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Evidence from Iran: Determining the relationship between the five-factor personality traits and the coronavirus health guideline compliance

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Abstract

Introduction: In the pandemic condition, especially the highly contagious coronavirus disease (COVID-19), it is essential to follow the behavioral recommendations that reduce the infection risk. Humans' personality traits influence many of their behaviors. Knowing the relationship between personality traits and how individuals follow health guidelines is useful. Since it is possible to increase conformity to health guidelines by correcting maladaptive personality traits or strengthening adaptive personality traits, this study aimed to determine the relationship between health observance and the five personality traits.

Materials and Methods: In the present study, 220 students studying in various fields at the Ferdowsi University of Mashhad during the 2020-2021 academic year were selected voluntarily. They fulfilled NEO Five-Factor Inventory-Short Form and Health Observance Questionnaire. Data analyzed through regression statistical analysis and SPSS software version 26.

Results: The results showed that the personality type explains 36% of the health observance and quarantine compliance in the Corona outbreak. The conscientiousness dimension had the highest correlation ($r=0.562, P<0.05$), and the openness to experience dimension ($r=0.268, P<0.05$) had the lowest correlation with health observance and quarantine compliance. Only the neuroticism dimension was inversely related to health observance and quarantine compliance ($r=-0.320, P<0.05$).

Conclusion: Researchers can use conscientious characteristics as a model in health education protocols. Conscientiousness, extraversion, openness to experience, agreeableness, and neuroticism predicted health observance and quarantine compliance, respectively. Based on the correlation results, the neuroticism dimension was inversely related to the following health observances and quarantine compliance.

Keywords: COVID-19, Health, Personality trait, Quarantine

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Introduction

The coronavirus is one of the most important pathogens that primarily targets the human respiratory system and significantly threatens public health (1). The disease symptoms include fever, pneumonia, decreased white blood cells and lymphocytes, coughing, and shortness of breath. This disease is transmitted through direct contact with people who have a fever and respiratory symptoms or have traveled to areas where COVID-19 is prevalent (2). On February 11, 2020, the World Health Organization named this pathogen COVID-19 (1). There is no specific antiviral drug or easily accessible vaccine against COVID 19. Therefore, society should reduce the risk of virus transmission from one sick person to another, especially for vulnerable populations like children, healthcare workers, and the elderly. As a result, behavioral guidelines and preventive measures are among the most important ways to prevent the transmission of COVID 19. China and other countries, such as the United States, have taken critical preventive measures to reduce the prevalence of the disease (1). Thus, behavioral management is the best way to prevent any respiratory distress associated with COVID-19 (e.g., quarantining the patient to avoid respiratory droplets spreading) (3). The World Health Organization (WHO) has provided worldwide guidelines for reducing COVID-19 infection, including washing hands regularly, maintaining social distance, avoiding hand contact with eyes, mouth, and nose, using gloves outdoors, avoiding raw animal products, avoiding unnecessary travel, and wearing a mask (4). Various factors are involved in following health recommendations. The most important ones are the individual's personality traits (5).

An individual's personality is a pattern of relatively permanent features and unique characteristics that provide stability and individuality to a person's behavior. These traits are somewhat predictable and affect emotions, cognition, and behavioral patterns (6).

Hansen (1989) tested the relationship between personality variables and disregard for safety and accidents as a path analysis model and reported a positive relationship between personality traits (neuroticism dimension) and accidents (7).

Insecure behavior is a personality trait. Also, some studies recommended that personality

traits may influence the compliance or non-compliance of health care instructions and suggested a factor called the tendency to self-injury (8). Thus, considering the individual's role in self-care, one of the influential factors in health care behaviors is personality traits (9). A person's personality affects illness risk by creating unhealthy behaviors or can improve health by accepting the possibility of disease danger and complying with health care instructions (10-12). For example, research has shown that personality traits are an influential factor in the self-care of patients with diabetes (8,9,13,14).

Since various studies have emphasized the role of personality traits in following medical advice, it seems that in the face of COVID-19, adherence to health tips and following quarantine compliance are likely affected by personality dimensions. However, according to our search, no related study has been published on this topic. Therefore, the purpose of this study is to predict the level of health observance and quarantine compliance based on personality traits.

Materials and Methods

The statistical population in this study was 220 students (157 females and 63 males) who were studying in various fields at the Ferdowsi University of Mashhad during the 2020-2021 academic year. The voluntary sampling method was used due to the prevalence of COVID-19 and the need to collect questionnaires remotely. Using the Google Form tool, the questionnaires were submitted electronically and in the form of links via reputable social applications such as Telegram, WhatsApp, and Instagram.

To determine the sample size ($n=117$), we used Cohen's statistical formula. As a result of the voluntary sampling method, the final sample in this study includes 220 subjects (157 females, 63 males).

Inclusion criteria for this study were being a student at the Ferdowsi University of Mashhad, aged 18-45 years, and living in Iran during the COVID-19 outbreak. Those who answered the questionnaire incompletely were excluded from the sample. The research questionnaire had 400 visitors, of which 250 answered the scale. Finally, after removing incomplete questionnaires, a total of 220 data samples were recruited. As a result, the response rate to the questionnaire was 62.5%.

Research instruments

A) *NEO Five-Factor Inventory, Short-Form* (Costa and McCrae, 1985): This questionnaire has 60 questions and measures five personality traits: extraversion (10 questions), agreeableness (12 questions), neuroticism (12 questions), openness to experience (12 questions), and conscientiousness (14 questions). This test has a 5-point Likert scale (strongly disagree to strongly agree strongly). The NEO subscales showed the right internal consistency. Costa and McCrae reported the appropriate Cronbach's alpha coefficient for NEO variables, ranging from 0.68 (for agreeableness) to 0.86 (for neuroticism). McCrae and Costa have stated that the revised five-factor NEO inventory instrument corresponds precisely to its complete form for the validity (15).

The short form correlates higher than 0.86 with its full version (16) and validated the Persian version of the NEO in a sample of the Iranian population. The Cronbach's alpha coefficient for each NEO dimension sounds good (ranging from 0.42 to 0.79), and the test-retest reliability of five dimensions revealed acceptable results (ranging from 0.56 to 0.86). Bagherian Sararoudi et al. performed the back-translation method for the Persian NEO, and the content-related validity was approved. The Persian version of this tool's construct validity for each subscale of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness was appropriate (ranged from 0.71 to 0.91) (16).

B) *The Health Observance Questionnaire* (Hassanpour Azghadi, Bakhshizade, and Ziaee): The first part of the questionnaire examines

demographic information as a separate instrument, including gender, age, education, marital status, and occupational status. The questionnaire includes information on personal health observance and quarantine compliance (59 items). Hassanpour Azghadi et al. used the 5-point Likert scale. The content validity was approved. Cronbach's alpha ($\alpha=0.91$) and test-retest reliability ($r=0.86$) were also appropriate (17). This study investigates the relationship between personality traits (neuroticism, extraversion, agreeableness, openness to experience, and conscientiousness) as predictor variables and the degree of health observance and self-quarantine as the criterion variable. We used the regression statistical analysis method in SPSS software version 26. All the basic regression assumptions were confirmed (Table 1). Given that there is no specific theoretical model as a default, all the independent variables enter the equation simultaneously. Thus, we used simultaneous regression to examine each personality trait contribution to predicting the degree of health considerations. Simultaneous regression evaluates the predictive power of each independent variable while statistically controlling other predictor variables in the analysis. We entered five NEO personality dimensions into the equation model as predictor variables and assumed the level of health observance and quarantine rule compliance as criterion variables. The results showed that the personality type explains 36% of the health observance and quarantine compliance in the Corona outbreak. According to the results, the conscientiousness dimension plays the most critical role in predicting the level of health observance and self-quarantine compliance.

Table 1. The data distribution

| Variable | Skewness | Elongation |
|---------------------------------------|----------|------------|
| Neuroticism | 0.086 | -0.281 |
| Extraversion | -0.157 | -0.635 |
| Agreeableness | 0.049 | -0.675 |
| Openness to experience | 0.321 | -0.193 |
| Conscientiousness | -0.020 | -0.261 |
| Observing hygiene and self-quarantine | -0.590 | -0.817 |

As the skewness and elongation of all variables are between -1 and +1, this study's data has a normal distribution; therefore, the regression model is suitable for the data analysis (18). Table 2 shows the demographic

characteristics of the research variables. Out of 220 subjects, 70.7% were female, and the rest were male. Table 3 shows the descriptive analysis of research variables.

Table 2. Demographic characteristics

| Variable | Frequency | Percent |
|---------------------------------|-----------|---------|
| Gender | | |
| Female | 157 | 70.7 |
| Male | 63 | 28.4 |
| Total | 220 | 100 |
| Age (Year) | | |
| < 25 | 101 | 45.5 |
| 25-40 | 95 | 42.8 |
| > 40 | 24 | 10.8 |
| Level of education | | |
| High school degree | 77 | 34.7 |
| Bachelor | 91 | 41 |
| Master | 41 | 18.5 |
| Ph.D. | 11 | 5 |
| Marital status | | |
| Married | 99 | 44.6 |
| Single | 121 | 54.5 |
| Occupational status | | |
| Employee | 6 | 2.7 |
| Freelance | 55 | 24.8 |
| Doctor, nurse, or medical staff | 5 | 2.3 |
| Teacher or university professor | 20 | 9 |
| Unemployed | 51 | 23 |
| Others | 83 | 37.4 |

Table 3. Descriptive data of research variables

| Variable | M | (SD) |
|---------------------------------------|----------|----------|
| Neuroticism | 35.8227 | 7.91683 |
| Extraversion | 32.0909 | 6.38283 |
| Agreeableness | 41.7773 | 6.55851 |
| Openness to experience | 36.8091 | 4.55107 |
| <i>Conscientiousness</i> | 45.9227 | 6.73086 |
| Observing hygiene and self-quarantine | 221.8727 | 25.18737 |

According to Table 4, the conscientiousness dimension had the highest correlation with the level of health observance and quarantine compliance ($r= 0.562$, $P< 0.05$). The lowest correlation with the dependent variable was openness to experience ($r= 0.268$, $P< 0.05$).

Only the neuroticism dimension was inversely related to the health observance and quarantine compliance ($r= -0.320$, $P< 0.05$). In general, there is a significant relationship between NEO five-factor personality traits and the level of health observance and quarantine compliance.

Table 4. The relationship between NEO personality traits and health observance

| Variable | 1.Observing hygiene | 2.Neuroticism | 3. Extraversion | 4.Agreeableness | 5. Openness to experience | 6. <i>Conscientiousness</i> |
|-----------------------------|---------------------|---------------|-----------------|-----------------|---------------------------|-----------------------------|
| 1. Observing hygiene | 1 | -0.320 | 0.458 | 0.395 | 0.268 | 0.562 |
| 2. Neuroticism | -0.320 | 1 | -0.658 | -0.481 | -0.198 | -0.592 |
| 3. Extraversion | 0.458 | -0.658 | 1 | 0.466 | 0.243 | 0.597 |
| 4. Agreeableness | 0.395 | -0.481 | 0.466 | 1 | 0.339 | 0.437 |
| 5. Openness to experience | 0.268 | -0.198 | 0.243 | 0.339 | 1 | 0.214 |
| 6. <i>Conscientiousness</i> | 0.562 | -0.592 | 0.597 | 0.437 | 0.214 | 1 |

The analysis of the variance shows the significance of the whole model ($F(5,214)=26.42, P<0.001$). By using the simultaneous regression method, the results showed that five personality factors were able to predict the level of health observance significantly and quarantine compliance ($R^2=0.382, SE=20.03, D.W=1.64$), and accordingly, five personality factors explain 0.36% of health observance and quarantine rule compliance. Regarding the Durbin-Watson index ($1.5<DW<2.5$), the observations' independence is acceptable, and the regression analysis is legitimate

The neuroticism dimension ($Beta=0.180, T=2.33, P<0.05$), extraversion ($Beta=0.280, T=2.69, P<0.05$), agreeableness ($Beta=0.19, T=2.271, P<0.05$) and conscientiousness ($Beta=0.457, T=6.369, P<0.05$) were able to significantly predict the level of health observance and quarantine compliance, among which conscientiousness had the highest level of predictability. But the openness to experience variable ($Beta=0.104, T=1.815, P>0.05$) couldn't significantly predict health observance and quarantine compliance (Table 5).

Table 5. The regression model predicting the health observance from NEO personality traits

| Model 1 | Variable | β | Standard error of beta coefficient | Standardized beta coefficients | T | P | Alignment assumptions | |
|------------|------------------------------|---------|---------------------------------------|-----------------------------------|-------|-------|--------------------------|-----------|
| | | | | | | | VIF | Tolerance |
| | Constant number | 51.145 | 22.687 | | 2.254 | 0.025 | | |
| | Neuroticism | 0.573 | 0.246 | 0.180 | 2.333 | 0.021 | 2.066 | 0.484 |
| | Extraversion | 0.821 | 0.305 | 0.208 | 2.69 | 0.008 | 2.065 | .0484 |
| | Agreeableness | 0.574 | 0.253 | 0.149 | 2.271 | 0.024 | 1.497 | 0.668 |
| | Openness to experience | 0.577 | 0.318 | 0.104 | 1.815 | 0.071 | 1.144 | 0.874 |
| | Conscientiousness | 1.712 | 0.269 | 0.457 | 6.369 | 0.000 | 1.786 | 0.560 |

Discussion

Personality refers to the specific patterns of thinking, emotions, and behavior that determine a person's interaction style with their social environment. Based on this definition, in the COVID-19 outbreak, health observance and quarantine compliance may relate to people's personality traits.

Accordingly, the present study results also indicate a relationship between NEO personality traits and the degree of health observance and quarantine compliance. The moral dimension was most related to health observance among the five personality dimensions. Other studies have shown that some personality traits can play an essential role in disease etiology. Human personality can indirectly cause illness through destructive behaviors or improve health through medical compliance and healthy behaviors. In other words, personality traits correlate with medical regimen adherence in various diseases (11,19-22). But so far, the role of personality traits in the Coronavirus disease, especially given its global prevalence, has not been studied.

As mentioned, conscientiousness had the most significant positive relationship with health observance and quarantine compliance. Several

other studies recognized conscientiousness as a predictor of mental health and the most influential personality trait in explaining self-care (9,23-25). For example, Noroozi, Tahmasebi, and Shaybani studied the relationship between personality traits and diabetic patients' self-care. Thus, 396 diabetic patients completed self-care questionnaires and five personality factors (NEO-FFI-60). The findings revealed that conscientiousness is the most important personality trait in explaining diabetic self-care (9). This study is limited to people with diabetes, who could have specific mental health problems because of their medical condition, so the results may not be generalizable to healthy individuals in the event of a virus outbreak. The authors concluded that people with low conscientiousness usually do not follow prescribed medications. However, the conscientiousness dimension consists of three facets of responsibility: duty, dutifulness, and deliberate. So, conscientiousness makes a person prone to following the Corona Anti-Corruption Headquarters protocol because compliance with the health guidelines requires a sense of responsibility towards society and a desire to reduce risk. Very conscientious people are also accurate, reliable, and on-time; as a

result, they follow treatment instructions very carefully. Conversely, people with low conscientiousness are less likely to follow orders in areas contrary to the principle of pleasure, such as diet and exercise (26). Also, conscientiousness is associated with traits that can express health. Being conscientious is positively correlated with perceived responsibility for task control, perceived ability, hope, positive emotion, empathy, and pride (27). On the other hand, attributional styles can play an essential role in adaptive behaviors and problem-solving, one of which is the locus of control. According to Attribution Theory (28), people with an internal locus of control believe that their skills determine their behavior, while people with an external locus of control share luck in their behavior. People with an internal locus of control are physically and mentally healthier than those with an external locus of control. In this regard, various studies have investigated the relationship between the locus of control and personality traits. Previous studies identified conscientiousness as a factor explaining the locus of control (29,30). The attributional style theory suggests that people with high conscientiousness perform more self-care behaviors.

The positive relationship between extraversion and health observance in this study is consistent with several studies that have shown a significant relationship between extraversion and general health. Researchers claimed that extroverted individuals adhere more closely to treatment instructions than introverted people (23,25,31). Emami Pur and Sabzmejdani examined the relationship between personality traits and general health. Two-hundred and five students fulfilled NEO-FFI-60 and the Goldberg and Hiller General Health Questionnaire. The results showed a positive and significant relationship between extraverted personality traits and general health (31). Extroverted people's psychological reactions to coronavirus and their level of compliance with health guidelines in risky conditions are unclear. It is assumed that hope for recovery and having a positive attitude towards life are subsets of the extraversion dimension and can increase medical adherence (22). Findings showed that highly extroverted people are more motivated to conform to life care recommendations. More importantly, the extraversion dimension includes facets such as

warmth, assertiveness, positive emotions, and gregariousness. These characteristics increase people's desire to protect those around them through health observance and self-quarantine compliance. Many other things make it easier for people to adapt to difficult situations as a whole, like online communication, creative social ideas, entertainment, and new games that make it easier to deal with difficult situations (21). Contrary to previous research, the present study could show a positive relationship between agreeableness and health observance. The agreeable person is altruistic, cooperative, sympathetic, and demonstrates more compliance. He/she is eager to help others and can conform to health norms. Therefore, he/she does not want to cause the virus transmission among his/her fellowmen and put others' lives in danger. Given that the agreeableness dimension contains the compliance facet, people who score highly follow the rules more than others, so they are more likely to value quarantine rules and health guidelines (9).

The results showed little correlation between the openness to experience dimension and health observance. Based on the regression results, this personality dimension could not significantly predict the level of adherence to health and quarantine compliance, which are in line with the other findings (31). Studies suggest that those with high scores in the openness to experience dimension tend to experience positive and negative affections, so there is no direct relationship between openness to experience and health. The presence of risk-taking and adventure facets in the openness to experience dimension makes it difficult for the high scores to comply with the rules and restrictions of the COVID-19 outbreak.

The negative relationship between the neuroticism dimension and health observance is in line with several other findings that have reported an inverse association between these two constructs. Researchers suggested that most depressed and anxious diabetics do not follow the treatment instructions well. Thus, it can be concluded that adherence to treatment decreases as neuroticism increases (32,33). This study aimed to determine the relationship between personality traits and adherence to treatment in one-hundred patients with type 2 diabetes. The Eysenck personality questionnaire and the treatment adherence questionnaire were used in the study. The

results showed that adherence to treatment decreases with increasing neurotic personality traits in individuals (32). It should be noted that this study was limited to diabetic patients. These findings show that fear of treatment consequences reduces follow-up improvements in people with high neuroticism. Neuroticism influences self-care behaviors through health beliefs (25-27). Neurotics, on the other hand, have more irrational beliefs and are less able to control their impulses and manage their stress than others, all of which can reduce compliance.

The neuroticism dimension consists of six facets, which include depression, anxiety, impulsiveness, vulnerability to stress, and learned helplessness. It means that the high scorers in this dimension suffer from a lack of motivation to maintain their health and that of others and a lack of rational decision-making and thinking, directly affecting compliance with health guidelines (26). It is important to note that all research on the role of personality traits in self-care behaviors has been limited to individuals with specific illnesses, and the authors couldn't find any consistent data on the general population during a pandemic. So the present study was novel regarding the use of a normal sample size.

This study shows that each person's personality is related to health observance. Perhaps this finding indicates the effect of education and awareness-raising on people's health compliance with any personality trait. People need specialized instructions and training in health observance that conform to their personality characteristics. Given the prevalence of COVID-19 (34), Saeidnia et al., concluded that intelligent education for the care and prevention of infectious diseases plays a vital role in improving self-care skills, symptom management, personal health observance, and quarantine compliance (35). Other research has shown that training programs such as generating and disseminating threatening messages and emphasizing the effectiveness of recommended strategies promote protective behaviors against COVID-19 (34). Conscientious people can also take part as role models in the training process.

This study showed that compliance with the medical instructions and quarantine rules could be related to personality traits such as conscientiousness, extraversion, openness to experience, agreeableness, and neuroticism,

respectively. Since these five main personality traits can be influenced to some extent by education and training, these personality characteristics can improve, especially at a young age, thus increasing the adherence of people to medical instructions in the future and improving the mental and physical health of society. We recommend the highly predictive personality dimensions' facets as the core concepts of the health observance educational protocol. The present findings can help educate people on health observance and self-care instructions, increasing motivation and responsibility to follow health and self-care recommendations. One of limitations is the application of self-reported questionnaires. The self-report scales may be at the risk of participants' mental tendency to a positive expression of themselves; also, the lack of literature on the relationship between personality traits, health observance, and quarantine compliance has made the conclusions difficult. The present study was done at the beginning of the COVID-19 pandemic, so we had no data on participants' medical history of COVID-19 infection and their COVID-19 related grief experiences. These personal experiences can affect health observance. The lack of such information can be considered another limitation of this study. Because of this, another study should be done to look at more variables that can better explain how health observance and personality traits are linked during pandemics.

Conclusions

Researchers can use conscientious characteristics as a model in health education protocols. Conscientiousness, extraversion, openness to experience, agreeableness, and neuroticism predicted health observance and quarantine compliance, respectively. Based on the correlation results, the neuroticism dimension was inversely related to the following health observances and quarantine compliance.

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