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Original Research

Public perceptions, anxiety and the perceived efficacy of health-protective behaviours to mitigate the spread of the SARS-Cov-2/COVID-19 pandemic

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ABSTRACT

Objectives: Data relating to the novel coronavirus disease 2019 (COVID-19) in the Middle East remains sparse. This study examines the public's perceptions of the pandemic, assesses the extent to which participants have adhered to a range of recommended health-protective behaviours to prevent infection and evaluates whether anxiety about COVID-19 or perceptions related to the pandemic are associated with greater adherence to these behaviours.

Study design: A cross-sectional, survey-based design was used. Data were collected using an electronic survey distributed to students, staff and faculty at universities in the three major cities of the United Arab Emirates, Abu Dhabi, Al Ain and Dubai, between the 23rd and 31st of April 2020. A total of 634 participants were included in the analysis.

Methods: Participants reported whether they had adhered to health-protective behaviours such as spatial distancing, increased hygiene and disinfection and diminished time spent outside their homes. They also reported the perceived efficacy of a range of behaviours aimed at reducing risk for contracting COVID-19. Data relating to perception of risk, negative consequences of contracting the disease, perceived longevity of the illness and perceptions of the accuracy of the information read about COVID-19 were collected. Anxiety related to COVID-19 was also assessed, as well as a range of demographic variables. Binary logistic regressions were used to examine whether the demographic variables, perceived efficacy ratings and the perception variables were associated with overall adherence.

Results: A total of 44.8% of the sample reported adherence to all the examined behaviours. Participants who were employed, those with some or completed postsecondary education and those with a chronic illness diagnosis were more likely to adhere to the precautionary behaviours. The perception of personal risk of infection (odds ratio [OR]: 0.83, 95% confidence interval [CI]: 0.71–0.98), perception of substantial life consequences of becoming infected (OR: 0.87, 95% CI: 0.75–0.10) and the perception that the public health information was clear (OR: 0.69, 95% CI: 0.57–0.83) were all positively related with behavioural adherence. The health-protective behaviours were all perceived as being highly efficacious in combating infection, and these efficacy ratings were also positively associated with greater behavioural adherence (OR: 0.41–0.77). Having read the official government public health information was related to greater behavioural adherence (OR: 0.37, 95% CI: 0.23–0.61).

Conclusions: Dissemination of reliable public health information during a public health crisis is essential. This study's results highlight the importance of providing the public with information that is clear and consistent and, moreover, emphasises the efficacy of the recommended behaviours as this is likely to improve adherence. When individuals perceive themselves to be at personal risk and are aware of the severity of the consequences posed by the illness, they are more likely to adopt caution. However, in this sample, the trustworthiness of the information portrayed in the media and the perceived duration of the pandemic – whether this would resolve soon or persist well into the future – did not impact adherence.

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Introduction

On the 11th of March 2020, the novel coronavirus disease 2019 (COVID-19) was officially declared a pandemic by the World Health Organization (WHO), an announcement that was met by a number of governments with the institution of varying virus-mitigating measures and the recommendation or requirement for the use of health-protective behaviours on the part of its residents. These collective efforts were targeted at impeding the spread of the disease and the consequent deleterious impact of the pandemic.

'Spatial distancing',¹ in which individuals deliberately maintain a safe distance between themselves and others as well as the general practice of reducing the number of people one comes into contact with, is arguably the most widely recommended practice. The varying governmental responses have resulted in temporary closures of schools/educational institutions, recreational facilities, places of worship and public entertainment venues of all varieties. Moreover, working individuals have largely been encouraged to work remotely from home where possible. At the time of writing (late April 2020), some governments also instituted the closure of all non-essential workplaces.

During previous occurrences of widespread infectious disease, the promotion of increased use of hygiene-related behaviours in the public domain has generally proved successful in restraining the spread of the disease.² However, the public typically experience consistent adherence to these recommended behaviours as a difficult and onerous task, one that is frequently met with a nonchalant attitude or, in some cases, outright resistance. The findings of previous research conducted during the first global outbreak of severe acute respiratory syndrome in 2002 and those relating to swine flu a few years thereafter appear to indicate that the public's perceptions about the outbreak may be a significant factor in determining the degree to which individuals elect to adhere to the official recommendations. Specifically, individuals appear to be more likely to comply with official government-mandated regulations relating to health-protective behaviours if they perceive that the respective behaviours are likely to be effective in preventing infection,^{3,4} they believe themselves to be at increased risk of being negatively affected by the pandemic,^{4–6} they believe that the illness carries severe and life-threatening ramifications,^{4,7} the illness is perceived as being impervious to vaccination and/or treatment and is therefore unlikely to abate in the near future⁸ and where the prevailing perception is that the authorities are providing information that is clear and understandable to the public and, by extension, can be trusted to protect the public.⁴ Preliminary investigations of the public's response to the COVID-19 pandemic appears to concur with this literature.

The perception of a higher risk of contracting COVID-19 has been found to be predictive of an increased tendency to engage in virus-mitigating behaviours such as handwashing and spatial distancing.⁹ Moreover, research suggests that elevated levels of anxiety and worry may also be associated with an increased likelihood to adhere to health-protective behaviours, including in relation to COVID-19, which suggests that, in some cases, anxiety may serve a functional and protective means.^{3,6,9} In addition to these factors, two others may be relevant in determining whether people adopt precautionary behaviour in response to an outbreak. First, the public may mistrust the information portrayed by media outlets and, if the prevailing view that the media have over-exaggerated the extent of the outbreak is held, people may elect to disregard recommendations for preventative behaviour.¹⁰ Second, in the case of a novel virus, much uncertainty may exist which, in turn, may impact whether individuals engage in precautionary

behaviours.¹¹ The provision of clear and accurate information may therefore be paramount in persuading individuals to adhere to preventative behaviours as this provides a clear rationale for doing so.

Government response to COVID-19 in the United Arab Emirates

Authorities in the United Arab Emirates have instituted a number of measures in an attempt to impede the spread of the disease. During the first week of March 2020, a few days before the WHO declared COVID-19 a pandemic, all schools and higher education institutions were physically closed and commenced virtual delivery of lessons/lectures, a decision that was initially intended to last for four weeks but continued throughout the spring and summer semesters. The week thereafter (15 March 2020), remote working arrangements were implemented for public sector employees, and retailers reduced their hours of operation. From March 25th, all commercial centres, shopping malls, leisure centres including gyms and places of worship were closed. Pharmacies and supermarkets remained open. Restaurants were limited to home delivery. Most notably, Dubai and Abu Dhabi international airports closed, suspending all flights. A nationwide disinfection program was implemented during which time residents were required to remain indoors. A permit was required to leave one's home for essential work or extraordinary reasons. Violations of the stay-at-home order carried exorbitant fines (Dubai police used radar technology to monitor motorists violating the measure). Use of masks and gloves and social distancing were required when outdoors. By April 5th, metro, tram and intercity bus services ceased operating. Drive-through testing centres opened on April 7th where residents were tested free of charge. Despite these measures, recent weeks have seen the numbers of confirmed infections continue to rise, 28,704 confirmed cases and 244 deaths at the time of writing (24 May 2020).¹²

Aims and hypotheses

To assess the associations between the public's perceptions relating to COVID-19, levels of anxiety and their adherence to health-protective behaviours, a cross-sectional study was conducted with a demographically representative sample from the United Arab Emirates (UAE). This study is the very first to examine the public's experiences and perceptions about the pandemic in this country. In operationalizing the study's aim, the following hypotheses were proposed. First, at the demographic level, it was predicted that participants who were employed (compared to students), those with at least a bachelor level of education, those who were older and those with a pre-existing chronic illness would report greater adherence to the health-protective behaviours. Second, a higher degree of coronavirus-related anxiety was predicted to be positively associated with greater adherence. Third, elevated scores across the following perception variables would be positively related with behavioural adherence (i.e. elevated personal risk for infection, detrimental consequences of infection, trustworthiness of media information, longer duration of the pandemic and clarity of public health information). Fourth, it was hypothesised that behavioural adherence would more readily occur where individuals perceived these behaviours to be efficacious in combating infection. Lastly, it was predicted that having read the official government public health information would be positively associated with behavioural adherence but negatively with anxiety about COVID-19.

Method

Participants and procedure

This study was conducted during the last week of April (23–31 April 2020) at a time when lockdown procedures and control measures were at their most stringent in the UAE. The study was advertised, electronically, to students, employees and faculty at universities in Abu Dhabi, Al Ain and Dubai, the three largest cities in the UAE. Participants were approached via the respective institution's electronic mailing lists. An invitation email was sent which contained an invitation to participate, brief background information relating to the study and a link to the electronic survey. The first page of the survey displayed information about the responsibilities of the investigator, the rights of participants (e.g. voluntary participation, right to withdraw participation, informed consent) and the investigator's contact details. Clicking ahead to the next page was indicative of the provision of consent. Given the dynamic nature of the pandemic and the likelihood that experiences and perceptions would likely change quite rapidly, the researcher team was keen to complete data collection within a brief period of time. Therefore, a week (7 calendar days) was allocated for the purpose of collecting data.

The final sample consisted of 634 participants, of which 516 were women and 118 were men. The sample ranged substantially in age, the majority of whom were aged 18–24 years ($n = 446$, 70.6%). Participants were resident across the seven emirates of the country, but the majority were resident in Abu Dhabi ($n = 438$, 69.1%). The majority of the sample were currently enrolled students ($n = 434$, 68.5%) and the remaining 31.5% ($n = 200$) were employed. In terms of the highest level of education, 33.4% had completed high school ($n = 212$), a further 31.2% ($n = 198$) had partially completed some tertiary education and the remaining 35.3% ($n = 224$) had completed at least a bachelor's degree or higher. A total of 76 participants (12%) reported the presence of a chronic illness diagnosed by a doctor.

Materials and instruments

Health-protective behaviours

Participants were asked six questions about their current adherence to health-protective behaviours in response to the COVID-19 pandemic. These behaviours were adopted from the work of Rubin et al.⁷ They also aligned with the recommended behaviours provided by the Ministry of Health and Prevention (MOHP), information that was distributed to schools, universities and occupational settings and via social and electronic media. Questions related to spatial distancing/staying indoors (behaviours 1, 3 and 4), public transport (behaviour 2) and hygiene and disinfection (behaviours 5 and 6). These six questions were phrased as follows: 'Over the past 7 days, I have ... because of COVID-19' to which participants provided a 'yes' or 'no' response. A further two questions were also included. The first was adopted from the literature on previous pandemics and queried whether the participant had discussed with a friend or family member what to do if either person was diagnosed with COVID-19. The second additional question captured handwashing frequency ('In the past 24 h, how many times have you washed your hands with soap and water, not including baths, showers, or washing up?').

Perceived efficacy of health-protective behaviours

Six questions, adopted from James Rubin et al.,⁷ were used to assess whether participants believed that a specific behaviour was efficacious in reducing their risk of contracting COVID-19. The six questions measured perceived efficacy in relation to 'reducing

contact with others' (item 1), 'avoidance of public transport' (item 2), 'cleaning and disinfection' (item 3), 'handwashing' (item 4), 'mask wearing' (item 5) and 'avoidance of hospitals/clinics' (item 6). As with the previous scale, these behaviours were also advocated as being preferable and efficacious in the MOHP public health information distributed to the public. Questions were phrased using the following preamble, 'I believe that ... reduces your risk of catching COVID-19', and participants' perceived efficacy in relation to each behaviour was measured using a 5-point Likert scale which ranged from 'strongly agree' to 'strongly disagree'.

Anxiety

Anxiety about COVID-19 was assessed using the validated Arabic version of the six-item Spielberger state-trait anxiety inventory (STAI).¹³ For this study, items were phrased prompting participants to report how they had been feeling over the preceding 7 days in relation to the COVID-19 pandemic. Responses were provided using a 4-point Likert scale from 1 ('Not at all') to 4 ('Very much so'). The computed score for this scale ranges from 6 to 24. Data for this scale were categorised as follows: a score of 12 or more indicated the presence of COVID-19-related anxiety while those participants who scored 18 or more were categorised as experiencing high anxiety.¹⁴ The STAI has been demonstrated to be a highly valid and reliable measure of anxiety, including with Arabic-speaking samples.^{13–15} Internal consistency in the present study was satisfactory ($\alpha = .71$).

Additional perceptions related to COVID-19

Participants were asked five questions to assess their subjective perception of various aspects relating to the pandemic. These items were adopted from amongst a list previously used by Rubin et al.⁷ These questions assessed perceived personal risk (item 1), perceived consequences of infection (item 2), trustworthiness of COVID-19 information in the media (item 3), perceived duration of the pandemic (item 4) and clarity of public health information (item 5). Participants provided responses using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) with higher scores indicating greater agreement with the statement.

Personal/demographic variables

The following demographic variables were queried: participant sex, age, working status, educational level and the presence of any chronic illness diagnosed by a doctor. The MOHP in the UAE controls and directs the dissemination of public health information to ensure that the public in this country has access to accurate information relating to the pandemic. Thus, participants were also asked whether they had read the MOHP's public health information relating to COVID-19.

Data analytic plan

Following the practice of Rubin et al.,⁷ a single primary outcome variable was computed by determining whether each participant reported complete adherence to the six health-protective behaviours. This resulted in a binary variable. Inter-item correlations were also computed between the items assessing the six behaviours. As these items were designed using an ordinal scale, Spearman rank-order correlation coefficients were computed which were all highly significant (r_s values = 0.09 to 0.56, $P < .05$) suggesting that the behaviours were indeed associated with each other. A binary logistic regression was then used to examine the associations between the demographic/personal characteristics (i.e. sex, age, working status, education and presence of a chronic illness) and the composite behavioural adherence variable. Binary logistic regressions were also used to investigate the associations

between the perceived efficacy of using the health-protective behaviours and the composite adherence variable, as well as between each of the five perception items and the composite adherence variable. Mann-Whitney U-tests were used to examine the association between anxiety levels and behavioural adherence and whether having read the MOHP's public health messaging was related to either anxiety level or to behavioural adherence. This non-parametric test was used to examine differences between the stratified subgroups as the data distributions for these variables deviated significantly from normal (Kolmogorov-Smirnov tests were computed and produced *D* values that ranged from 0.13 to 0.51, all $P < .001$).

Results

Health-protective behaviours, anxiety and the perceived efficacy of behavioural adherence

Table 1 illustrates the sample's reported adoption of the recommended health-protective behaviours in response to the COVID-19 pandemic. The sample reported widespread use of the six behaviours. Each individual behaviour was positively endorsed by at least 80% or more of the sample. A total of 284 participants (44.8%) reported the use of all six behaviours. More than half of the sample ($n = 354$, 55.8%) had discussed with a friend or family about either person's desired response if the other were to contract the illness. Handwashing frequency increased substantially. The majority reported having engaged in handwashing more frequently than usual (84.2%), and most ($n = 282$, 44.5%) had washed their hands 5 to 9 times during the preceding 24 h.

Using a cut-off of 12 on the STAI, which was indicative of the presence of anxiety about COVID-19, most of the sample ($n = 584$, 92.1%) scored above this threshold. A total of 24 participants (3.8%) scored more than 18, a score which indicates the presence of high anxiety about COVID-19.

Table 2 illustrates the sample's perception of the efficacy of each of the six behaviours in protecting against COVID-19 infection. All six behaviours were overwhelmingly perceived as being efficacious in protecting against potential infection. At least half of the sample endorsed each behaviour with a response of 'strongly agree'.

Association between demographic/personal variables and behavioural adherence

Table 3 illustrates the associations between the demographic/personal variables and the composite behavioural adherence

variable following the computation of binary logistic regression analyses. Participants who were employed, those with some or completed postsecondary university education and participants with a chronic illness diagnosis were more likely to adhere to the recommended health-protective behaviours. Gender and age were not significantly associated with adherence.

Association between anxiety and behavioural adherence

A Mann-Whitney U-test was conducted to compare the anxiety levels of participants who had adhered to all the recommended health-protective behaviours with those who had not, but this analysis was not significant ($U = 278.000$, $z = -0.64$, $P > 0.05$). Where the sample was stratified according to the anxiety level first using the cut-off score of 12 and again using the cut-off score of 18, the groups still did not significantly differ.

Association between perception variables and behavioural adherence

Table 4 illustrates descriptive data for the five perception items and the associations between these items and behavioural adherence. Analyses revealed significant associations for perceived personal risk (item 1), perceived consequences of infection (item 2) and clarity of public health information (item 5). Items 3 (trustworthiness of COVID-19 information in the media) and 4 (perceived duration of the pandemic) were not significant. All results remained unchanged when adjusting for sex, age, education, working status and the presence of a chronic illness.

Association between perceived efficacy of health-protective behaviours and behavioural adherence

The perceived efficacy of each individual health-protective behaviour was significantly related to behavioural adherence. The magnitude of these effects was as follows: reducing the number of people met over the course of a day (odds ratio: 0.56, 95% confidence interval [CI]: 0.41–0.76), avoiding public transport (odds ratio: 0.62, 95% CI: 0.44–0.88), cleaning or disinfecting things you might touch (odds ratio: 0.41, 95% CI: 0.31–0.53), washing your hands regularly with soap and water (odds ratio: 0.41, 95% CI: 0.31–0.55), wearing a face mask when out in public (odds ratio: 0.77, 95% CI: 0.64–0.93) and avoiding hospitals and clinics (odds ratio: 0.76, 95% CI: 0.61–0.94). When these analyses were repeated but adjusted for the impact of age, sex, education and working status, all associations remained statistically significant.

Table 1
Health-protective behaviours in response to the COVID-19 pandemic.

Questions	<i>n</i> (%) of positive Responses
'Over the past 7 days, I have _____ because of COVID-19':	
Deliberately cancelled or postponed a social event, such as meeting friends, eating out, or going to a sports event	552 (87.1)
Reduced the amount I use public transport	414 (65.3)
Reduced the amount I go into shops	610 (96.2)
Kept away from crowded places generally	616 (97.2)
Increased the amount I clean or disinfect things that I might touch, such as doorknobs or hard surfaces	526 (83.0)
Washed my hands with soap and water more often than usual	534 (84.2)
Performed all 6 precautionary behaviours	284 (44.8)
Because of COVID-19, I have discussed with a friend or family member what we would do if one of us catches COVID-19	354 (55.8)
In the past 24 h, how many times have you washed your hands with soap and water (not including baths, showers or washing up)?	
0 to 4	172 (27.1)
5 to 9	282 (44.5)
10 to 14	128 (20.2)
15 to 19	26 (4.1)
More than 20	26 (4.1)

Table 2
Perceived efficacy of health-protective behaviours.

Question	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I believe that _____ reduces your risk of catching COVID-19.					
Reducing the number of people you meet over a day	480 (75.7)	128 (20.2)	24 (3.8)	2 (0.3)	0 (0)
Avoiding public transport	508 (80.1)	108 (17.0)	18 (2.8)	0 (0)	0 (0)
Cleaning or disinfecting things you might touch	414 (65.3)	156 (24.6)	50 (7.9)	12 (1.9)	2 (0.3)
Washing your hands regularly with soap and water	434 (68.5)	158 (24.9)	32 (5.0)	10 (1.6)	0 (0)
Wearing a face mask when out in public	332 (52.4)	190 (30.0)	86 (13.6)	26 (4.1)	0 (0)
Avoiding hospitals and clinics	372 (58.7)	174 (27.4)	80 (12.6)	8 (1.3)	0 (0)

Data are the number (percentage) of participants.
COVID-19, coronavirus disease 2019.

Table 3
The association between personal variables and behavioural adherence.

Variables	n (%) of participants	n (%) using all health-protective behaviours	Odds ratio (95% CI)
Sex			
Women	541 (81.4)	228 (42.1)	0.88 (0.59–1.31)
Men	118 (18.6)	56 (47.5)	Reference
Age group, years			
18–24	446 (70.3)	214 (47.9)	0.54 (1.0–2.99)
25–34	68 (10.7)	22 (32.4)	1.02 (0.18–6.15)
35–54	88 (13.9)	32 (36.4)	0.88 (0.15–5.05)
55–64	26 (4.1)	14 (38.9)	0.43 (0.07–2.77)
≥65	6 (0.9)	2 (33.3)	Reference
Working status			
Full- or part-time work	200 (31.5)	78 (39.0)	1.41 (1.01–1.99)
Not working	434 (68.5)	206 (47.5)	Reference
Educational attainment			
High school	212 (33.4)	104 (49.1)	0.67 (0.46–0.98)
Some college/university	198 (31.2)	92 (46.5)	0.75 (0.51–1.10)
Bachelor's degree and higher	224 (35.3)	88 (39.3)	Reference
Chronic illness			
Present	76 (12.0)	26 (34.2)	1.65 (1.00–2.73)
None	558 (88.0)	256 (45.9)	Reference

CI, confidence interval.

Effect of the MOHP's public health information on behavioural adherence and anxiety

Most of the sample had read the MOHP's public health information relating to the COVID-19 pandemic in the UAE ($n = 540$, 85.2%). The mean anxiety level did not differ between participants who had read this information and those who had not ($U = 23815.000$, $z = -0.97$, $P > 0.05$). However, participants who had read the information were more likely to adhere to the preventive behaviours (odds ratio: 0.37, 95% CI: 0.23–0.61).

Discussion

The present study explored the demographic and psychological predictors of adherence to recommended health-protective behaviours in response to preventing COVID-19 infection in a sample

of UAE residents. The results of this study suggest that the public response to the government-imposed preventive measures have generally been robust. While some measure of anxiety was pervasive across the sample, adherence to all the recommended hygiene and virus-mitigating behaviours was common. The sample viewed the use of these behaviours as being highly efficacious, and the belief of efficacy was positively related with adherence to these behaviours. Participants' perceptions of the efficacy of a given behaviour may result from the information that they have access to. This sample was drawn from university populations – both staff and students – these are populations that are more likely to actively seek information. Moreover, the majority of the sample had read the MOHP's official guidance on recommended preventive behaviours and having done so was positively associated with increased use of all the health-protective behaviours. In practice, convincing the public during times of an outbreak about the

Table 4
The association between perception variables and behavioural adherence.

Items	m (SD) ^a	Odds ratio (95% CI)	Adjusted odds ratio ^b (95% CI)
1. I believe there is currently a high risk of catching COVID-19 in the shops I go to	3.76 (0.10)	0.83 (0.71–0.98)	0.83 (0.70–0.98)
2. I think that if I catch COVID-19, it will have major consequences for my life	3.74 (1.12)	0.87 (0.75–1.01)	0.86 (0.74–0.99)
3. I think that the media have overexaggerated the risks of catching COVID-19	3.01 (1.24)	0.99 (0.87–1.12)	1.01 (0.89–1.15)
4. In my opinion, this COVID-19 pandemic is going to continue for a long time	3.68 (0.92)	1.03 (0.87–1.23)	1.04 (0.87–1.24)
5. Overall, the information I have heard about COVID-19 has been clear	3.98 (0.89)	0.69 (0.57–0.83)	0.68 (0.57–0.83)

COVID-19, coronavirus disease 2019; CI, confidence interval; mean (m); standard deviation (SD).

^a Items scored from 1 to 5 with higher scores indicative of greater agreement.

^b Adjusting for sex, age, working status, educational level and the presence of a chronic illness.

enormity of the threat being faced is often a difficult task for public health agencies; however, it appears that officials in the UAE have succeeded in doing so.

The positive predictive associations between some of the perception items and behaviour change in this sample illuminate additional factors that could potentially be targeted by officials elsewhere in the world, or during future outbreaks, as an attempt to enhance adherence with official directives. In concurrence with previous research,^{4–7,16,17} adherence was more likely when accompanied by the belief that one's risk of contracting the illness was high and that, if infected, this posed substantial detrimental consequences for one's life.

Perceptions that the public health information communicated about the pandemic was clear and understandable was also associated with an increased likelihood of adhering to the recommended behaviours. Reducing uncertainty in an affected society via the provision of clear and consistent information is frequently advocated,^{10,16} but, in most cases, this is intended as a measure to reduce experienced anxiety during crises. In the present study, as was the case in previous investigations,⁷ the mean score for the 'clarity of information' item in the perceptions scale (item 5) indicates that the MOHP's public health information succeeded in communicating consistent and understandable information, which in turn appears to have promoted increased execution of health-protective behaviour.

COVID-19–related anxiety was prevalent. However, in contradiction to much of the literature,^{7,9,18} this variable was not related to behavioural adherence. In relation to outbreaks of disease, including COVID-19, it has frequently been found that the presence of anxiety and fear serve adaptive and functional purposes, prompting individuals to prepare for encountering future negative stimuli, and therefore renders the adoption of health-promoting behaviours more likely.^{7,9,18} However, in the present study, alternate factors (e.g. older age, working status and having a chronic illness) appear to be more strongly related to adherence with health-protective behaviours. An additional consideration is that despite anxiety being so pervasive in this sample, one should be cautious not to pathologise 'functional anxiety', as it occurs within the context of preparing for a tangible rather than imagined threat. There is however the possibility that some individuals, those with pre-existing risk factors for mental illness, may experience the pandemic as a precipitant for the onset of pathological levels of distress and the development of maladaptive coping strategies. Mental health professionals can play an integral role within the context of this pandemic to provide support both to those encountering mental health difficulties directly related to the experience of enduring the pandemic and to those with more severe presentations of pathology amplified by the pandemic.

This study's results endorse the widely held view that providing the public with information that is clear and consistent and focuses on small, feasible actions that individuals can perform to reduce their risk of infection is a prudent approach to follow during public health crises. Highlighting the efficacy of the recommended behaviours may further serve to maximise adherence. In this study's sample, these strategies proved successful at promoting greater behavioural adherence to the recommended health-protective behaviours, despite the presence of fear and anxiety.

Limitations of the study

The cross-sectional design of this study precludes any conclusions to be drawn about the longitudinal and temporal relationships between these variables. While this study assessed adherence to recommended behaviours whilst in the midst of the pandemic,

assessments across multiple time points would facilitate an understanding of how these behaviours might change in response to circumstances. For example, the period before the outbreak was declared a pandemic compared with the period following the institution of lockdown measures or a comparison of adherence to health-protective behaviours during a complete lockdown compared to a period of easing lockdown measures.

The instruments used in this study, with the exception of the STAI, are not psychometrically validated instruments. Rather, the instruments, and the items that they consist of, were selected based on the literature (as they have previously been used in the context of pandemic studies⁷) and informed by the UAE government's recommendations. Participants' knowledge about the pandemic and, more specifically, knowledge of how best to protect themselves from infection were a primary construct in this study. Therefore, it was best to align the content of the items with the MOHP's public health information. However, despite the use of these measures having met the study's goals, validated measures would have been preferable.

The measure of anxiety used in this study is a widely used instrument, including in the conduct of studies related to outbreaks of disease.⁷ Moreover, the indication that a psycho-emotional construct such as an anxious mood might promote greater adherence to preventive behaviours in the context of a pandemic, as has been suggested in the literature, would be a valuable addition to the evidence base. However, the finding in the present study that anxiety was unrelated to adherence might suggest that the STAI instrument may not be measuring the specificities of anxiety in relation to COVID-19. Indeed, recently, a number of validated measures have emerged that assess fear and anxious symptomology about coronavirus.^{19–21} Future studies using one of these measures may find significant associations.

The preponderance of female participants in this sample reflects the naturally occurring population from which the sample was drawn. Most university students in this country tend to be women, and it is therefore unsurprising that the majority of the participants were women. Given that sex may potentially introduce some degree of variation in the examined relationships of this study, all analyses were recomputed controlling for the potential impact of sex and, as was reported, the results remained unchanged when controlling for this potential confounding variable. However, future studies may wish to recruit samples with a more equitable distribution of men and women.

Author statements

Ethical approval

This study received ethical approval from the Social Sciences Ethics Sub-committee at the author's institution (Ref. No.: ERS_2020_6091). All procedures were conducted in accordance with the Declaration of Helsinki and its later amendments.

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Competing interests

None declared.

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