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Original article

Determinants of sanitary measures and lockdown compliance among health professionals during the COVID-19 pandemic

Les déterminants de l'observance des mesures sanitaires et de confinement des professionnels de santé durant la pandémie de COVID-19

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ABSTRACT

Introduction. – COVID-19 pandemic forced several countries to establish sanitary and lockdown measures to prevent the spreading of the virus. Only necessary workers were allowed to work, including health workers in hospitals.
Objectives. – This study explores the association between some variables and sanitary measures compliance among health workers during a pandemic.
Method. – A total of 299 Health workers were recruited online using social networks. Participants completed questionnaires evaluating personality, coping, Anxiety and depression, psychological flexibility and sanitary measures compliance.
Results. – Correlations indicated most observant participants were more likely to present efficient coping and more based on problem solving. Also, Honesty-Humility as a personality trait was positively correlated to a better compliance. Regressions indicated the perceived utility of sanitary measures was the strongest predictor for compliance among health workers. Honesty-Humility and sanitary risks perception were predictors for compliance.
Conclusions. – This study conducted among health workers points indicates variables associated with higher compliance. Our results suggest compliance and non-compliance as health behaviours or risk behaviours are linked to perceived threats. This perception is linked to health workers' knowledges, their coping strategies, and personality.

Mots clés :
Observance
Soignants
Personnalité
Coping
COVID-19

RÉSUMÉ

Introduction. – La pandémie COVID-19 a obligé de nombreux pays à mettre en place des mesures sanitaires et de confinement afin d'en ralentir la propagation. Seules les professions nécessaires ont poursuivi leurs activités, dont les professionnels de santé en milieu hospitalier.
Objectif. – Cette étude a pour but l'exploration de facteurs en jeu dans l'observance des mesures sanitaires auprès du personnel médical hospitalier en période de pandémie.
Méthode. – Un total de 299 professionnels de santé a été recruté via les réseaux sociaux. Les participants ont complété des questionnaires évaluant la personnalité, le coping, l'anxiété et la dépression, la flexibilité psychologique et l'observance des mesures sanitaires.
Résultats. – Les corrélations effectuées ont montré que les participants les plus observants sont ceux qui présentaient un coping efficace, et principalement axé sur la résolution de problèmes. De plus, l'honnêteté comme trait de personnalité était corrélée positivement à une meilleure observance. Nos

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régressions ont indiqué que l'utilité perçue des mesures sanitaires est le plus solide prédicteur de l'observance chez les professionnels de santé. L'honnêteté et la perception des risques sanitaires sont apparues comme des facteurs prédicteurs de l'observance.
Conclusion. – Cette étude menée auprès de professionnels de santé a permis de mettre en évidence certains facteurs associés à une meilleure observance. Nos résultats suggèrent que l'observance et la non-observance en tant que comportements de santé ou à risques est influencée par la perception des menaces. Cette perception est liée aux connaissances des professionnels de santé, le coping à l'œuvre et la personnalité.

1. Introduction

The year 2020 has been marked by the COVID-19 pandemic. This coronavirus causes respiratory infections and by July 2020 had already entailed over 600 thousand deaths all around the world, including 30 thousand confirmed deaths in France (Dong et al., 2020). In France, the government imposed a lockdown and partial unemployment to keep people at home. Only essential workers were authorized to go to work. These workers included health professionals such as nurses, physiotherapists or physicians. They faced great risks to ensure the continuity of the French medical system and treat patients suffering from COVID-19. The virus is highly transmissible, one infected person spreading it to an average number of three other persons (Verity et al., 2020). It is necessary that health-workers follow health measures and behaviors required by the government in everyday life for their families and co-workers and to prevent spreading the virus since many nosocomial infections are transmitted by their hands (Pittet et al., 1999; Anderson et al., 2020; Les gestes barrières, 2020). In this study, we will focus on the psychological factors linked to compliance with health measures among health professionals.

1.1. Compliance concept and personality

Compliance is an important concept in health-related topic. There is no consensual definition of this concept, although previous studies have retained a certain number of elements in common to clarify compliance or its synonyms, such as adherence (Kyngäs et al., 2000). In the latter study, the authors stressed cognitive-motivational processes, self-care behaviours and professional power over the patient to make them follow clinical instructions in their definition of compliance. As mentioned by Tarquinio and Tarquinio (2007), a correct conception of compliance cannot be limited to a passive individual following medical advice; it must also include the nature of the threat, knowledge about it, and what we understand about it. To summarise, compliance must also refer to the ability to optimise self-health. To summarise, compliance is the concordance between health rules or recommendations, one's active behaviours and health beliefs (Morin, 2001a, b). It slightly differs from therapeutic adherence which includes the idea of health measure understanding and approval (Salicru, 1997) We will retain these ideas for our study.

In order to study compliance among health workers, we reviewed two models. Theoretical models in health psychology consider intrinsic factors as predictors of behaviours. Azjen, in his theory of planned behaviour, included perceived behavioural control as a predictor of the intention behind health actions. This theory is frequently used to predict compliance among nurses (Ajzen et Fishbein, 1988; Ajzen, 1985, 1991, Fischer & Tarquinio, 2014; Ogden, 2008; Auzoult et al., 2015). Another major model in health psychology, the integrative and multifactorial model (Bruchon-Schweitzer et al., 2014) emphasises an individual's psychosocial history, notably how personality traits are related to interactions between individuals and situations, leading to behaviours. As mentioned in the meta-analysis by Tarquinio and Tarquinio (2007), patients' characteristics are part of the factors influencing compliance. Consoli and Safar observed profiles linked to compliance in HTA treatment (as cited in Sarradon et al., 2008). This role is also supported by Sobel (cited in Scheen & Giet, 2010), who found that personality traits were related to compliance when the practitioner-patient relation was not strong enough. Following recent studies and considering our target population, we grounded the study to the HEXACO model. Some studies established profiles based on HEXACO traits and linked to coping strategies (Gojković et al., 2021). In that study, Conscientiousness and Extraversion were negatively associated with risk taking behaviours and adaptive resilience. Honesty-Humility traits in the HEXACO model refers to prosocial behaviours and refraining ourselves to act against other individuals (Thielmann et al., 2020). During a pandemic requiring social distancing and taking action for ourselves, our surroundings and the society, study on stockpiling during the COVID-19 pandemic hints Honesty-Humility is suited to explain some preventive and risk-taking behaviours, since this trait is positively associated with prosocial behaviours (Columbus, 2021).

1.2. Coping strategies and psychological flexibility during the pandemic

Although theoretical models have shown that personality traits may be associated with compliance, it cannot be predicted by a single factor (Tarquinio & Tarquinio, 2007). Compliance is linked to coping as coping strategies determine the way people manage situations. For example, following the 5-factor model of personality, Extraversion predicts social support-oriented strategies (Shakespeare-Finch et al., 2005). Various models in health psychology use coping as a major predictor for health behaviours, notably in the integrative multifactorial model (Bruchon-Schweitzer et al., 2014). Coping is defined as the strategies used to reduce the stress caused by a problem (Lazarus & Folkman, 1984). Compliance can be considered as a problem-focused coping strategy when faced with a disease (Ferreira et al., 2010). Some research has shown that problem-focused coping is a is related to better compliance among patients suffering from diabetes, whereas emotional-focused coping predicts poorer compliance (Julien, 2007). In a study investigating the influence of coping style on adherence among Cystic Fibrosis Patients, Abbott et al. (2001) identified differences in coping style, for example avoidance coping strategies were associated with non-adherence, supporting the role of coping in compliance. Regarding the pandemic, a recent study found the choice of a coping mechanism related to COVID-19 fears is related to personality profiles, based on the HEXACO model (Gojković et al., 2021).

Our coping strategies are mediated by our psychological flexibility. This concept is part of the representative approach of Acceptance and Commitment Therapy (ACT) and described as the ability to take actions while experiencing uncomfortable thoughts and feelings (Dionne et al., 2013), but also accept bad events in order to gain strategies to overcome them (Billoux et al., 2012). Work by Cheng (cited in Kashdan & Rottenberg, 2010) studied the interaction between coping and psychological flexibility and found that regardless of the coping style, good flexibility and good coping were associated with less anxiety and fewer depression symptoms in daily life than poor flexibility. Various studies support the link between coping and psychological flexibility, as this concept has a buffering impact on problem-focused coping (Leonidou et al., 2016). Given the psychological outcomes of the pandemic, it is important to study the role of psychological

flexibility on compliance. The difficulty in containing the virus and the lack of knowledge about it have led to an increased mental disorders prevalence (Salari et al., 2020). During the pandemic, high prevalence of generalized anxiety symptoms and depression symptoms were shown (Bäuerle et al., 2020). Recently, psychological flexibility appeared to be a protective psychological resource during the pandemic by moderating the psychological impact of the fear about the pandemic, lack of contact and psychological outcomes of the COVID-19 lockdown (Pakenham et al., 2020).

1.3. The present study

Our main purpose was to study the factors associated with the compliance with health measures among health professionals. On the one hand, we hypothesize that compliance will be linked to personality and on the other hand, given the literature, we hypothesize that better coping and psychological flexibility will be positively associated with greater compliance. We also hypothesize that anxiety and depression will be associated with compliance.

2. Method

2.1. Procedure and participants

A quantitative method was used in this study. Our survey was available online for all health workers in France for a month and was shared on social networks, from mid-April to mid-May 2020, the end of lockdown in France. All participants were 18 or more and were health professionals in contact with patients in hospital or in private practice. The survey consisted of six questionnaires, totalling 166 items, and took approximately 20 minutes.

The first page of the survey was a brief introduction giving participants information about the research team, the theme of the study, the time needed to answer and also the confidentiality and anonymity of the data (RGPD number: 202004211820). The study was approved by the Research Ethics Committee of Toulouse (2020-270, favourable advice provided on 22 April 2020).

During the online availability of the survey for any health worker, 501 health-workers began answering our questionnaire and 299 completed it. All of them considered that their work put them at risk of contracting the COVID-19 virus. We based our statistical analyses on this sample ($n = 299$).

2.2. Measures

2.2.1. Sociodemographic measures

The sociodemographic questionnaire explored variables, such as gender, age, marital and professional status, and place of residence. We also questioned our participants about their health by asking them if they suffered from a chronic disease or mental disorder, were pregnant, and if they were currently undergoing medical follow-up with a practitioner.

Participants were also questioned about their negative emotional experience of the lockdown with a 10-point Likert scale ranging from "I feel fine" to "I feel very bad", higher score indicating greater distress from the lockdown emotional experience. Participants were asked if their work put them at risk of contracting the virus or not, and if they answered "Yes" to the previous question, they were asked if they were health-workers.

Five questions concerned the COVID-19 virus. Respondents were asked if they had contracted the virus, if one or more of their relatives had contracted it, were hospitalized because of it, or had died from it. A 10-point Likert scale was also used to ask about their fear of contracting the virus, ranging from "Absolutely not worried" to "extremely worried", higher scores indicating greater fear of contracting the COVID-19.

2.2.2. Personality traits

The HEXACO-60 is a 60-item questionnaire giving a measure of the six major dimensions of personality: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness and Openness to experience (Ashton & Lee, 2009). Participants were invited to respond on a 5-point Likert scale ranging from "Strongly disagree" to "Strongly agree". In our study, internal consistency was acceptable with Cronbach's $\alpha = 0.74$ for Honesty-Humility, 0.74 for Emotionality, 0.77 for Extraversion, 0.75 for Agreeableness, 0.69 for Conscientiousness and 0.78 for Openness to experience.

2.2.3. Coping

Coping strategies were examined using the Ways of Coping Checklist (WCC; Vitaliano et al., 1985) in its French adaptation (Paulhan et al., 1994). Respondents complete the questionnaire by positioning themselves on a 4-point Likert scale ranging from "No" to "Yes". Five coping scores assess the quality of the respondent's coping strategies, namely: Problem-solving coping, Support seeking, Avoidance, Self-blame and Positive reappraisal. Higher scores indicate better coping. For this sample, internal consistency was very good (Cronbach's $\alpha = 0.85$). In the original version of the questionnaire, the respondent is asked to select a stressful situation before answering. For the present study, the lockdown was the situation chosen by default for all participants.

2.2.4. Anxiety and depression

Participants completed the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) in its French version (Lépine et al., 1985) The HADS has two sub-scales examining anxiety and depression symptoms, with seven items for each sub-scale. Scores for each item range from 0 to 3. Higher scores indicate more severe symptomatology. In our sample, internal consistency was highly acceptable, with a Cronbach's $\alpha = 0.82$ for anxiety and 0.79 for depression.

2.2.5. Psychological flexibility

According to Acceptance and Commitment Therapy (ACT), the Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011) was designed to assess psychological flexibility (Hayes et al., 2004). In the present study, the French version of the AAQ-II was used (Monestès et al., 2009). AAQ-II is a 10-item questionnaire using a 7-point Likert scale; possible answers range from "Never true" to "Always true". Higher scores indicate greater psychological flexibility. For our sample, internal consistency was highly acceptable (Cronbach's $\alpha = 0.86$).

2.2.6. Compliance with health measures

In order to examine compliance, we designed a customized questionnaire composed of two subscales. The first examines the compliance with certain health measures, based on government recommendations: handwashing for at least 20 seconds, covering the mouth and nose with one's arm when coughing and sneezing, one-meter social distancing, using paper tissues only and throwing them away immediately after use, wearing masks and gloves, temperature monitoring, and staying at home. To ensure that our items are not confused with professional requirements for hospital workers, we have set the context of everyday life during the lockdown and used the term "*geste barrière*" which is understand in France as the health measures to be used in any circumstance when not at home. Respondents used a 5-point Likert scale, ranging from "Yes, every time" to "Never". For example, one question was "Do you use a mask or gloves?" Each question resulted in a score ranging from 0 to 4 and a grand total ranging from 0 to 28. The internal consistency for the first subscale was sufficient (Cronbach's $\alpha = 0.60$) and all the items were correlated to the Compliance score (see Table 1). Based on a meta-analysis by Taber (2018) about the usage of Cronbach's Alpha, describing a Cronbach's Alpha of 0.60 as "sufficient" or "satisfactory", we computed a score on this subscale.

The second subscale questioned participants about their perception of the utility of these measures using a 10-point Likert scale

Table 1
Internal correlations for the Compliance subscale.

Variable	Handwashing	Coughing gestures	Social distancing	Paper tissue usage	Wearing masks	Temperature monitoring	Staying at home
Compliance score	.675***	.594***	.386***	.529***	.628***	.652***	.299***

***$p < .001$.

ranging from "Totally disagree" to "Totally agree". Scores on this subscale range from 7 to 70. Higher scores indicate better compliance and greater agreement. The last item asked participants if they thought the government was able to handle the crisis, regardless of political opinions. Answers were on a 10-point Likert scale ranging from "Totally unable" to "Totally able". For example, one question was "Do you agree with the use of a mask?" We based this questionnaire on the recommendations of Costagliola and Barberousse (2001).

The internal consistency for the second subscale was robust (Cronbach's $\alpha = 0.82$).

2.3. Data analysis

The purpose of this study was to explore factors associated with compliance with health measures among health professionals receiving patients during lockdown in France. All the individuals in our sample considered that their work put them at risk of contracting the COVID-19 virus. Before conducting any statistical analysis, parametric tests were carried out to study the relationship between compliance, coping, anxiety and depression scores, personality traits, psychological flexibility and continuous sociodemographic variables using the Pearson correlation coefficient. Spearman correlations were used to study the relationship between compliance and discrete sociodemographic variables such as place of residence. Based on the correlations, we conducted stepwise regressions to determine the best predictors of compliance.

Statistical analyses were conducted with a *p*-value threshold of 0.05 using SPSS 25 Software.

3. Results

3.1. Descriptive statistics

3.1.1. Sociodemographic data

A total of 299 health professionals completed our online questionnaire. Descriptive statistics for sociodemographic data are displayed in Table 2.

Table 2
Sociodemographic data.

	n = 299
Age, M (SD)	36.9 (11.0)
Gender, *n* (%)	
Man	12 (4.0)
Woman	287 (96.0)
Marital status, *n* (%)	
Married/Cohabiting	200 (66.9)
Divorced	30 (10.0)
Widowed	3 (1.0)
Single	66 (22.1)
Children, *n* (%)	
No	149 (49.8)
Yes	150 (50.2)
Number of children, M (SD)	0.88 (1.02)
Employment at risk, *n* (%)	
No	23 (7.7)
Yes	276 (92.3)
Chronic disease, *n* (%)	
No	245 (81.9)
Yes	54 (18.1)
Housing zone during quarantine, *n* (%)	
Urban	114 (38.1)
Semi-urban	79 (26.4)
Rural	106 (35.5)

Table 3
Mean scores for Compliance to sanitary measures and perceived utility.

	n = 299
Compliance, M (SD)	22.05 (3.63)
(1) Handwashing for at least 20 seconds	3.45 (0.73)
(2) Covering mouth and nose when coughing/sneezing	3.47 (0.92)
(3) One-meter social distancing	3.46 (0.82)
(4) One-time use and immediate disposal of paper tissues	3.68 (0.76)
(5) Wearing mask and gloves	2.95 (1.25)
(6) Temperature control	1.40 (1.40)
(7) Stay at home/Lockdown	3.63 (0.60)
Perceived utility, M (SD)	60.25 (11.02)
(1)	9.63 (1.63)
(2)	9.21 (1.98)
(3)	9.28 (1.85)
(4)	9.40 (1.85)
(5)	8.08 (2.47)
(6)	6.26 (2.68)
(7)	8.38 (2.24)

In the sample, 276 participants (92.3%) considered that their job put them at risk of contracting the virus. 54 participants suffered from a physical disease (18.1%) and 22 from a mental disorder (7.4%). At the time of our research, 11 participants were pregnant.

Regarding questions related to the pandemic and lockdown, 37 participants were not living at home during lockdown (12.4%). 14 were tested positive for COVID-19 (4.7%) and 35 showed some symptoms (11.7%). 116 had one or more relatives who had contracted the virus (38.8%), 32 had one or more relative hospitalized (10.7%) and 12 had one or more relative who died from the virus (4%).

Concerning the fear of contracting the virus, the mean score for our sample was 5.76 out of 10, and the mean score for the emotional experience of lockdown was 5.38 out of 10.

3.1.2. Compliance

Using our custom scale, we computed two scores, Compliance and Perceived utility of the health measures (Table 3).

Compliance scores ranged from 2 to 28. The mean score for compliance was 22.05 (± 3.63). Temperature monitoring was the least well-respected measure with a mean score of 1.40 (± 1.40) and using disposable tissues was the most widely respected measure with a mean score of 3.68 (± 0.76).

The mean score for the perception of the overall utility of the health measures was 60.25 (± 11.02). Here also, the lowest score was for temperature monitoring 6.26 (± 2.68) and the highest for hand-washing with a mean score of 9.63 (± 1.63).

The mean score for the item concerning the government's ability to handle the pandemic was 4.10 (± 2.42).

3.2. Correlations

Correlations are displayed in Table 4. Also, some sociodemographic data were correlated with certain variables. Age was positively correlated with the fear of contracting the virus ($r(299) = 0.20, p \leq 0.001$), compliance ($r(299) = 0.02, p \leq 0.05$), depression ($r(299) = 0.16, p \leq 0.01$), Extraversion ($r(299) = 0.14, p \leq 0.05$) and problem-focused coping ($r(299) = 0.15, p \leq 0.01$). It correlated negatively with Emotionality ($r(299) = -0.14, p \leq 0.05$).

We also found that gender was correlated positively with Emotionality ($r(299) = 0.22$, $p \leq 0.001$), stress perception caused by the pandemic ($r(299) = 0.16$, $p \leq 0.01$), and problem avoidance ($r(299) = 0.16, p \leq 0.01$). These results mean women presented more traits associated with Emotionality, experienced greater stress

Table 4
Means, standard deviations and correlations between psychological concepts.

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Compliance	22.05	3.63	—															
2. Perceived utility	60.25	11.02	0.354***	—														
3. Gouvernment percieved ability	4.10	2.42	−0.135*	0.054	—													
4. Anxiety	8.78	4.36	0.177**	0.036	−0.234***	—												
5. Depression	6.28	3.98	0.067	−0.066	−0.213***	0.588***	—											
6 Psychological flexibility	46.56	10.38	−0.036	0.112	0.168**	−0.559***	−0.541***	—										
6. Honesty	38.21	11.44	0.139*	0.002	−0.019	−0.043	−0.024	0.139*	—									
7. Emotionality	32.39	6.28	0.002	−0.112	0.024	0.358***	0.208***	−0.435***	−0.071	—								
8. Extraversion	34.03	6.02	0.073	0.068	0.093	−0.216***	−0.277***	0.49***	0.13*	−0.278***	—							
9. Agreeableness	30.96	6.15	−0.017	0.089	0.023	−0.098	−0.062	0.124*	0.23***	−0.108	0.117*	—						
10. Conscientiousness	37.76	5.64	0.08	0.104	−0.028	−0.047	−0.077	0.233***	0.227***	−0.012	0.216***	−0.007	—					
11. Experience	33.05	7.2	−0.12*	0.067	−0.017	0.005	−0.044	0.064	0.048	−0.14*	0.124*	0.083	0.032	—				
12. Problem solving	23.10	4.29	0.223***	0.117*	−0.062	−0.085	−0.064	0.181**	0.043	−0.14*	0.372***	0.17**	0.152**	0.167**	—			
13. Support Seeking	14.80	3.23	0.044	0.092	0.156**	−0.088	−0.125*	0.198***	0.095	0.147*	0.296***	0.143*	0.162**	0.164**	0.422***	—		
14. Self-blame	8.74	2.75	0.033	−0.05	−0.058	0.329***	0.285***	−0.447***	−0.124*	0.256***	−0.265***	0.009	−0.241***	0.046	0.067	0.021	—	
15. Reappraisal	14.20	3.07	0.224***	0.138*	−0.059	0.026	−0.034	0.042	0.045	0.015	0.159**	0.166**	0.037	0.065	0.623***	0.328***	0.252***	—
16. Avoidance	16.30	4.55	0.008	−0.027	−0.06	0.321***	0.347***	−0.394***	−0.187**	0.252***	−0.238***	−0.055	−0.182**	−0.083	0.032	0.021	0.482***	0.181**

*$p < .05$, **$p < .01$, ***$p < .001$.

Table 5
Regression coefficient of predictors on Compliance.

Variable	*B*	β	*SE*	*t*
Perceived measures utility	0.08	0.26	0.02	5.04*
Living area	0.61	0.14	0.21	2.96*
Fear to contract COVID-19	0.26	0.18	0.08	3.44*
Perceived job risk	2.74	0.20	0.69	3.98*
Honesty	0.09	0.15	0.03	3.01*
Problem-focused coping	0.16	0,19	0.04	3.83*
Experiences	−0.06	−0.12	0.03	−2.35*

*$p < .05$.

caused by the on-going pandemic and used more coping strategies based on problem avoidance. It correlated negatively with psychological flexibility ($r(299) = -0.13$, $p \leq 0.05$), reporting men showed greater psychological flexibility.

In our sample, the perception of the risk of contracting COVID-19 correlated positively with compliance ($r(299) = 0.28$, $p \leq 0.01$) and perceived utility of the measures ($r(299) = 0.17$, $p \leq 0.01$). The place of residence also correlated positively with compliance ($r(299) = 0.20$, $p \leq 0.01$) but not with perceived utility. Compliance correlated positively with age ($r(299) = 0.2$, $p \leq 0.01$). Chronic or mental disorder were not correlated with compliance, but chronic disease correlated negatively with psychological flexibility ($r(299) = -0.18$, $p \leq 0.01$), as did mental disorder ($r(299) = -0.20$, $p \leq 0.001$).

3.3. Regressions

We conducted multiple linear regression with enter method to explain the compliance with health measures with the following variables: Perceived utility of the measures, perceived job risk, fear of contracting COVID-19, problem-focused coping, Honesty-Humility, place of residence, Openness to experience, anxiety and age. The results indicated a significant model with $R^2 = 0.31$, $F(7, 291) = 19.05$, $p < 0.001$. Table 5 presents the contribution of the variables. Anxiety and age were excluded. The perception that health professionals had of the utility of the health measures proposed, but so Honesty-Humility and problem-focused coping appeared to be the strongest predictor of compliance.

4. Discussion

The purpose of this study was to study the relationship between personality and compliance with health measures among health workers during the Covid-19 pandemic in France. The second objective was to examine the association between anxiety, depression and compliance. The third objective was to examine the association between better coping strategies and psychological flexibility with compliance.

Our first hypothesis about personality traits was partially verified, as the personality traits of Honesty-Humility and Openness to experience were associated with compliance. We observed that Honesty-Humility was associated to greater compliance among health workers, whereas those who were more open to experience were more likely to comply less with health measures. These findings are consistent with theoretical models about health behaviours, which postulate that personality is one of the factors related to health issues (Bruchon-Schweitzer et al., 2014). In our sample, we observed that both anxiety and Honesty-Humility correlated positively with compliance, suggesting that more honest and anxious workers are more likely to respect health measures. A similar trend was observed for adherence to HIV antiretroviral therapy, where the interaction between personality, anxiety and depression was associated with patients' adherence (Gordillo et al., 1999 cited in Morin, 2001a, b). It has to be noted we observed the government perceived ability to handle the crisis is negatively correlated with anxiety, depression and compliance. In other words, people with higher levels of anxiety, depression and lower compliance were more likely to think the French Government was not able to handle the pandemic. Despite this relationship, this is not associated with compliance or risk perception in our sample, according to the present regressions. It is consistent with recent works where the people's trust in the government is negatively correlated with anxiety and depression, but not predictive of the COVID-19 fear (Bäuerle et al., 2021).

If we consider non-compliance as a risk-taking behaviour, this can throw light how it is related to Honesty-Humility. In 2011, Weller and Tikir (2011) used the HEXACO to explore the link between risk-taking attitude and personality. They found that low Honesty-Humility was associated to more risk-taking behaviours in health and ethical domains, as low Honesty-Humility is associated with lower perceptions of risk. As mentioned above, representations about the viral threat play a great role in compliance among health workers, and knowledge of transmission and prevention is associated with greater compliance (Auzoult et al., 2015). Participants were more likely to comply with the protective measures when they perceived their work as a risk of contracting the virus. In the field of social psychology, deviant behaviours at work are due to job stress. It was found that the interaction between Honesty-Humility and job stress is associated with fewer deviant behaviours (Chirumbolo, 2015). Another study found that bad working conditions for nurses were related to worse compliance (Repond, 2012). In our sample, participants perceived their jobs as presenting a moderate risk of contracting the virus with a rating of 5.76 out of 10. Our findings suggest that Honesty-Humility is related to the interaction between job stress and compliance.

We observed that Openness to experience was negatively correlated with compliance, meaning that a higher need for experience is associated with poorer compliance. It was previously observed that Openness to experience is associated with risky health behaviours (Vollrath et al., 1999), suggesting that this personality trait alters the perception of risk. This was already hinted at in a previous study that established links between personality and risk-taking behaviours (Booth-Kewley & Vickers, 1994) in which it was found that Openness to experience was related to substance use. To summarise, it can be concluded that Honesty-Humility and Openness to experience are linked to the compliance with health precautions and risk perceptions among health workers. Similar observations can be found, where Openness to experience is associated with poorer threat appraisal during the COVID-19 pandemic (Modersitzki et al., 2020).

Our hypothesis regarding the relation between coping and compliance was also verified, as we found that compliance tended to be higher among health workers presenting better coping. In addition, a greater use of problem-focused strategies was associated with better compliance, meaning that better compliance acts as a problem-focused strategy used by health workers to decrease the risk of contracting the virus. This is consistent with the theoretical models we based our hypothesis on (Azjen, 1985, 1988, Ajzen, 1991, Fischer & Tarquinio, 2014; Bruchon-Schweitzer et al., 2014). It is also consistent with various studies indicating that problem-focused coping is the most widely used strategy among health professionals (O'Brien & DeLongis, 1996; Healy & McKay, 2000). Similar observations were made in a recent investigation, where it was found that women nurses tended to prefer problem-focused strategies during the COVID-19 pandemic (Huang et al., 2020). This is consistent with our study, in which 287 participants out of 299 were women. Following the integrative and multifactorial model (Bruchon-Schweitzer et al., 2014), problem-focused coping seems to be linked to the interaction between Honesty-Humility and job stress. This is consistent with previous findings during the 2002–2004 SARS pandemic, in which nurses used more coping strategies to reduce work stress (Chen et al., 2006). Regardless of the profession, some research investigated the role of coping in health behaviours during this same pandemic. The avoidance of any perceived threat by avoiding public places and people during the pandemic was a health behaviour predicted by coping strategies (Lee-Baggley et al., 2004). Also consistent with this research is our finding that positive thinking or reappraisal was associated with better compliance, meaning that when health workers re-evaluate the situation with positive thoughts, they have more health behaviours. On the other hand, we did not find any

link between empathic responses such as support-seeking strategies. It has been suggested that an empathic response has a positive impact on compliance in order to protect those close to us (Puterman et al., 2009). This relationship is however hinted at by our findings on Honesty-Humility, which is a personality trait based on our relation with other individuals. During the current pandemic, coping, more specifically problem-focused coping, was linked to greater compliance among health workers.

Our hypothesis about the association between anxious and depressive symptoms with compliance was not verified. Although anxiety and depression in our sample is associated with personality traits, notably Emotionality and Extraversion, negatively associated with psychological flexibility and positively associated with poorer coping strategies, these variables do not predict compliance or perceived utility about sanitary measures. However, the associations we found are congruent with the literature, as psychological flexibility has a negative relationship with anxiety and depression regarding the pandemic (Dawson & Golijani-Moghaddam, 2020). Our results suggest similar observations as work by Felix (2021) where Emotion-oriented coping and negative-Emotionality were found to be associated to higher levels of anxiety.

Lastly, our hypothesis about the implication of psychological flexibility was not verified, as it did not correlate with compliance or with the perceived utility of the health measures. This absence of correlation is consistent, however, with the literature, as an avoidance strategy is associated with poor psychological flexibility (Billoux et al., 2012). Our results show that an avoidance coping strategy was not associated with compliance (Abbott et al., 2001). Knowing the relation between avoidance and psychological flexibility, it is consistent not to find a negative relation between the latter and compliance. On the other hand, general coping is negatively associated with psychological flexibility, which is inconsistent with previous research (Leonidou, 2016).

4.1. Limitations

There are some limitations in our study. First, the cross-sectional aspect and the number of people who completed the questionnaire strongly limit the conclusions that can be drawn about causality and generalization among health-workers. This decision was made because of the stressful nature of the pandemic for health workers in hospital: our survey contains 155 items and takes 20 to 30 minutes to complete. Adding more questionnaires or making this research longitudinal was not an option due to the effort it would have represented for health workers to complete it after a work shift.

Secondly, 96% of our sample were women, limiting the impact of our research. Recent research about the psychological aspects of the COVID-19 pandemic indicates that there is a difference between how men and women coped during this time (Huang et al., 2020).

Thirdly, one of the two subscales in our compliance questionnaire presented a Cronbach's alpha lower than the threshold usually considered acceptable (Cronbach's $\alpha = 0.60$). A threshold of 0.70 would have ensured a better internal consistency. It would be interesting to explore associations between our variables and each item of our compliance questionnaire instead of a score.

As stated above, there are some inconsistencies between our results and previous research into psychological flexibility or coping. It would have been necessary to conduct a similar study to confirm our results during the following lockdowns is in France.

Finally, we only asked participants if they were health workers or not. In order to obtain more precise results, it would have been useful to ask for their exact profession. This would have allowed us to explore potential differences in compliance and its mechanisms between professions, as suggested by previous research (Pittet et al., 1999).

5. Conclusion

Despite its limitations, this study provides some clues about the compliance with health measures among health workers. Following the major models in health psychology, our research might suggest the existence of a link between personality, coping and compliance with health measures. Honesty-Humility was found to be associated with greater compliance whilst Openness to experience was associated with poorer compliance. Coping, and more precisely problem-focused coping, was also related to greater compliance. Given the link between personality, coping and their impact on compliance, our results might suggest that personality plays a role in how health threats and countermeasures are perceived by health workers and so how they coped during the COVID-19 pandemic, resulting in health behaviours. These findings could lead to enhancements in the way health professionals are trained about viral infections by emphasising about risks for their patients and their family if they are not practice sanitary measures in everyday life, especially during a world pandemic.

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The authors declare that they have no competing interest.

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