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Personality and mental health: Factors impacting perceived health risks and protective behaviors during the early COVID-19 quarantine

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Abstract

Previous studies have demonstrated the psychological impact of stressful events related to an infectious disease outbreak. This impact may be moderated by the perception of risk and individual differences in personality. The aim of this study was to analyze the effects of the personality profiles and mental health on the perceived risk (being infected, getting hospitalized, and dying from COVID-19) and on preventive behaviors (wash your hands, stay at home, maintain social distance, touch your face, and mask use). A total sample of 126 Argentine adults, both genders, participated and filled in the Revised NEO Personality Inventory (NEO PI-R), the Symptom Checklist-90 (SCL-90) scale, a sociodemographic questionnaire, and COVID-19 estimates regarding risk perception and preventive behaviors. Results show that people with undercontrolled personality profile and high interpersonal sensitivity overestimated their probability of getting infected, hospitalization, and dying from COVID-19. In addition, the resilient profile group with high anxiety overestimated the probability of hospitalization and dying; the undercontrolled profile group with high anxiety, phobic anxiety, or psychoticism, also overestimated their probability of dying; the undercontrolled profile people with high interpersonal sensitivity, or high anxiety reported higher probabilities of maintaining social distance. Anxiety and depression symptoms explain a low percentage of the perceived risk variance; while conscientiousness, together with mental health were able to explain the estimated probability of engaging in protective behaviors. These findings could be useful to implement more effective and realistic strategies to promote the adoption of preventive behaviors.

Keywords: *COVID-19, personality, mental health, perceived risk, protective behaviors.*

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The pandemic has become a priority for researchers from different disciplines, among them psychology. In the event of pandemics or natural disasters, people's physical health and the fight against the pathogen are the primary focus of attention of stakeholders/managers and health professionals, so the implications for mental health tend to be overlooked or underestimated (Ornell, Schuch, Sordi, & Kessler, 2020). However, being able to understand how we perceive and behave in the face of a pandemic is essential to develop strategies for preventing infection.

On 30 January 2020, the World Health Organization stated that due to the new coronavirus (SARS-CoV-2) the world is facing an international public health emergency. Less than two months later, on March 11, 2020, the World Health Organization (WHO) had declared a pandemic (WHO, 2020b). The virus has been found to represent a greater risk for developing countries, where health systems are more vulnerable (WHO, 2020b). There is also evidence that socioeconomic factors could be related to preventive behaviors during the COVID-19 pandemic (Atchison et al., 2020; Quiroz Reyes, 2020).

In this respect, containment measures such as staying at home, social distancing, avoiding touching the face, using masks, and handwashing were recommended (WHO, 2020a). Reeves et al. (2020) found that rapid detection and treatment, preventive isolation, and traceability of infections are key strategies to stop the spread of the virus. For this reason, many of the affected countries rapidly put in place preventive measures related to the use of face masks and social isolation, in addition to the communication of correct hygiene and health habits such as the avoidance of touching one's face and the importance of hand washing (Patel et al., 2020). In particular, the use of face masks is one of the most important preventive measures to slow down the spread of the virus (Rab, Javaid, Haleem, & Vaishya, 2020). In addition, reducing the contact of the hands with the face area is crucial for this same purpose (Rengasamy, Eimer, & Shaffer, 2020).

In Argentina, a strict and mandatory quarantine was established starting on 20 March 2020. Except for essential workers, the rest of the population was confined to their homes, for more than 100 days at the time of this study. Restrictive measures were implemented which changed the day-to-day routines, and the roles and interactions of parents, workers, friends, neighbors, and citizens in general. The coronavirus pandemic has become a societal event that has modified social networks, habits, routines, and human interactions (Order 297/2020).

This stressful event has pushed most persons outside their usual range of experiences (Allegrante, Auld, & Natarajan, 2020). Therefore, the way people estimate risks and their coping behaviors are important considerations (Allegrante et al., 2020; Wang, McKee, Torbica, & Stuckler, 2019) to understand the impact of the pandemic and quarantine on citizens, from a psychological perspective. Health-related decision making is a complex process in which a person moves through a series of stages or phases, coping with the stressful event in different ways (Rosenstock, 1974). Previous studies have shown the psychological impact of stressful events related to an infectious disease outbreak moderated by the person's

perceptions (Calvillo, Ross, Garcia, Smelter, & Rutchick, 2020; Wu et al., 2009). Those who perceive higher risks are more motivated to implement protective behaviors (De Bruine & Bennett, 2020; Fischhoff, 2012; Rosenstock, 1974), thus individual differences in personality and mental health symptomatology play a crucial role in preventive health behavior (Booth-Kewley & Vickers, 1994; Rosenstock, 1974).

Certain studies have addressed how individual differences, gender, background, and socioeconomic factors affect decision-making and the perceptions associated with this type of situation of confinement and pandemic (see Lau, Griffiths, Choi, & Lin, 2010; Liu et al., 2020; Tang & Wong, 2004). For example, it has been shown that men are less likely to use face masks (Capraro & Barcelo, 2020), as well as less willing to adopt preventive behaviors (Bell, Breland, & Ott, 2013). Studies such as the one conducted by Capraro and Barcelo (2020) highlight the importance of achieving mass communication of the risks associated with COVID-19, since this could contribute to a greater acceptance of the use of face masks.

This study analyzed the effects of personality profiles and mental health symptomatology and their interactions in the estimation of the probability of three health-outcomes as risk factors related to COVID-19 (to be infected, to be hospitalized, and of dying due to COVID-19), and on the estimate of the likelihood of engaging in five protective behaviors (staying at home, social distancing, avoiding touching the face, using a mask, and handwashing).

Personality

For years personality has been studied as a pattern (configuration) of traits that varies from one individual to another (McCrae & Costa, 1992). Among the models, the most used is the one defined by Five Personality factors, which has been found to be associated with some of the most important life outcomes and risk factors (Akbari et al., 2019; Booth-Kewley & Vickers, 1994; Dahlen & White, 2006; Kline, Bankert, Levitan, & Kraft, 2019). For example, agreeableness shows differences in the motivation to cooperate (vs. acting selfishly) (Denissen & Penke, 2008). Stable individual characteristics can play an important role in how people think and reason (Stanovich & West, 2000). In this respect, different patterns of decision making have been associated with personality traits across several domains (Maner, Gailliot, Butz, & Peruche, 2007). Individuals with specific personality profiles such as low conscientiousness combined with high extroversion and/or high neuroticism were willing to take more risks (Castanier, Le Scanff, & Woodman, 2010). Higher levels of openness have been shown to correlate with engaging in more preventive health behaviors due to a better risk perception (Trobst et al., 2000).

Furthermore, previous studies have found that individuals with lower levels of neuroticism and higher conscientiousness and extroversion also reported better health (Gray & Pinchot, 2018). Neuroticism includes the disposition to experience relatively strong negative emotions and vulnerability to stress, related to harmful

health practices (Caspi, 1998; Gray & Pinchot, 2018). Contrarily, conscientiousness involves discipline and persistence, related to positive health behavior patterns based on long-term gratification (Booth-Kewley & Vickers, 1994; McCrae & Costa, 1992). The recent research by Blagov (2020) reported that agreeableness and conscientiousness predicted endorsement of social distancing and hygiene. The same study showed that extroversion has an inverse relation with social distancing. In addition, Blagov (2020) has found that the effect of hygiene disappears after controlling for other traits. This last study also found that there was an interaction between conscientiousness and neuroticism in the prediction of currently preventive behavior and future responses to the COVID-19 pandemic (Blagov, 2020).

Moreover, personality is generally studied from the perspective of personality profiles derived from the five traits proposed by Costa and McCrae (1996). Three different personality types (resilient, overcontrollers, and undercontrollers) were identified in the literature of the last two decades (Asendorpf, Borkenau, Ostendorf, & Van Aken, 2001; Rosenström & Jokela, 2017). These labels are consistent with the theory of ego-control and ego-resiliency proposed by Block and Block (1980). According to this personality model, ego-resiliency refers to the individual's ability to adapt his/her level of ego-control depending on the environment. Even though this model showed some stability over a 6-month period, Asendorpf et al. (2001) concluded that the borders between personality types are fuzzy.

In addition to what was stated above, a person with a high level of ego-resiliency (a resilient individual) has better adaptive resources to respond flexibly to changing situations, particularly stressful situations, well-adapted behavior and social competence, scoring low on neuroticism and relatively high on most other scales (Asendorpf et al., 2001; Boehm, Asendorpf, & Avia, 2002; Rosenström & Jokela, 2017). Otherwise, a person with low levels of ego-resiliency is ego-brittle, showing less adaptive flexibility, fixed patterns of responding and difficulty recovering from trauma (Bohane, Maguire, & Richardson, 2017).

Ego-control refers to the tendency to contain or to express emotional and motivational impulses. Thus, both extremes of ego-control are associated to low ego-resiliency, but they can be either desirable or maladaptive depending upon the situation (Bohane et al., 2017). In this sense, individuals with overcontrolled type of personality score high on neuroticism and low on extroversion, and have high emotional control (Asendorpf et al., 2001; Boehm et al., 2002; Rosenström & Jokela, 2017). On the other hand, individuals with an undercontrolled personality type score low on conscientiousness and agreeableness (Asendorpf et al., 2001, Boehm et al., 2002; Rosenström & Jokela, 2017). Therefore, these latter individuals show high aggressiveness, impulsiveness, low self-control, antisocial behavior, and an inability to delay gratification (Donnellan & Robins, 2010; Yu, Yang, Sun, Jin, & Zhang, 2020).

Previous studies have shown that overcontrollers have internalizing tendencies (e.g. more inhibited and shyer, lower social self-esteem, more loneliness,

symptoms of depression and anxiety), and undercontrollers showed externalizing tendencies (e.g. higher rate of antisocial behavior, lower peer popularity, aggression, attention problems) (Asendorpf & Van Aken, 1999; Asendorpf et al., 2001; Boehm et al., 2002; Caspi, 1998; Donnellan & Robins, 2010; Rosenström & Jokela, 2017). Therefore, undercontrolled and overcontrolled personalities are linked to more severe symptoms. In particular, Bohane and colleagues (2017) state that under-controlled personalities can sometimes be associated with depression disorders.

Mental health

During the COVID-19 quarantine, several studies related to isolation have reported increased levels of anxiety, stress, and depression (Carvalho, Moreira, de Oliveira, Landim, & Neto, 2020; Haider, Tiwana, & Tahir, 2020; Shigemura, Ursano, Morganstein, Kurosawa, & Benedek, 2020; Wang et al., 2020). Isolation seems to intensify the symptoms of those with pre-existing psychiatric disorders or preclinical conditions. Furthermore, previous research has demonstrated that fear-related behaviors had an epidemiological impact, both individually and collectively, during all phases of a pandemic event, increasing the suffering and psychiatric symptom rates of the population (Reardon, 2015). For example, patients with confirmed or suspected of COVID-19 may experience fear of the consequences of infection with a potentially fatal virus, and those in quarantine might experience boredom, loneliness, and anger (Wang et al., 2020), feelings of worry and fear in everyday activities (Huang et al., 2020). Wang et al. (2020) suggests that on some occasions these conditions could be related to disorders such as depression and anxiety. In addition, the uncertainty about infection and death or about the risk of infecting family and friends can potentiate dysphoria (Maunder et al., 2003) as well as cause information processing biases consistent with stressful events that activate different symptoms (Cadenas et al., 2015).

Along these lines, Adhanom Ghebreyesus (2020) suggests that any success in addressing anxiety and distress symptoms in the population would make it easier for people to have the will and the internal resources to follow relevant guidance from the public health authorities. Poor mental health is associated with other health concerns in young adulthood like substance abuse, risky sexual behavior, and violence (Agardh, Cantor-Graae, & Östergren, 2011). Specifically, high levels of mental health symptoms such as depression, anxiety, and psychoticism are associated with less preventive health behaviors and more risk-taking behaviors (Agardh et al., 2011). For example, anxiety influences the ability to make rational decisions and people with high anxiety also tend to engage in a variety of other maladaptive safety behaviors (e.g., excessive hand washing, social withdrawal, and panic purchasing) (Asmundson & Taylor, 2020). Besides these behaviors, the prevalence of higher depression and anxiety levels has been associated with an increased perception of risk of being infected themselves or of infecting their family members, worries about getting COVID-19 related symptoms, concerns regarding the possibility of

contacting people who are infected with the SARS-CoV-2 virus without clinical symptoms and being scared by COVID-19 epidemic news (Huang et al., 2020). As for interpersonal sensitivity, Marin and Miller (2013) state that this symptomatology is characterized by ongoing concerns about social threats, and that it is associated with infectious disease. Similarly, Denollet (2013) mentions that social inhibition is a characteristic feature of people with a predominance of interpersonal sensitivity. As regards phobic anxiety, authors suggest that this manifestation is associated with irrational fears that appear repeatedly when being in contact with what causes that fear (Derogatis & Cleary, 1977; Lader & Mathews, 1968). In addition, the prevalence of psychological distress and psychopathological symptoms is higher in women (Agardh et al., 2011; Caparrós-Caparrós, Villar-Hoz, Juan-Ferrer, & Viñas-Poch, 2007; Casullo, 2004; Casullo & Castro Solano, 1994; Derogatis, 1994; Gempp Fuentealba & Avendaño Bravo, 2008).

Mental health symptomatology refers to both perceived physical and psychological symptoms. Therefore, it includes problems with sleep, eating, guilt, and thoughts of death (Casullo & Castro Solano, 1999). Derogatis' (1977) classification includes nine aspects of symptomatology: somatization, obsessions and compulsions, interpersonal sensitivity, depression, anxiety, phobic anxiety, paranoid ideation, psychoticism, and hostility.

Current study

As shown by prior research, individual differences of personality and mental health play a key role in perceived risk and readiness to comply with public health measures (Boehm et al., 2002; Booth-Kewley & Vickers, 1994; Carvalho et al., 2020; Dryhurst et al., 2020; Haider et al., 2020; Kline et al., 2019; Shigemura et al., 2020; Wang et al., 2020). Resilient profiles are characterized by high levels in most traits (except neuroticism), including conscientiousness and agreeableness, and these factors have been related to maintaining positive health behavior patterns and endorsement of social distancing and hygiene, as well as doing things for the benefit of others and of society (Blagov, 2020; Dryhurst et al., 2020; Kline et al., 2019) Therefore, it is expected that people with resilient and overcontrolled profiles would show better adjustment in their risk estimates related to COVID-19, and a higher probability of preventive behaviors than undercontrolled individuals. This is expected since an overcontrolled profile is associated with excessive control of their emotions and poor interaction with others (Caspi, 1998). Finally, according to previous studies which have shown that personality measures predict health behavior patterns (Booth-Kewley & Vickers, 1994), a significant effect should be expected regarding personality profile and mental health symptomatology on the estimation of risk and the estimation of the probability of engaging in preventive behaviors.

Considering this research background, the aim of this study was to analyze the effects of personality profiles and mental health on the perceived risk (being infected, getting hospitalized, and dying from COVID-19) and on preventive

behaviors (wash your hands, stay at home, maintain social distance, touch your face, and mask use) during the early phase of social isolation due to COVID-19.

METHOD

Participants

A non-probabilistic sample of 126 Argentinian adults (females: 79.4%) participated in this study. Participants were residents of Argentina, with age between 18 and 40 years old and have completed compulsory schooling. It was also important for the objectives of this research that participants did not present personality disorders or depression. To fulfill this last requirement, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) was used as filter and inclusion criteria. In addition, individuals who were one standard deviation below the mean of Raven's Progressive Matrices test (2005) were excluded from the sample.

Sample size and a non-probabilistic sampling could produce some bias effects in the results. The data collection was carried out in a structured and controlled manner, as explained in the Procedure section.

Measures

Sociodemographic questionnaire. A sociodemographic questionnaire was developed and administered to the participants. The collected information included: age, marital status, gender, nationality, level of education, city of residence, employment status, and type of occupation.

Estimation of Risk and Protective Behavior during COVID-19 scale. We developed a questionnaire for this study to measure the estimated adherence to behaviors, following World Health Organization (2020a) advice, which may reduce the probability of being infected or spreading COVID-19. The 5 items that evaluate these probabilities ask for a response on a scale of 0 to 100 of the likelihood of engaging in each preventive behaviors/care regarding the COVID-19 risk of infection (wash your hands, stay at home, maintain social distance, touch your face, and mask use). Three additional items were included to estimate the subjective probability of three health-risk outcomes: being infected with COVID-19, being infected, and getting hospitalized with COVID-19, and the probability of dying from COVID-19. These additional items were also reported on a scale of 0 to 100 regarding the subjective estimate of the probability of such events. All the perceived risks and the preventive behaviors measured were used in the analysis of this study.

Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). This manual is a self-report instrument used as a

diagnostic and taxonomic tool for the measurement of mental disorders. This instrument was used to filter the participants based on the established inclusion criteria.

Raven's Progressive Matrices test (2005). This test is used to measure fluent intelligence and abstract reasoning. It is generally used as a measure of general human intelligence. This instrument was used to filter the participants based on the established inclusion criteria.

Revised NEO Personality Inventory (NEO PI-R; Costa & McCrae, 1996). This instrument was used to measure five major factors of personality: neuroticism, extroversion, openness, agreeableness, and conscientiousness. It consists of 240 items scored on a 5-point Likert scale (0 to 4), which goes from 'totally agree' to 'totally disagree'. The NEO PI-R contains no health-related items and thus avoids any problem of confounding between those constructs. Traits showed good internal consistency values (*alphas* > .84- .93). Total scores of NEO PI-R (Costa & McCrae, 1996) for each personality trait were calculated and a k-means cluster analysis shifting the profiles into better-fitting clusters according to their Euclidean distance was subsequently performed.

Three groups were found based on the five personality traits using cluster analysis method (k-means; 3 iterations; extroversion $F = 36.181$; $p < .001$; agreeableness $F = 3.631$; $p < .05$; conscientiousness $F = 89.577$; $p < .001$; neuroticism $F = 52.819$; $p < .001$; openness $F = 10.482$; $p < .001$). Figure 1 shows the participants grouped into three profiles (overcontrolled, undercontrolled and resilient). A resilient profile was characterized by high extroversion and conscientiousness, moderate openness and agreeableness, and low neuroticism. An overcontrolled profile included low extroversion, openness, and agreeableness, and moderate conscientiousness and neuroticism. Finally, the undercontrolled profile involved high neuroticism, low conscientiousness, low extroversion and agreeableness, and mid-level openness.

Symptom Checklist-90 (SCL-90; Derogatis, Lipman, & Covi, 1973, Spanish version Casullo & Castro Solano, 1999). It is a self-administered symptom scale that measures the degree of psychological distress that a person experiences during the period from one week before to the time of the evaluation. It consists of 90 items which evaluate patterns of symptoms present in individuals. Each of the items that comprise the scale is answered based on a five-point scale (0-4). It evaluates nine primary dimensions: somatizations, obsessions and compulsions, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and three global indices of psychological distress. All dimensions showed good internal consistency values (*alphas* > .70 to .88). The overall *alpha* score obtained was .97. All the measured patterns of symptoms were used in the analysis of this study. To determine Mental Health levels of SCL-90 (Derogatis et al., 1973), the 50th percentile was used to regroup in high and low symptomatology.

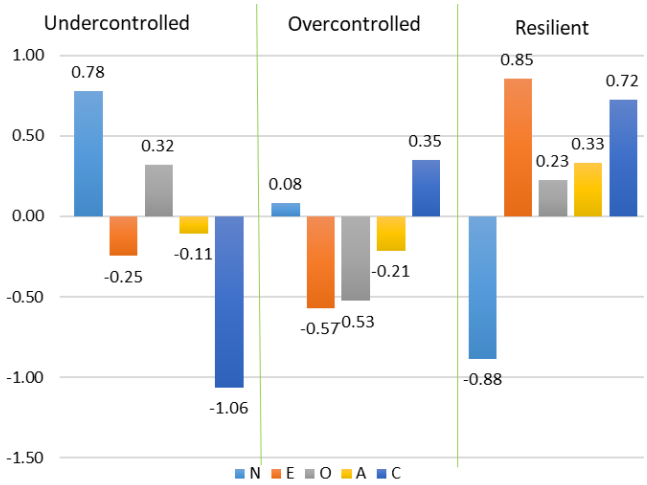

Figure 1. Three major personality prototypes characterized by their Big Five patterns

Procedure

Participants were invited to participate in the research through social networks and university courses. Those interested in participating were contacted individually via email so that they could contact the experimenter, if they wished. Each participant was informed of the objective of the investigation, the process and the commitment to confidentiality and anonymity of their participation. Participants recorded their voluntary participation agreement in an informed consent form, which also included the information that they could withdraw from the study at any point.

The instruments were administered online via the Inquisit Version 6.1.2 platform (Millisecond Software, 2020) and the session lasted 2 hours. At the time of administration, the experimenter connected by video-call to the cell phone or another device (other than the computer where the participant connected with the Inquisit platform) in order to monitor the session and assist the participant during the process. The experimenter checked that the subject understood each command, that responses were done without using a calculator or paper calculations, and that the participant was in an environment without distractions or interruptions.

The administration period took place during the mandatory preventive social isolation period, from the beginning of the second month of confinement until the beginning of the third month (April 23 to May 20, 2020), to ensure as much as possible a constant context of the pandemic event.

Data analysis

The data were prepared and analyzed using the SPSS 25 statistical program. The cumulative percentage of infection cases considering the population of the

participant's province (residence) for the specific day in which the battery was administered to each candidate, was subtracted from his/her estimated probability of infection. The cumulative percentage of people in intensive care units (ICU) taking into account the population of Argentina for the specific day in which the battery was administered to each candidate, was subtracted from his/her estimated probability of hospitalization. Finally, the cumulative percentage of deaths considering the overall Argentinian population for the specific day in which the battery was administered to each candidate, was subtracted from his/her estimated probability of dying from COVID-19.

Separate Kruskal-Wallis tests were performed to determine the effects of the personality profiles and each mental health symptomatology for the three health-risk estimated outcomes (differences between estimated and actual probabilities of: being infected, getting hospitalized, and dying from COVID-19) and for the probability of preventive behaviors (washing one's hands, staying at home, maintaining social distance, touching one's face, and using face masks). The 50 Percentile was used to determine the low and high groups within each mental health symptomatology for each personality profile (undercontrolled, overcontrolled, resilient) (see Table 1).

Bonferroni method was used to compensate for multiple comparisons, which adjusts the confidence level for each of the individual intervals aiming to control the family-wise error rate, i.e., the probability of incorrectly rejecting the true null hypothesis. The value of $p < .003$ was used for the evaluation of significance (three personality profiles and two mental health groups).

Table 1
Groups frequencies by personality profiles and mental health symptomatology.

		Personality Profile		
Mental Health Symptomatology		Undercontrolled	Overcontrolled	Resilient
Somatization	Low	20	20	24
	High	22	23	17
Obsessive Compulsiveness	Low	17	23	28
	High	25	20	13
Interpersonal Sensitivity	Low	15	24	31
	High	27	19	10
Depression	Low	17	20	30
	High	25	23	11
Anxiety	Low	17	23	29
	High	25	20	12
Hostility	Low	15	22	26
	High	27	21	15
Phobic Anxiety	Low	21	29	29
	High	21	14	12
Paranoid Ideation	Low	17	26	28
	High	25	17	13
Psychoticism	Low	19	19	28
	High	23	24	13

RESULTS

Descriptive analyses

Participants ranged in age from 18 to 40 (M = 23.33; SD = 5.54). Regarding their level of education, 54% were undergraduate university students, 15.9% postgraduate, and 30% reckoned only possessing high school diploma. 65% of participants reported working in several areas (health and social work, administration/business and marketing, research and science, construction and industry, education and IT, and services). Of those who work, 82% were working from home.

Table 2 shows descriptive statistics for each dependent variable: perceived preventive behaviors (washing one's hands, staying at home, maintaining social distance, touching one's face, and using face masks), and the three health-risk estimated outcomes (getting infected, hospitalized, and dying of COVID-19).

Table 3 shows the descriptive analysis of sociodemographic variables reported for the total sample and each personality profile (resilient, overcontrolled and undercontrolled).

Table 2

Descriptive statistics of the variables of preventive behaviors, risk estimates, personality traits, and mental health symptomatology

		Mean	*Standard Deviation*	*Min.*	*Max.*	*Skewness*	*Kurtosis*
Preventive Behaviors	Face Mask Use	96.94	10.07	5	100	-6.70	55.63
	Social Distance	91.00	12.86	35	100	-2.18	5.40
	Stay Home	85.78	19.66	0	100	-2.01	4.53
	Hand Wash	94.55	12.58	14	100	-3.77	17.45
	Touch Face	47.54	31.42	0	100	.00	-1.47
Risk Estimates	Dif. Subj. Prob. Infection with Real Prob.	33.50	24.08	.99	99.99	.73	-.30
	Dif. Subj. Prob Hospitalization with Real Prob.	17.88	19.52	-.02	89.99	1.74	2.88
	Dif. Subj. Prob. Deaths with Real Prob.	9.08	14,22	.00	69.99	2.56	6.90
Personality Traits	Extraversion	113.80	20.19	61	166	-.15	.03
	Agreeableness	118.37	16.09	76	154	-.08	-.14
	Conscientiousness	124.73	20.70	57	166	-.51	.16
	Neuroticism	95.33	24.35	20	160	-.00	.10
	Openness	122.21	16.63	71	167	-.10	-.01
Mental Health Symptomatology	Somatization	.94	.60	.00	3.25	1.06	1.68
	Obsessive Compulsiveness	1.42	.72	.00	3.10	.17	-.75
	Interpersonal Sensitivity	.85	.68	.00	2.78	1.01	.23
	Depression	1.33	.75	.00	3.23	.47	-.54
	Anxiety	.96	.71	.00	3.10	1.04	.74
	Hostility	.72	.56	.00	2.67	1.24	1.57
	Phobic Anxiety	.52	.68	.00	3.00	1.66	2.28
	Paranoid Ideation	.69	.70	.00	3.17	1.22	.81
	Psychoticism	.66	.54	.00	2.10	.69	-.27

Table 3
Descriptive statistics for each personality profile and the total sample

		Undercontrolled	Overcontrolled	Resilient	Total sample
Age	M years (SD)	26.29 (5.45)	25.79 (5.01)	26.93 (6.19)	23.33 (5.54)
Gender	Female	76.2%	79.1%	82.9%	79.4%
	Male	23.8%	20.9%	17.1%	20.6%
Marital Status	Single	80.5%	65.1%	68.3%	71.2%
	Living with someone	9.8%	30.2%	14.6%	18.4%
	Widow/er	0%	2.3%	0%	0.8%
	Married	4.9%	0%	17.1%	7.2%
	Divorced	4.9%	2.3%	0%	2.4%
Education Level	Completed High School	67.6%	57.9%	56.4%	60.5%
	Completed Tertiary Education	10.8%	2.6%	2.6%	5.3%
	Completed University	21.6%	39.5%	41%	34.2%
Exempt vs non-exempt occupation	Home Office	79.3%	80.8%	81.5%	80.5%
	At workplace	20.7%	19.2%	18.5%	19.5%

Gender differences

No differences were found by gender regarding any of the three health-risk estimated outcomes, nor the five reported probabilities of preventive behaviors (see Table 4).

Table 4
Mann-Whitney tests: Effects of gender on protective behaviors and perceived risks

Gender (*Median*)	Female	Male	*U*	*p*
Z Face Mask Use	.30	-.30	1091.5	.129
Z Social Distance	.54	.40	870.5	.070
Z Stay Home	.36	.26	1183.5	.519
Z Hand Wash	.43	.24	801.5	.061
Z Touch Face	.04	.39	1275.5	.944
Z Difference Subjective Prob Infection with real value	-.14	-.40	1014	.164
Z Difference Subjective Prob Hospitalization with real value	-.35	-.40	1229.5	.960
Z Difference Subjective Prob Deaths with real value	-.35	-.35	1225	.706

Effects of personality profiles and mental health symptomatology on risk estimates

Results in Table 5 show that there was a significant effect of personality profiles and the level of interpersonal sensitivity regarding the difference between the estimated probability and actual probability of getting infected (p = .044; E_R^2 = .09), getting hospitalized (p = .006; E_R^2 = .13) and dying (p = .001; E_R^2 = .17) of COVID-19.

In this sense, people with an undercontrolled profile and high levels of interpersonal sensitivity overestimate the probability of getting infected and dying from COVID-19 than those with a resilient profile and low levels of interpersonal sensitivity (see Figures 2 and 4). The former also overestimate the chances of being hospitalized and dying from this virus than those with an undercontrolled profile and low levels of interpersonal sensitivity (see Figures 3 and 4). Additionally, undercontrolled and high interpersonal sensitivity group also overestimates the probability of hospitalization more than those with an overcontrolled profile and low level of interpersonal sensitivity (see Figures 3).

Table 5
Kruskal-Wallis tests: Effects of personality profile and symptomatology on perceived risks.

	Personality Profile[*1] / Mental Health Symptomatology (*Median*)	U/ Low	R/ Low	O/ Low	U/ High	R/ High	O/ High	*H*	*p*	E_R^2	*Contrast*[*2]
Personality Profile / Somatization	Z Diff. Subj. Prob. Infection with Real Prob.	-.18	-.60	-.14	-.10	-.18	.41	8.18	.146	.07	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	.41	-.45	-.42	.05	-.19	-.45	4.90	.428	.04	-
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.18	-.56	-.35	-.32	-.21	-.42	8.77	.118	.07	-
Personality Profile / Obsessive Compulsive-ness	Z Diff. Subj. Prob. Infection with Real Prob.	-.20	-.54	.22	.22	-.60	-.14	7.35	.195	.06	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	-.07	-.45	-.50	.05	-.35	-.40	4.96	.420	.04	-
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.35	-.56	-.35	-.21	-.28	-.49	7.71	.173	.06	-
Personality Profile / Interpersonal Sensitivity	Z Diff. Subj. Prob. Infection with Real Prob.	-.49	-.60	.22	.22	-.37	-.39	11.41	.044	.09	U/High > R/Low
	Z Diff. Subj. Prob Hospitalization with Real Prob.	-.71	-.45	-.53	.10	-.27	-.40	16.45	.006	.13	U/High > U/Low U/High > O/Low
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.56	-.42	-.49	.34	-.25	-.35	20.40	.001	.17	U/High > U/Low U/High > R/Low
Personality Profile / Depression	Z Diff. Subj. Prob. Infection with Real Prob.	-.18	-.70	.22	.18	-.18	-.14	8.44	.134	.07	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	-.32	-.45	-.50	.05	-.19	-.40	6.22	.285	.05	-
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.42	-.56	-.49	-.21	-.21	-.35	10.89	.054	.09	-

	Personality Profile[*1] / Mental Health Symptomatology (*Median*)	U/ Low	R/ Low	O/ Low	U/ High	R/ High	O/ High	*H*	*p*	E_R^2	*Contrast*[*2]
Personality Profile / Anxiety	Z Diff. Subj. Prob. Infection with Real Prob.	-.25	-.81	.22	.59	-.16	-.14	10.50	.062	.09	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	-.45	-.45	-.40	.05	.56	-.45	16.11	.007	.13	R/High > R/Low
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.56	-.56	-.35	-.006	-.006	-.49	21.95	.001	.18	R/High > R/Low U/High > R/Low
Personality Profile / Hostility	Z Diff. Subj. Prob. Infection with Real Prob.	.12	-.70	.04	-.18	-.18	-.08	8.62	.125	.07	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	.28	-.45	-.40	.05	-.19	-.45	4.68	.456	.04	-
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.35	-.49	-.49	-.28	-.35	-.35	5.43	.365	.04	-
Personality Profile / Phobic Anxiety	Z Diff. Subj. Prob. Infection with Real Prob.	-.27	-.81	.22	.41	-.39	-.14	10.04	.074	.08	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	-.45	-.45	-.45	.28	.31	-.40	12.84	.025	.10	-
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.42	-.56	-.35	.06	-.11	-.49	16.54	.005	.13	U/High > R/Low
Personality Profile / Paranoid Ideation	Z Diff. Subj. Prob. Infection with Real Prob.	-.08	-.58	.26	.06	-.60	-.50	8.06	.153	.07	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	-.19	-.45	-.45	.05	-.19	-.42	4.05	.542	.03	-
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.00	-.53	-.49	-.35	-.28	-.35	6.70	.243	.05	-
Personality Profile / Psychoticism	Z Diff. Subj. Prob. Infection with Real Prob.	-.20	-.58	.68	.18	-.60	-.47	10.18	.070	.08	-
	Z Diff. Subj. Prob Hospitalization with Real Prob.	-.45	-.45	-.45	.05	-.19	-.40	8.02	.155	.07	-
	Z Diff. Subj. Prob. Deaths with Real Prob.	-.42	-.56	-.49	-.21	-.00	-.35	14.73	.012	.12	U/High > R/Low

[*1] U: Undercontrolled; R: Resilient; O: Overcontrolled

[*2] Contrasts considering Bonferroni's correction.

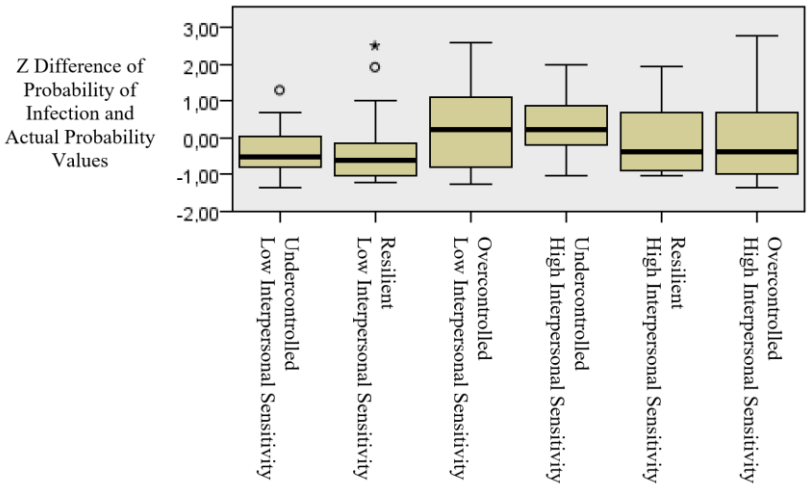

Figure 2. Personality Profile- Interpersonal Sensitivity group effects on difference between infection estimates and actual probability values.

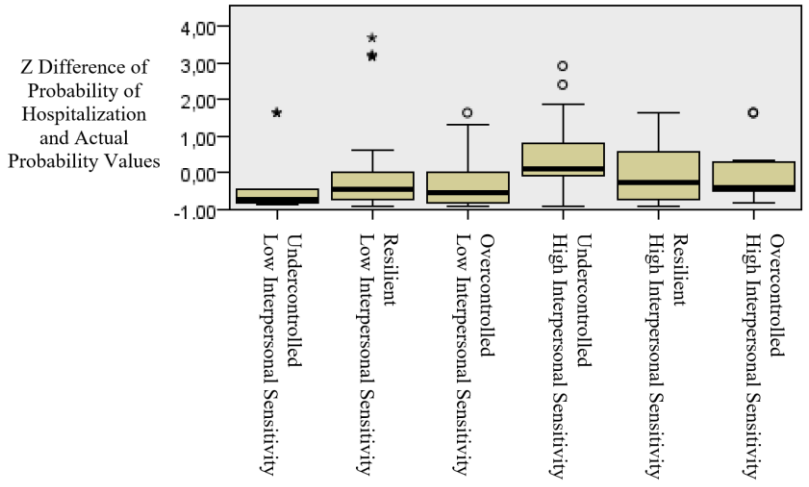

Figure 3. Personality Profile- Interpersonal Sensitivity group effects on difference between Hospitalization estimates and actual probability values

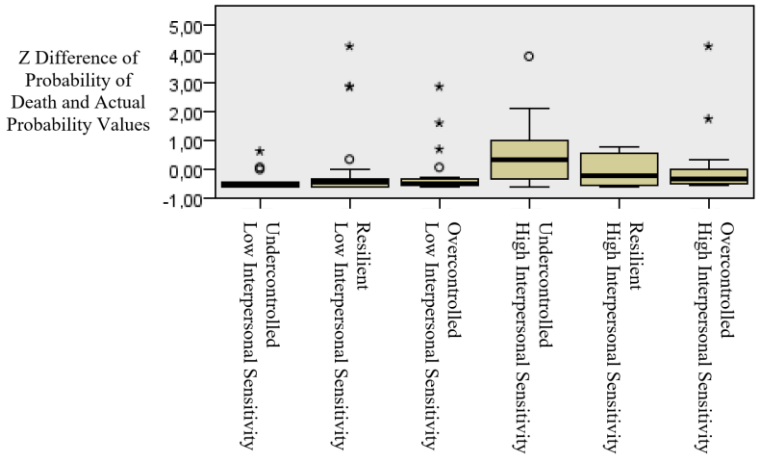

Figure 4. Personality Profile- Interpersonal Sensitivity group effects on difference between Death estimates and actual probability values

A significant effect was found of resilient profile and anxiety level group on probability estimates of hospitalization (p = .007; E_R^2 = .13) (see Figure 5) and dying because of COVID-19 (p = .001; E_R^2 = .18) (see Figure 6). People with a resilient profile and a high level of anxiety symptoms have higher difference between their risk estimates (of being hospitalized and of dying from COVID-19) and the real probability compared to resilient people with low anxiety. In other words, resilient people that suffer high anxiety have less adjustment overestimating these events. Statistically significant difference was also found between people with an undercontrolled profile and high levels of anxiety and those with a resilient profile and low levels of anxiety. In this sense, the former showed a greater difference in their estimates of the probability of dying compared to the real probability (see Table 5 and Figure 6).

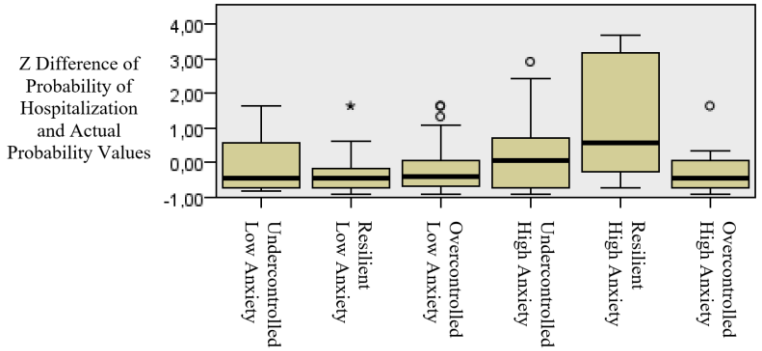

Figure 5. Personality Profile- Anxiety group effects on difference of Hospitalization estimates and actual probability values

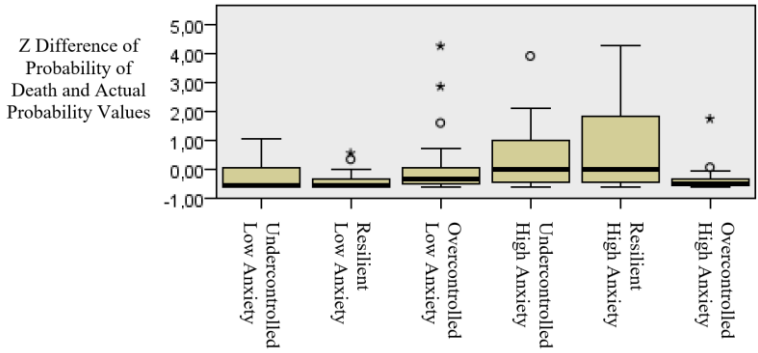

Figure 6. Personality Profile- Anxiety group effects on difference between Death estimates and actual probability values

There was a significant effect of personality profiles and phobic anxiety (p = .005; $E_R{}^2$ = .13), as well as personality profile and psychoticism (p = .012; $E_R{}^2$ = .12) on the difference between the estimated probability and actual probability of dying of COVID-19 (see Table 5). Individuals with an undercontrolled profile and high levels of this mental health symptomatology overestimate the probability of death compared to those with a resilient profile and low levels of this symptomatology (see Figures 7 and 8).

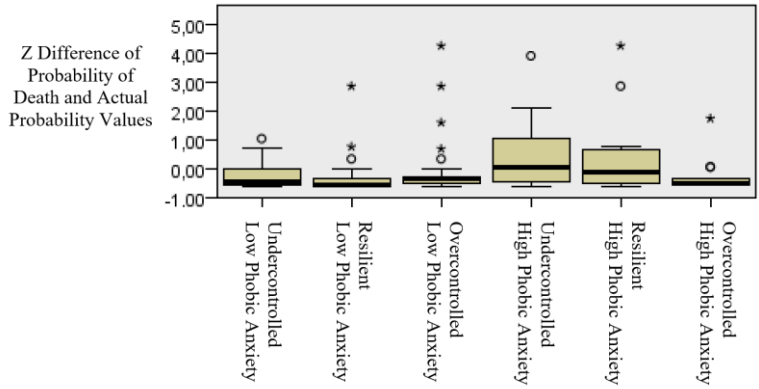

Figure 7. Personality Profile- Phobic Anxiety group effects on difference between Death estimates and actual probability values

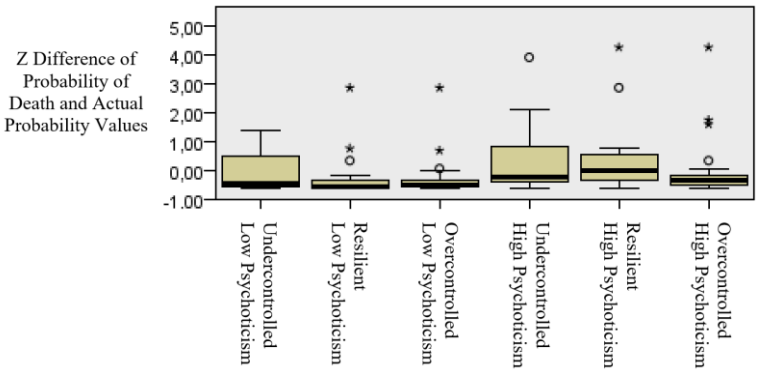

Figure 8. Personality Profile- Psychoticism group effects on difference between Death estimates and actual probability values

Effects of personality profiles and the other health symptoms on risk events estimates were non-significant (see Table 5).

Effects of personality profiles and mental health symptomatology on preventive behaviors

There was a significant effect of personality profiles and interpersonal sensitivity (p = .022; E_R^2 = .11), as well as personality profile and anxiety (p = .035; E_R^2 = .10) on the subjective probability of maintaining social distance (see Table 6). Specifically, a significant difference was found between people with a resilient profile and high levels of interpersonal sensitivity and those with an undercontrolled profile and high levels of interpersonal sensitivity: the former reported higher probabilities of maintaining social distance than the latter (see Figure 9). Also, people with a resilient profile and high levels of anxiety reported higher probabilities of maintaining social distance than individuals with an undercontrolled profile and high levels of anxiety (see Figure 10).

No significant effects were found on the subjective probability estimate of the other preventive behaviors, nor based on other mental health symptomatology (see Table 6).

Table 6

Kruskal-Wallis tests: Effects of personality profile and symptomatology on protective behaviors

	Personality Profile[*1] / Mental Health Symptomatology (*Median*)	U/ Low	R/ Low	O/ Low	U/ High	R/ High	O/ High	*H*	*p*	E_R^2	*Contrast*[*2]
Personality Profile / Somatization	Z Face Mask Use	.30	.30	.30	.30	.30	.30	2.01	.847	.02	-
	Z Social Distance	.23	.58	.54	.00	.54	.38	7.21	.205	.06	-
	Z Stay Home	.41	.69	.39	-.16	.46	.49	10.55	.061	.09	-
	Z Hand Wash	.43	.43	.43	.43	.43	.43	3.94	.558	.03	-
	Z Touch Face	.34	-.74	-.51	.68	-.08	.55	10.76	.056	.09	-
Personality Profile / Obsessive Compulsiveness	Z Face Mask Use	.30	.30	.30	.30	.30	.30	2.15	.828	.02	-
	Z Social Distance	.38	.42	.54	.00	.69	.38	10.58	.060	.09	-
	Z Stay Home	.26	.69	.51	-.09	.51	.36	5.68	.339	.05	-
	Z Hand Wash	.43	.43	.43	.43	.43	.43	2.34	.799	.02	-
	Z Touch Face	.07	-.63	.07	.58	-.71	.39	9.04	.107	.07	-
Personality Profile / Interpersonal Sensitivity	Z Face Mask Use	.30	.30	.30	.30	.30	.30	1.25	.940	.01	-
	Z Social Distance	.38	.46	.54	.00	.69	.38	13.16	.022	.11	R/High > U/High
	Z Stay Home	.26	.51	.51	.11	.72	.31	5.58	.348	.05	-
	Z Hand Wash	.43	.43	.43	.43	.43	.43	2.65	.753	.02	-
	Z Touch Face	.07	-.71	.06	.68	-.47	.39	8.86	.114	.07	-
Personality Profile / Depression	Z Face Mask Use	.30	.30	.30	.30	.30	.30	1.20	.944	.01	-
	Z Social Distance	.31	.50	.62	-.07	.62	.38	11.87	.037	.10	-
	Z Stay Home	.26	.72	.51	.01	.26	.46	6.26	.281	.05	-
	Z Hand Wash	.43	.43	.43	.43	.43	.43	3.52	.620	.03	-
	Z Touch Face	-.52	-.73	-.46	.68	-.23	.39	11.62	.040	.09	-
Personality Profile / Anxiety	Z Face Mask Use	.30	.30	.30	.30	.30	.30	3.55	.616	.03	-
	Z Social Distance	.38	.38	.38	.00	.66	.54	11.96	.035	.10	R/High > U/High
	Z Stay Home	.46	.67	.51	-.24	.49	.36	10.03	.074	.08	-
	Z Hand Wash	.43	.43	.43	.43	.43	.43	5.46	.362	.04	-
	Z Touch Face	.07	-.74	.07	.58	.31	.39	10.34	.06	.08	-
Personality Profile / Hostility	Z Face Mask Use	.30	.30	.30	.30	.30	.30	1.66	.894	.01	-
	Z Social Distance	.38	.58	.38	.00	.54	.54	8.94	.111	.07	-
	Z Stay Home	.36	.72	.36	-.09	.26	.51	8.54	.129	.07	-
	Z Hand Wash	.43	.43	.19	.43	.43	.43	8.15	.148	.07	-
	Z Touch Face	-.23	-.63	.39	.39	-.71	.07	9.82	.080	.08	-
Personality Profile / Phobic Anxiety	Z Face Mask Use	.30	.30	.30	.30	.30	.30	2.55	.768	.02	-
	Z Social Distance	.07	.38	.38	.00	.69	.62	11.44	.043	.09	-
	Z Stay Home	.01	.72	.26	.26	.36	.51	4.55	.472	.04	-
	Z Hand Wash	-.04	.43	.43	.43	.43	.43	10.21	.069	.08	-
	Z Touch Face	.39	-.74	.07	.39	-.16	.39	7.59	.180	.06	-
Personality Profile / Paranoid Ideation	Z Face Mask Use	.30	.30	.30	.30	.30	.30	6.62	.250	.05	-
	Z Social Distance	.38	.50	.54	.00	.54	.38	9.19	.102	.07	-
	Z Stay Home	.26	.72	.26	.11	.26	.51	7.11	.212	.06	-
	Z Hand Wash	.43	.43	.43	.43	.43	.43	4.66	.458	.04	-
	Z Touch Face	.68	-.31	.23	-.23	-1.03	.23	10.16	.071	.08	-
Personality Profile / Psychoticism	Z Face Mask Use	.30	.30	.30	.30	.30	.30	8.79	.118	.07	-
	Z Social Distance	.38	.50	.38	-.07	.54	.54	10.58	.060	.09	-
	Z Stay Home	.26	.72	.26	.01	.26	.51	7.56	.182	.06	-
	Z Hand Wash	.43	.43	.43	.43	.43	.43	6.17	.290	.05	-
	Z Touch Face	.30	-.47	-.46	.58	-.74	.71	11.13	.049	.09	-

[*1] U: Undercontrolled; R: Resilient; O: Overcontrolled

[*2] Contrasts considering Bonferroni's correction.

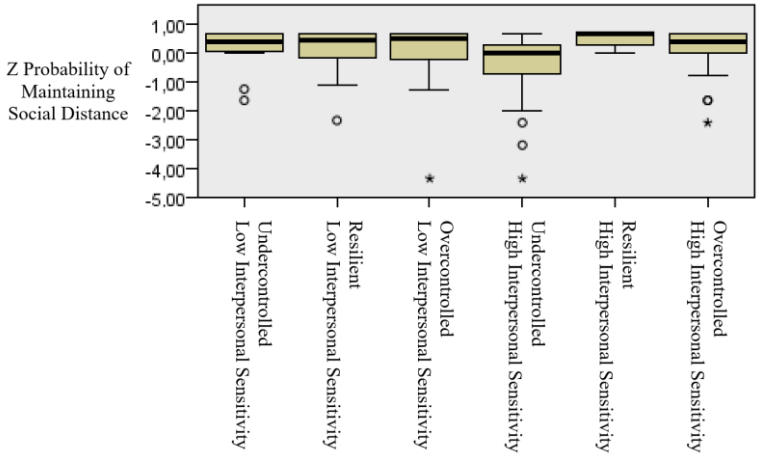

Figure 9. Personality Profile- Interpersonal Sensitivity group effects on Social Distance

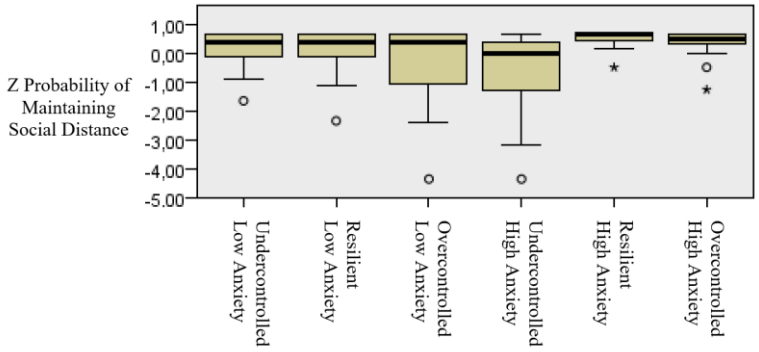

Figure 10. Personality Profile- Anxiety group effects on Social Distance

Regression analysis

After assessing the effects described above, an evaluation of the explanatory capacity of personality traits and mental health symptomatology regarding the perceived risk and preventive behaviors was performed. Descriptive statistics of the variables of Preventive Behaviors, Risk Estimates, Personality Traits, and Mental Health Symptomatology can be observed in Table 2.

The regression analysis of risk estimation suggests that anxiety explains significantly 4% of the difference in the estimation of subjective probability of COVID-19 infection with the actual probability value (β = .222; p < .05), while depression explains 5% of the difference in the estimation of subjective probability of COVID-19 death with the actual probability value (β = .238; p < .01). For preventive behaviors,

conscientiousness as a personality trait explains 3% of face mask use (β = .189; p < .05), and 12% of social distancing behavior (β = .362; p < .001). Hostility explains negatively 10% of stay-at-home behavior (β = -.322; p < .01), depression explains positively 6% of touching face behavior (β = .364; p < .01). Furthermore, the model that includes phobic anxiety (β = .364; p < .01) and psychoticism (β = -.284; p < .01) explains 8% of hand-washing behavior (R^2 *change* = 0.043 to 0.056) (See Table 7).

Table 7.
Linear Regression Models of perceived risk and protective behaviors.

Dependent Variable*	Model	Independent Variables*	β	t	p	Adjusted R^2
Dif. Subj. Prob. Infection with Real Prob.	1	Anxiety	.222	2.516	.013	.042
Dif. Subj. Prob. Death with Real Prob.	1	Depression	.238	2.719	.007	.049
Face Mask Use	1	Conscientiousness	.189	2.134	.035	.028
Social Distance	1	Conscientiousness	.362	4.303	.000	.124
Stay Home	1	Hostility	-.322	-3.775	.000	.097
Touch Face	1	Depression	.251	2.875	.005	.055
Handwashing	1	Phobic Anxiety	.207	2.343	.021	.035
	2	Phobic Anxiety	.364	3.528	.001	.084
		Psychoticism	-.284	-2.758	.007	

* Models were developed using the standardized values (Z) of the variables.

DISCUSSION

The aim of this study was to examine the effect of individual differences in personality and mental health on the perception of risks from COVID-19, and on the estimated engagement in preventive behaviors, during the early period of mandatory quarantine in Argentina.

Results suggest that an undercontrolled personality profile with high interpersonal sensitivity is associated with a greater overestimation of the probability of getting infected, hospitalized, and dying from COVID-19, compared with resilient and undercontrolled profile with low interpersonal sensitivity. High levels of neuroticism and low conscientiousness that characterize an undercontrolled personality profile (Asendorpf et al., 2001; Rosenström & Jokela, 2017) are stable traits that were found related with a more willingness to take more risks in previous studies (Castanier et al., 2010). A stressful event as the pandemic could activate in undercontrolled individuals ongoing concerns about social threats (Marin & Miller, 2013) and social inhibition symptoms (Denollet, 2013). The uncertainty about infection and death or about the risk of infecting family and friends can potentiate dysphoria (Maunder et al., 2003) as well as cause information processing biases consistent with stressful events that activate different symptoms (Cadenas et al.,2015).

The same pattern was found for people with an undercontrolled personality profile with high levels of phobic anxiety or psychoticism: they overestimate the

probability of death more than resilient people with low levels of these symptomatology. These results are consistent with previous findings that point out that undercontrolled profiles are linked to more severe symptoms than resilient profiles (Bohane et al., 2017). In addition, phobic anxiety is related to the presence of irrational fears (Derogatis, 1977; Lader & Mathews, 1968), while psychoticism has shown to be associated with less preventive health behaviors and more risk-taking behaviors (Agardh et al., 2011).

Personality profiles have also demonstrated a joint effect with anxiety symptoms on risk estimates. Specifically, a high level of anxiety during the first month of the quarantine seems to impact on resilient people overestimating their probability of being hospitalized and of dying of COVID-19, compared with resilient people with low anxiety values. On the one hand, the literature has identified a resilient profile as more flexible to changes, characterized by a low level of neuroticism and high levels of the other traits (Boehm et al., 2002). On the other hand, an exacerbated manifestation of anxiety is characterized by nervousness, dysfunctional beliefs about health and illness, and maladaptive coping behaviors (Asmundson & Taylor, 2020; Casullo, 2004; Casullo & Castro Solano, 1999; Derogatis, 1977). High anxiety led to an increased perception of risk (Agardh et al., 2011). Thus, a stressful event like the COVID-19 pandemic can be perceived as threatening by increasing anxiety, even when threat sensitivity as a trait is low. In this case, this anxiety as a symptom could be related to a contextualized anxiety rather than to trait anxiety, as a form of reaction to the situation being experienced as threatening.

Individuals with a resilient personality profile and high levels of anxiety reported higher probabilities of maintaining social distance than those with an undercontrolled profile and high levels of anxiety. On the one hand, the influence of the personality profile (resilient versus undercontrolled) is crucial since at the same high anxiety levels, the resilient people take greater preventive behaviors and try to omit risk (Bohane et al., 2017). In addition, previous findings have suggested that individuals with undercontrolled profiles are associated with higher rates of antisocial behavior (Boehm et al., 2002). Although previous research has shown a significant association between anxiety and less engagement in preventive health behavior, with more risk-taking behavior (Agardh et al., 2011; Asmundson & Taylor, 2020), it depends on the more basic and stable personality traits. The same pattern was found for resilient individuals with high interpersonal sensitivity: they report a greater probability of maintaining social distance than undercontrolled individuals with high levels of interpersonal sensitivity. Again, although interpersonal sensitivity is characterized by ongoing concerns about social threats (Marin & Miller, 2013), personality traits as high extroversion and conscientiousness, moderate openness and agreeableness, and low neuroticism, could help in the development of more preventive behavior as maintaining social distance. This result is consistent with previous studies that have found the undercontrolled profiles as more prone to taking risks than resilient ones (Bohane et al., 2017).

The results of the model that includes phobic anxiety and psychoticism explain 8% of the estimated probability of complying with handwashing behavior. The variable with the most explanatory power in this model is phobic anxiety; it explains the estimated probability of handwashing behavior. This reflects the persistent fear response, causing avoidance or escape behavior (Casullo & Castro Solano, 1999). Even though the low power of the effect, psychoticism shows a negative relationship with the estimated probability of handwashing behavior, resulting in less care behavior (Derogatis, 1977).

Results from the linear regression analysis of risk estimation demonstrated that anxiety explains only 4% of the difference between the estimates of subjective probability of risk of infection with COVID-19 and the actual values of this risk in the population. Similarly, depression explains 5% of the difference between the estimates of the subjective probability of dying from COVID-19 infection and the actual probability of dying derived from population values. Anxiety and depression can activate biased information processing that corresponds to the pandemic conditions (Cadenas et al., 2015; Huang et al., 2020; Maunder et al., 2003). However, the variance explained by these factors is quite low. Therefore, future studies should consider other variables such as individual differences in coping strategies, management of anxiety, and other cognitive resources that could explain the observed variations in risk estimates.

Regarding preventive behaviors, individuals with higher levels of conscientiousness will show higher probability of engaging in social distancing behavior and use of face masks. These results are consistent with recent studies (Blagov, 2020; Kline et al., 2019), which report that traits like conscientiousness could promote prosocial behaviors such as social distancing. Hence, our results support the hypothesis that conscientiousness could help in maintaining positive health behavior patterns (Booth-Kewley & Vickers, 1994). Finally, it was found that hostility explains negatively 10% of the estimate of staying-at-home behavior. The literature shows that hostility refers to a state of anger and explosive behavior (Casullo & Castro Solano, 1999). Therefore, those with high hostility would not stay calm during the pandemic, thus, impacting on their behavior. Depression explains 6% of the estimated probability of face-touching behavior. These results support the hypothesis that high levels of depression are associated with less preventive health behaviors (Agardh et al., 2011).

Limitations. In the linear regression analyses, the contributions of personality traits such as conscientiousness and some symptoms as anxiety and depression are low according to our results (between 3 and 12%). These findings suggest that preventive coping behaviors during a pandemic are complex phenomena. Therefore, other sociocultural variables related to the specific context, socio-economic background of the population of each country (or residence area), and social behavior, should all be considered together with personality traits in future studies.

Sample size and a non-probabilistic sampling could produce some bias effects in the data set. Thus, future studies should try to increase the sample size and obtain a stratified random sample. In addition, the distributions of the variables used in the regression models show deviations from normality, so future research with larger samples could re-analyze these phenomena and yield more robust results. Although no significant differences were found according to gender, a balanced male-female ratio, with a broad age range could be considered in a future study.

Anxiety is related to the amount and type of information that people manage during a crisis (Calvillo et al. 2020; Dryshurst et al., 2020). Future research should consider these variables moderating or mediating the effects of anxiety found in this study.

Based on the limitations described, the authors consider that future studies should re-analyze the effects of personality profiles and mental health symptoms, since the non-significant results of this study could be affected by issues such as sample size and consequently, the low power of the test.

Implications and conclusion. Some studies have found a high level of mental disorders as a consequence of long periods of isolation, situations of uncertainty or stress (Allegrante et al., 2020; Carvalho et al., 2020; Haider et al., 2020; Ornell et al., 2020; Shigemura et al., 2020; Wang et al., 2020). The present research studied the effect of mental health symptoms with personality traits on the estimation of risk of some negative health outcomes, and on the estimation of the probability of engaging in health protective behaviors.

Considering a pandemic with the characteristics of COVID-19, in a context where the implications for mental health tend to be overlooked due to other emergencies of society (Ornell et al., 2020), being able to understand how different people perceive the associated risks and behave accordingly is very important. Knowing the effect of symptomatology and personality on the subjective perceptions of individuals is essential to develop strategies for preventing infection. In this sense, the main results show that personality profiles combined with specific symptoms have a small effect size on the risk estimates and on the protective behaviors estimates.

These findings could be useful to implement more effective and realistic strategies to promote the adoption of preventive behaviors. Thinking about future situations similar to the one experienced during 2020, results might help mental health practitioners communicate to patients and the general public in a more effective way the experienced situation related COVID-19.

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