decisions to be around people?
9	To what extent has the threat of Corona virus influenced your travel plans?
10	To what extent has the threat of Corona virus influenced your use of safety behaviors (e.g., hand sanitizer)?
11	I buy more groceries and other etc. when I go grocery shopping
12	I avoid social contacts
13	I avoid physical contact (e.g., giving hands)
14	I try to avoid contact with potential contaminated areas (doorknobs, elevator buttons, etc.)
15	I avoid social activities such as going to restaurants, theaters, cinemas
16	I try to maintain a safety distance to other people

(state), while the other measures anxiety as a stable characteristic of an individual (trait). Both scales consist of 20 items, rated on a 4-point Likert scale from 0 (*not at all*) to 4 (*very much so*). For our sample, Cronbach's alpha for the STAI state is 0.95 (CI 95%: 0.94, 0.95), and 0.87 for the trait STAI (CI 95%: 0.86, 0.88).

Anxiety Sensitivity Inventory (ASI[45]). Anxiety sensitivity is a well-established questionnaire and confirmed personality traits related to the risk for panic attacks. In addition, individuals suffering from panic attacks or at risk for panic disorder are highly sensitive to any physiological changes in their body (eg, increased heart rate or breathing). Therefore, these changes in the physiological responses are interpreted as signs of a possible panic attack or imminent threat. The questionnaire includes 16 items, rated on a 5-point Likert scale ranging from 0 (*very little*) to 4 (*very much*).

The Cronbach's alpha of this questionnaire in our sample is 0.92 (CI 95%: 0.91, 0.92).

Short Health Anxiety Inventory (SHAI[46]). The SHAI is an 18-item self-report measure assessing health anxiety independently of physical health status. The items measure worry about health, awareness of bodily sensations or changes, and feared consequences of having an illness, using a multiple-choice response format ranging from 0 (*no symptoms*) to 3 (*severe*). The SHAI has demonstrated good reliability and validity as a measure of health anxiety in clinical and nonclinical samples.[46,47] The Cronbach's alpha in the current sample is 0.88 (CI 95%: 0.87, 0.90).

Fear of Contamination (FoC[48]). The FoC questionnaire reflects an adapted version of the Padua Inventory of Obsessive-Compulsive Disorder Symptoms.[49] This adapted version distinguishes between obsessive behaviors and worries. As the questionnaire is lengthy and we were not interested in obsessive-compulsive disorders but rather in behaviors mediated by the fear of contamination, only the contamination subscale was administered. This subscale consists of 10 items describing behaviors, and participants had to evaluate how well each item described their behavior on a 5-point Likert scale from 0 (*not at all*) to 4 (*very much*). The Cronbach's alpha of this questionnaire for this sample is 0.90 (CI 95%: 0.89, 0.91).

Body Vigilance Score (BVS[50]). In the BVS, participants were asked to indicate the degree to which they agree with a particular statement regarding attentional focus on bodily sensations on an 11-point Likert scale ranging from 0 (*none*) to 10 (*extreme*). More, specifically, 3 items measure attentional focus, perceived sensitivity to changes in bodily sensations, and the average duration of time spent attending to bodily sensations. A fourth item involves having participants rate their attention to 15 bodily sensations, as defined by the DSM-IV physical symptoms for panic attacks. Responses to the fourth item are averaged to yield a single score and the 4 items are summed up to derive a total BVS score. The Cronbach's alpha of this questionnaire in our sample is 0.93 (CI 95%: 0.92, 0.94).

Analysis Strategy

We first aimed at establishing the best indicators for measuring behavioral responses and emotions during the COVID-19 pandemic. As a first step of determining the factor-structure, Horn's parallel analysis[51] was calculated to determine how many factors need to be considered for the items of the COVID-Inventory. Then, we ran a factor analysis with the number of factors obtained by the parallel analysis to examine which factors fit well and made substantive sense. The R package "paran" was used for the analysis.

Second, Structural Equation Modeling (SEM[52–54]) was used to investigate the structural relations across the factors and questionnaires. In the model, we considered the confirmatory factor analysis (CFA) to define the latent variables for the factors and used these as dependent variables for the simultaneous linear regression. For the regression, the independent variables BDI, IUS, STAI, ASI, SHAI, FoC, and BVS were inserted. Additionally, we calculated the full information maximum likelihood (FILM[55]) to estimate the missing values of 28 participants for the STAI X2 and of 3 participants for the BVS.

The main goal of the study was to test whether the uncertainties related to the spread of the COVID-19 might have a stronger

Table 3. Parallel factor analysis merged for the COVID-Inventory and COVID-Behavior

Factor	Adjusted eigenvalue	Unadjusted eigenvalue	Estimated bias
Social distancing	4.543	4.805	0.262
Perceived risk of infection	0.860	1.071	0.210
COVID-19-related worry	0.323	0.494	0.171
Pandemic	0.119	0.256	0.137
Physical distancing	0.064	0.170	0.106

impact on international students, who are abroad, and, therefore, in a more unpredictable and unknown context, as compared with national students, who live in a more known and possibly predictable context. To this end, we tested the factor structure of our COVID-inventory for measurement-invariance between the 2 groups of students and conducted multi-group analysis based on the SEM model described above to investigate differences between the 2 groups of students. To this purpose, we tested for measurement invariance between the groups, testing for (in order) configural, metric, and scalar invariance. Differences between successive models were tested a using chi-squared (χ^2) test for further details please consider.[52,56] To test the overall fit of the model, we also considered whether the model differed less than 0.010 in comparative fix index (CFI), less than 0.015 in root mean square error approximation (RMSEA), and less than 0.030 in standardized root mean residuals (SRMR).[52,56] For these analyses, the R package "lavaan" was used. The alpha level was set at 0.05 for all the analyses.

Results

Parallel Factor Analysis

The Horn's parallel analysis identified 5 factors. We then ran a factor analysis to identify the underlying constructs and considered adjusted eigenvalues larger than 0 (Table 3). Specifically, Items 2, 5, and 6 of the COVID-Inventory were grouped as 1 factor, which we labeled as "COVID-19 pandemic." Considering that these questions (eg, whether participants believe that the spread of the SARS-CoV-2 may become a pandemic) were asked at the very beginning of the COVID-19 pandemic, and the requested information was clarified during the survey, we decided to exclude this factor from further analyses. Items 1, 7, and 11 represent a second factor labeled as "COVID-19-related worry," which included concerns about the virus and hoarding behavior. The third factor, labeled "perceived risk of infection" included Items 3 and 4. The fourth factor included Items 10 and 14 of the COVID-Inventory and was labeled "physical distancing," which refers to strategies and behaviors to avoid potential contamination situations. All the remaining items were included within a final fifth factor labeled as "social distancing," which refers to strategies and behaviors to reduce social contacts.

Structural Equation Model (SEM)

The model appeared to be a good fit for the observed data (χ^2 (131) = 364.47; P < 0.001; Figure 1) as indicated by the CFI
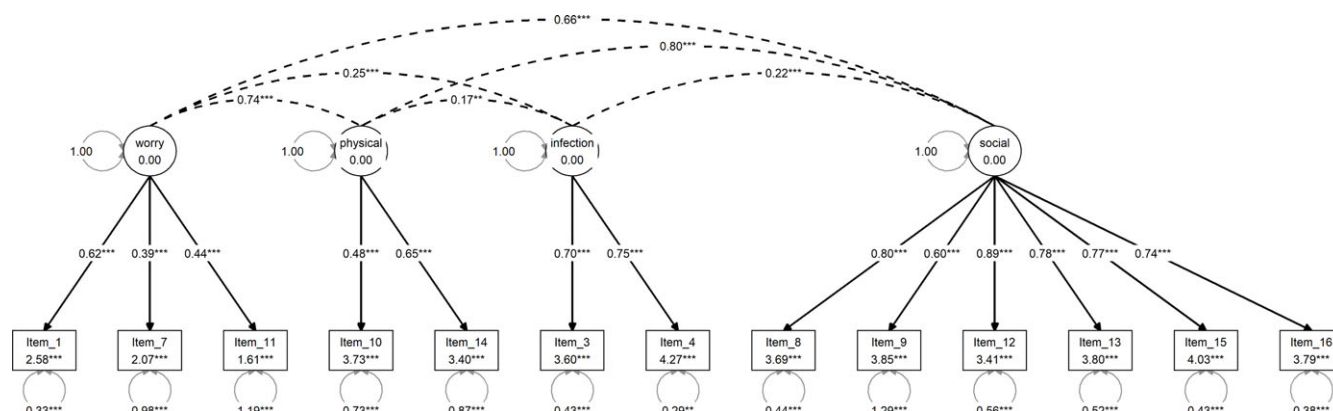
Figure 1. Confirmatory factor analysis (CFA). The boxes on the bottom depict the observed variables (ie, the items of the 2 COVID-related questionnaires) with the intercepts and the variance (in grey). The circles depict the latent variables (ie, the factors). The solid black lines indicate the betas for each item in relation to the factors. The dotted lines on the top represent the covariance between the factors.

(CFI = 0.945), the RMSEA (RMSEA = 0.046) and the SRMR (SRMR = 0.032).[2]

The factor "perceived risk of infection" was not predicted by any questionnaire (all P values < 0.061). Anxiety sensitivity did not significantly predict any factors (all P values < 0.144). The variance of the other 3 factors were significantly predicted by a different set of questionnaires (see Figure 1b). Briefly, the factor "COVID-19-related worry" was significantly predicted by intolerance of uncertainty, trait and state anxiety, health anxiety, and fear of contamination; the factor "physical distancing" was significantly predicted by depression, trait anxiety, body vigilance, and fear of contamination; while the factor "social distancing" was predicted by depression, both trait and state anxiety, body vigilance, and fear of contamination.

Comparison of Dutch and International Students

Both the configural model (χ^2 (262) = 524.89; P < 0.001; CFI: 0.935, RMSEA: 0.049, SRMR: 0.037) and the metric model (χ^2 (271) = 539.30; P < 0.001; CFI: 0.934, RMSEA: 0.048, SRMR: 0.038) fitted the data well overall, and did not differ substantially in fit (χ^2 (9) = 14.42; P = 0.108).

A model in which the intercepts were constrained to be equal across groups in addition to the factor loadings (scalar invariance: χ^2 (280) = 648.12; P < 0.001; CFI: 0.910; RMSEA: 0.056; SRMR: 0.043), fitted worse than the metric model (χ^2 (9) = 108.81; P < 0.001). We, therefore, determined which intercepts differed the most between groups in the metric model and freed 1 intercept at a time between groups in the scalar model, starting with the item with the largest difference between groups and working in order of magnitude of difference. After freely estimating Items 14, 12, 11, 9, 10, and 1 between groups, the difference in fit between the metric model and the (partial) scalar invariance model (χ^2 (274) = 546.88; P < 0.001; CFI: 0.933; RMSEA: 0.048; SRMR: 0.038) were within our cutoffs again (χ^2 (3) = 7.58; P = 0.056).

We then considered the (partial) scalar model and looked at whether the factors were predicted by different questionnaires separately for each group (Figures 2 and 3). Fear of contamination was the only questionnaire in both groups, which significantly

predicted all the factors (except for the perceived risk of infection). The factor COVID-19-related *worry* was additionally predicted by trait (STAI X2) and anxiety in both groups as well as by state (STAI X1) anxiety and intolerance of uncertainty (IUS) across the national students, while by health anxiety (SHAI) across the international students. The factor *physical distancing* was additionally predicted by trait anxiety in both groups, and by depressive scores across the national students. Finally, factor *social distancing* was predicted by trait anxiety, depression, and body vigilance across national students.

Discussion

The primary aim of this study was to investigate the impact of the restrictions imposed during the first lockdown due to the spread of the SARS-CoV-2 virus. Specifically, we studied whether being abroad and, therefore, in a lesser-known context might have increased the experience of psychological burden. For this purpose, national and international students were compared. In general, we observed that young people, who lived abroad, experienced a greater negative impact on their well-being, replicating previous findings[25,26,35]

General Psychological Burdens

International students exhibited higher scores across all questionnaires (except for fear of contamination), suggesting that they were more anxious, displayed higher depression scores, were more intolerant of uncertainty, and reported stronger fear related to health and body symptomology. Although it is unclear whether differences between the 2 groups of students were present before the COVID-19 pandemic, it is quite striking that those individuals who live abroad and who, therefore, might feel less confident and safe about the context they are living in report higher burdens than those, who know the context (ie, the country) since birth. This finding aligns with the idea that context provides crucial information about the imminence of a threat or whether it will be (or will not be) encountered.[31,33,57] The SARS-CoV-2 virus is, per se, an unpredictable threat. In other words, human beings do have the ability to detect viruses only through symptoms such as fever, cough, and fatigue. However, some infected individuals may not show any noticeable symptoms. This makes it difficult or
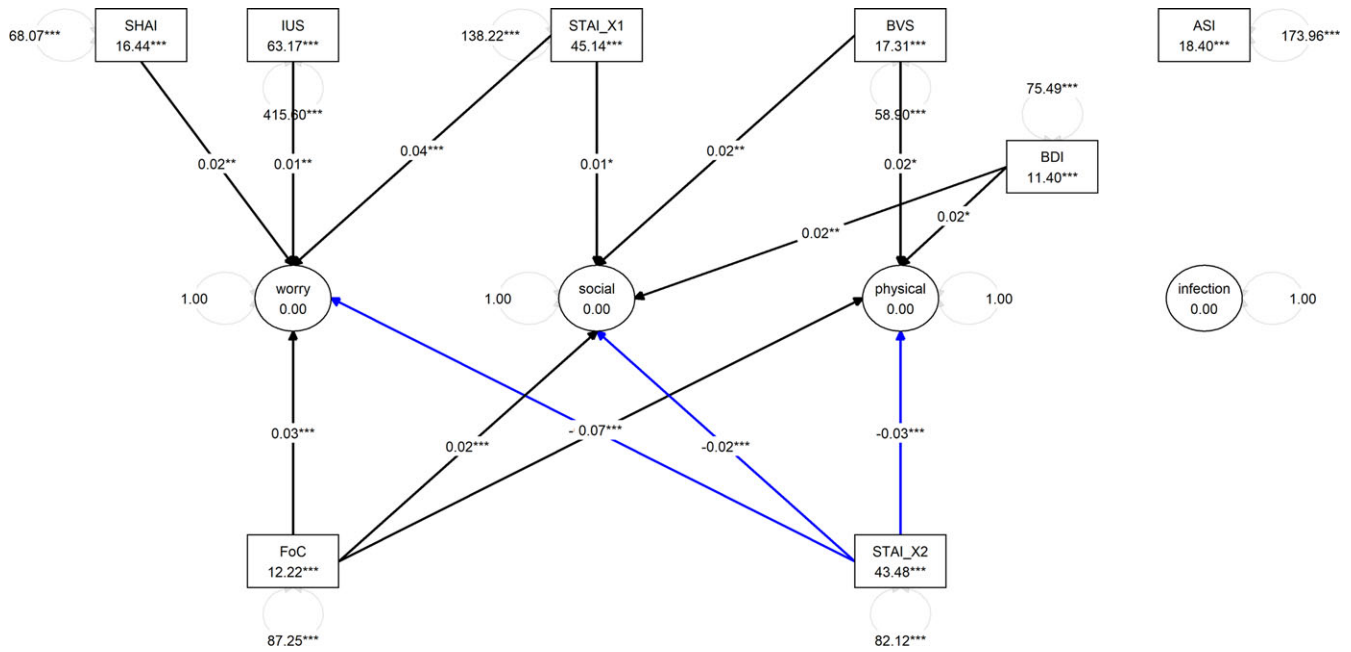
Figure 2. Results of the structural equation model (SEM). The boxes on the bottom and the top depict the questionnaires (and their sum scores). Blue lines depict negative predictions, while blue lines positive predictions. The factor perceived risk of infection (infection) was predicted by any questionnaire, and ASI predicted any factor. COVID-19-related worry (worry), physical (physical) and social (social) distancing were predicted negatively by trait anxiety (STAI X2) but positively by fear of contamination (FoC). Both body vigilance (BVS) and Beck Depression Inventory (BDI) positively predicted safety behaviors, while state anxiety (STAI X1) predicted COVID-19-related worry and social distancing. COVID-19-related worry was additionally predicted by intolerance for uncertainty (IUS) and health anxiety (SHAI).
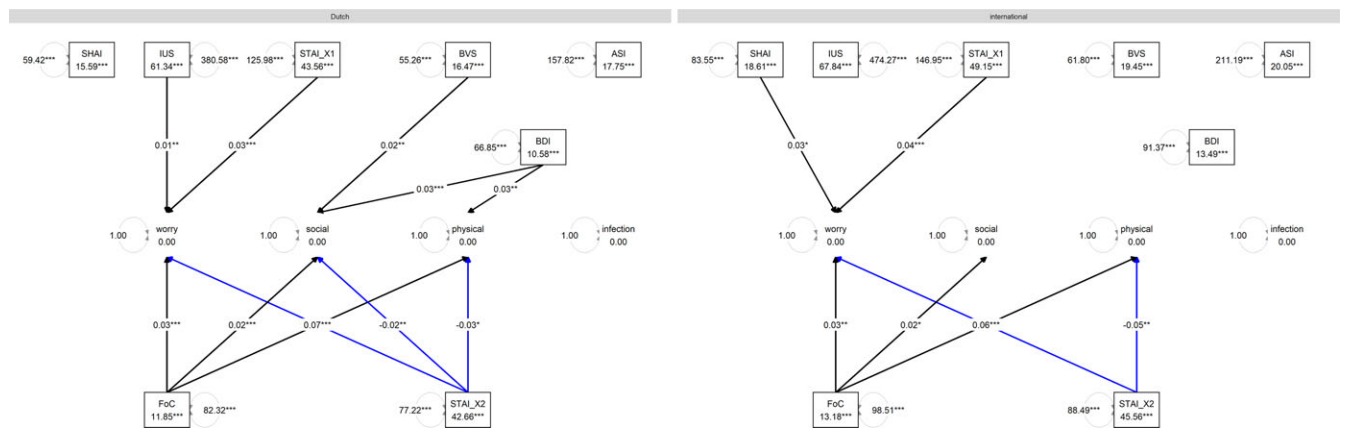

Figure 3. Results of the structural equation model (SEM) separately for the groups. The boxes depict the questionnaires (and their sum scores). Blue lines depict negative predictions, while black lines positive predictions. The factors were predicted by different questionnaires between the two groups. Health anxiety (SHAI) predicted any factor across Dutch students, while across international students the intolerance of uncertainty (IUS), depression (BDI), and body vigilance (BVS) were not significant predictors. Across international students, social distancing were exclusively predicted by fear of contamination (FoC), while across Dutch students this factor was additionally predicted by trait anxiety (STAI X2), BDI, and BVS. Physical distancing was predicted by STAI X2 and FoC in both groups, but among Dutch students the BDI was additionally predictive. Lastly, COVID-19-related worry was predicted in both groups by FoC, trait and state (STAI X1) anxiety, but for Dutch students the IUS additionally predicted the preoccupations for the virus, while across internationals the SHAI.

incapable to identify SARS-CoV-2 virus. Such incapacity to identify the virus leads to a sustained fear response (also called anxiety response[27]) linked to the inability to identify safety.[28,33] Because of its unpredictability, the virus can be perceived as quite threatening,[29] and some individuals can be particularly sensitive to such unpredictable threats.[30] We, therefore, suggest that living in a well-known (ie, assuring) context may provide the necessary information to feel safe. In a familiar context, individuals have guidance on how to predict an "encounter" with the virus, and this in turn could reduce the individuals' psychological burdens.

COVID-19 Related Factors of Emotional and Behavioral Responses

Despite the psychological burdens seeming higher among international students, this difference is not necessarily related to the spread of the virus. As such, we used the COVID-19-related items to investigate whether the students' psychological burdens were linked to the virus's spread. We identified 4 factors based on the 16 self-formulated questions on how participants perceived and felt about the spread of the virus. First, the factor labeled

COVID-19-related worry grouped 3 items: concerns related to the spread of the coronavirus, the potential severity of the illness, and hoarding behavior. This group of items suggest that being concerned about the consequences of the virus is strongly associated with hoarding-like behaviors (eg, grocery shopping), which is in line with previous studies.[58,59] Second, the factor labeled perceived risk of infection included items where participants evaluated the risk of getting infected or that someone they know becomes infected. Third, the factor labeled physical distancing grouped questions focusing on how strongly objects and situations, which might be contaminated, are avoided and how strongly safety behaviors such as hand washing are undertaken. Finally, the fourth factor included items on avoiding social contacts, such as meeting someone, traveling, and maintaining distance (labeled as social distancing). These findings were replicated in the whole sample and for each group. Thus, we found that fear of contamination[60] and bodily preoccupations[3] predicts safety-like behaviors such as washing hands, maintaining physical distance, or wearing a mask and that fear of contamination is associated with more substantial anxiety of the virus.[61]

Additionally, our model suggests that fear of contamination is not only related to physical distancing but also predicts social distancing, such as avoiding crowded situations or social activities, as well as changing travel plans. Moreover, both of these safety behaviors were also predicted by body vigilance and level of depression, but not by health anxiety or intolerance of uncertainty. These findings support contemporary cognitive-behavioral models,[62,63] which suggest that health anxiety plays a crucial role in the etiology of mental disorders due to a misinterpretation of the body sensations and catastrophic beliefs about the illness. It is, therefore, conceivable that individuals more vigilant to their body symptoms are more motivated to engage in safety behaviors (ie, physical and social distancing) to prevent the appearance of bodily symptoms. In contrast, individuals with stronger health anxiety or intolerance of uncertainty show more preoccupations because they tend to catastrophize the impact of the virus on health more pronouncedly or because they have fewer resources to endure aversive situations.[20,21,43]

Comparison of Dutch and International Students

Of interest, our model outlined a distinct pattern of predictors for national and international students, respectively. Specifically, concerns or worries about the spread of the coronavirus were predicted by intolerance of uncertainty among national students but by health anxiety among international students. In contrast, social and physical distancing was predicted by depression and body vigilance among national students but not among international students. Our model suggests that the factors describing worries for and safety behaviors to the virus were influenced by health-specific characteristics (ie, fear of contamination and health anxiety) among international students, while among national students, the virus-related factors were more influenced by individual-specific characteristics such as depression, intolerance of uncertainty, and body vigilance. As mentioned above, a well-known context might provide the necessary information to feel safe compared with an unfamiliar one. It is, therefore, conceivable that the former is less anxiogenic and definable as a weak situation, while the latter is more anxiogenic and thus defined as a strong situation. Weak and strong situations can allow inter-individual differences to emerge or not, respectively.[64,65] In light of our results, the inter-individual

differences of national students could emerge and predict the response to the virus because these students are in a weak situation. Whereas being in a strong and anxiogenic situation such as the international students determined that contamination-related processes mainly predicted the virus-related responses.

In line with our assumptions, international students had more worries and concerns about the spread of the virus, and they initiated more intense safety-like behaviors (eg, avoidance of possibly contaminated areas or situations with possible social contact), suggesting that either feeling less safe or having higher psychological burdens might lead to more preoccupations and distancing. In contrast, international students did not report a higher perceived risk of infection. This was unexpected, but a possible explanation could be that this factor encompasses distinct mechanisms and is more closely associated with cognitive processes than the other factors. In other words, asking about the risk of contracting the virus may require a cognitive and "cold" evaluation of the situation, while avoidance and worries can be more strongly modulated by an emotional evaluation of the situation.[66] Moreover, our model suggests that the perceived risk of infection is not predicted by any of the questionnaires, a finding consistent across both groups. Hence, it seems that affective mechanisms such as being anxious, experiencing fear, or feeling depressed do not influence how the risk is "coldly" estimated.

Our model revealed no effect for anxiety sensitivity, while trait anxiety negatively predicted COVID-19-related factors. At first glance, these results seem contra-intuitive and contrast with previous studies.[67] However, the relationship between anxiety sensitivity and fear of coronavirus appeared to be more prominent in the clinical population[68] or when combined with intolerance of uncertainty.[21] At the same time, prepandemic trait anxiety predicted fear of COVID-19, a prediction qualified in the clinical population.[69] It is, therefore, conceivable that our sample does not present with "sufficient" clinical scores to detect the association between COVID-19-related factors and anxiety sensitivity or trait anxiety.

Moreover, we did not plan interaction effects between the questionnaires, which may have prevented the detection of different types of structures within the data. To date, few studies have focused on the relationship between trait anxiety and fear of coronavirus. The few known studies that have examined such relationships suggest that pre-pandemic trait anxiety predicts fear of COVID-19,[69] and increased trait anxiety in university students during the COVID-19 pandemic reduced motivation and increased boredom.[70] However, both of these results do not apply to our study. Instead, we suggest that highly anxious university students may have found the cost of being isolated too high, leading them to decrease their level of social distancing. Such behavior is similar to what has been observed in patients with spider phobia, where they tend to exhibit less avoidance behavior toward the feared animal if doing so leads to an advantageous result.[71]

Limitations

In the following, we acknowledge 2 limitations of the study. First, knowing where and with whom the students lived during the lockdown may have been an essential factor to consider. It is possible that some of the international students did not remain in the Netherlands during the first lockdown but returned home to their native countries and were within the well-known context. Moreover, returning to their native country might have increased their social contacts (for instance, by living with the family), which

in turn may have been a buffer for psychological distress, as studies on social support suggest.[6] Second, our virus-related factors might deviate from the numerous factors observed in the broader literature regarding the psychological burdens of the SAR-CoV-2's spread. For example, some articles focus on physical distancing (eg, see Hein et al.[3] and Knowles et al.[60]), while others, like us, differentiate between physical and social distancing. Future research should, therefore, precisely define what a safety behavior is, so that we can then better distinguish the underlying processes.

Conclusions

In summary, we found 4 factors describing the individuals' reactions to the spread of the virus. These referred to concerns or preoccupations about the spread of the virus, the perceived risk of infection, and safety behaviors which were subdivided into physical (eg, washing hands, maintaining distance) and social (eg, avoiding social contact or crowded situations) distancing. Living abroad and thus in a less-known and unfamiliar context was linked to higher psychological burdens and increased health-related concerns. These results underscore the importance of prioritizing the mental well-being of international students in any risk mitigation or mental health plans developed by universities in the aftermath of the COVID-19 pandemic.

International students may benefit from a more structured support system within the university, which would facilitate finding social contacts, accessing information on locally relevant rules and regulations, and identifying appropriate health-related resources.

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