



Personality Types and COVID-19 Pandemic: Exploring Individual Responses to a Global Crisis: A Review

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Abstract

Background: Personality traits are significant indicators of health across the lifespan, and influence behavioral choices. Available research evidence shows that personality can play a role in adherence to preventive health behaviors (PHBs) during the COVID-19 crisis. Certain traits increase the risk of infection, while others enhance coping with the COVID-19 pandemic.

Objectives: This review examines how personality influences adherence to health guidelines during a crisis.

Method: A narrative synthesis approach was used to review studies showing how personality traits are associated with adherence to COVID-19 preventive measures.

Results: The findings suggest that benevolent personality traits correlate with greater adherence, while malevolent personality traits increase the risk of noncompliance with public health measures. Specifically, conscientiousness emerges as the strongest predictor of adherence to health regulations and behaviors.

Conclusions: According to the results of this review, it can be concluded that personality can be a determinant of individual differences in compliance. This means that people with different personality traits are more or less likely to comply with health measures and rules. Understanding these connections can help public health officials develop more effective strategies to promote healthy behaviors.

Keywords: COVID-19, Personality, Big Five Model, Dark Traits, Conscientiousness, Prosocialness

1. Introduction

Since the beginning of the COVID-19 pandemic, with the declaration of a public health emergency around the world, countries have emphasized the importance of following health behavior guidelines to avoid contamination and prevent further spread as the most effective approach to managing this disease (1). Without vaccination, the spread of COVID-19 depends on how strictly people follow prevention guidelines, which has also led to changes in behavior (2) in terms of observing social distancing, reducing mobility, practicing hand hygiene, using masks and properly disposing of masks, and disinfecting homes and workplaces (3, 4). However, not everyone in the community complied with health

guidelines, leading to noncompliance with health protocols. This lack of adherence or, more accurately, the lack of self-health management caused concern for health and government officials because it exposed both individuals and society to the unfortunate consequences of COVID-19. On the other hand, the importance of personal factors cannot be ignored, as in some cases, people's no commitment to preventive behaviors may have been due to individual characteristics (5, 6). During the COVID-19 pandemic, research has shown that personal characteristics such as impulsivity, cognitive ability (e.g., optimism and awareness of infection risks), risk management skills, moral norms, a sense of responsibility, utilitarian orientation and self-interested motivation can greatly

impact adherence to health protocols (7-11). Personality traits are strong predictors of health throughout life, with behavioral choices serving as the link between personality and health (12). Recent studies have shown that personality significantly influences compliance with recommended health behaviors to mitigate the spread of COVID-19 (13). Therefore, personality traits are among the effective factors in self-healthcare behaviors.

1.2. Personality and Health

The relationship between personality and health has long fascinated humans. While personality encompasses individual differences such as gender, mental abilities, and traits, it also significantly influences how people think, feel, and behave in various aspects of life, including health (14). Personality, a biopsychosocial pattern of behaviors and reactions that evolve over time, is intricately tied to health through complex causal and noncausal pathways. Causal pathways include health-related behavioral habits or lifestyles, such as willingness to adopt risky behaviors (e.g., smoking, alcohol abuse) and protective behaviors (e.g., physical activity, adequate sleep, healthy eating). Noncausal links also involve genes, early experiences, and personality changes resulting from illnesses (15, 16). A comprehensive meta-analysis has shown that several personal factors can influence preventive behaviors during the COVID-19 pandemic. These factors include individuals' past experiences, cognitive abilities, physical condition, motivation levels, sense of responsibility, risk management skills, and self-management abilities (6). Overall, a substantial body of research suggests that personality traits can predict individual differences in adherence to preventive health behaviors (PHBs) during the COVID-19 pandemic, such as social distancing and personal hygiene (5, 17). Investigating these linkages can enhance our understanding of causal relationships and enable the development of targeted interventions.

2. Objectives

As personality traits influence behavior, feelings, and thoughts across situations and time, examining their role in hygiene behaviors and compliance can provide valuable insights into preventing the spread of crises threatening human health, such as the COVID-19 pandemic. Therefore, this review summarizes what is currently known about the role of personality traits in adherence to PHB during the COVID-19 pandemic.

3. Methods and Results

A narrative synthesis approach was used to review studies showing how personality traits are associated with adherence to COVID-19 preventive measures. Relevant literature was systematically searched using keywords in databases like PubMed, PsycINFO, and Google Scholar. Articles were screened based on title, abstract, and full-text review. Data extracted included sample characteristics, personality measures, and key findings. Studies were categorized by personality dimensions. The narrative synthesis identified patterns and themes across studies to understand the influence of personality traits on adherence to health guidelines during the COVID-19 crisis.

3.1. Personality and Adherence to Preventive Health Behavior During the COVID-19 Pandemic

The studies were categorized based on three types of personality traits: Benevolent traits, associated with empathy and concern for others; malevolent traits, linked to harmful or destructive behavior toward others; and general personality traits as proposed by the five-factor model (FFM).

3.2. The Role of Benevolent Personality Traits

Benevolent personality traits refer to a set of characteristics that are related to kindness, empathy, and concern for others. People with benevolent personalities have a genuine desire to help people and make a positive impact on the world. They are empathetic and understand the feelings and needs of others and often go out of their way to support those around them. Some common characteristics associated with benevolence include generosity, patience, optimism, and the willingness to help others without expecting anything in return (18). Research has shown that people with a benevolent personality have better mental health, stronger social relationships, and a greater sense of well-being (19, 20). The presence of benevolent characteristics in individuals cultivates a propensity for prosocial behaviors. These traits positively influence individuals to engage in behaviors that benefit others and society as a whole.

Numerous studies show that greater manifestations of caring and considerate attitudes towards others exemplified by prosocial personality traits can play important roles during the COVID-19 pandemic. It appears that those with prosocial tendencies exhibit adaptive and well-adjusted responses to health and

safety measures, contributing to a constructive approach in these challenging times (21). For example, it has been suggested that prosociality is a stable and long-term predictor of health-related behaviors such that measured prepandemic prosociality can predict health protective behaviors during the COVID-19 pandemic. Indeed, prosocial individuals have shown greater adherence to hygiene recommendations and physical distancing guidelines (22). Similarly, while prosociality positively influenced compliance with public health guidelines specifically during wave 3, the average level of this personal characteristic remained consistent across all three waves. As a result, it was suggested that personality factors may play a more important role in adherence to health regulations by reducing the risk of proximity and the need to comply with rules (23). Furthermore, individuals with strong prosocial motivation exhibit greater adherence to hygiene practices and social distancing guidelines due to their genuine concern for the well-being of others (24). Another study revealed a significant association between a prosocial personality and heightened levels of social responsibility, leading to increased positive responses to COVID-19-related health and safety measures, such as consistent mask wearing and practicing social distancing, while high narcissism increased negative responses (21). Additionally, a positive correlation was observed between a stronger sense of social responsibility and a greater likelihood of adhering to essential health behaviors, such as consistent disinfecting practices (25). In addition to being one of the important dimensions of prosocial personality (26), social responsibility is also a strong predictor of altruistic personality. This means that people who are more socially responsible tend to have a higher level of altruistic personality (27). In this regard, research has indicated that women who possess a strong sense of responsibility tend to adhere to health protocols more diligently, as they prioritize the well-being of others. Additionally, women who demonstrate kindness and compassion also have shown a higher likelihood of faithfully following health protocols (5). Further evidence has confirmed that individuals with a strong sense of personal responsibility prioritize their own health and that of their loved ones. Consequently, they were more inclined to adhere to preventive behaviors such as practicing good hygiene and maintaining social distancing. On the other hand, individuals with a greater sense of collective responsibility exhibited more prosocial behaviors, such

as sharing relevant information regarding preventive measures, assisting neighbors with shopping, and actively participating in organized networks dedicated to caring for others (28). Other researchers conducted two studies, and demonstrated that adherence to physical distancing and acceptance of COVID-19 pandemic-related restrictions are better predicted by prosociality-oriented personality tendencies such as a sense of responsibility for collective health (SRCH) and social responsibility. Notably, SRCH emerged as a stronger and more consistent predictor of adherence to social distancing measures (11).

Empathy is a prosocial personality tendency that has been generally suggested to enhance adherence to physical distancing during the COVID-19 pandemic (29). It has become evident that empathetic concerns for vulnerable individuals have greatly bolstered prosocial motivation during the pandemic, especially among individuals displaying heightened levels of self-transcendence (30). It has also been shown that a lack of empathy can lead to a decrease in behaviors related to social distancing (31). There is substantial evidence suggesting that affective empathy (32, 33) and altruism (34) play crucial roles in predicting acceptance and adherence to public health guidelines. Moreover, these traits influence individuals' willingness to be vaccinated. However some authors have not reported a significant relationship between altruism and protective behaviors (35). However, it has been suggested that engaging in prosocial behaviors during the COVID-19 pandemic can have a profound impact on positive affect, empathy, well-being, and social connectedness, indicating the immediate effect of helping others on the helper's mood, such that it fosters a sense of social care (36, 37).

An individual's optimism significantly influences the correlation between their mood and willingness to engage in helping behavior (38, 39). In fact, being optimistic can encourage positive emotional attitudes and behaviors and include prosocial behaviors (39). Previous studies have shown that optimists are more likely to engage in prosocial behaviors (40). On the other hand, prosocials are also more optimistic than individualists (41). Although some evidence suggests that optimism may not have a significant impact on adherence to health rules during the COVID-19 pandemic (42). In contrast, a qualitative study conducted in Iran revealed that women who displayed greater patience and held more hope for the future (a form of optimism) were more likely to follow health

protocols, despite the challenges associated with compliance (5). Studies pre-dating the COVID-19 pandemic have consistently demonstrated that optimism contributes to good health (43, 44), and promotes a mindset open to change, consequently enhancing adaptability skills (45), so that Optimistic individuals tend to embrace and maintain positive health behaviors (43), which can greatly contribute to adherence quarantine rules during the COVID-19 crisis. This highlights the potential influence of optimism in specific contexts and warrants further investigation.

3.3. The Role of Malevolent Personality Traits

Another type of personality trait that came to the attention of researchers during the COVID-19 pandemic was malevolence. Malevolent or self-centered personality traits represent the dark sides of the human personality (46). In fact, malevolent traits are those that promote antisocial behaviors and are associated with a callous-manipulative interpersonal style. They are often characterized by a lack of empathy, a focus on self-interest, and a willingness to exploit or harm others (47). This personality dimension encompasses a range of socially and ethically undesirable traits, which can include malice, egoism, greed, sadism, moral disengagement, a sense of entitlement, and selfishness in the subclinical range (48, 49). People with higher levels of dark malevolent traits are more likely to make unethical decisions, take inappropriate and unwise risks, disregard the negative consequences of their actions on others, violate social norms, prioritize their own self-interest, and show less empathy for others (47, 50, 51). Of the so-called dark traits, three stand out in particular, forming what's known as the "dark triad": Machiavellianism, psychopathy, and narcissism (52). The dark triad is considered a fluid personality construct that exists independently of any individual dark trait. As such, each dark trait serves as an indicator of this central dark core within a person's personality (50).

Since following health guidelines can be considered prosocial behavior, dark triad personality traits have attracted much attention as constructs that show predominantly negative relationships with prosociality and health outcomes (53). In a study, a model was tested to examine the relationship between dark triad factors, along with other related traits such as moral disengagement and impulsivity, and the violation of quarantine rules and noncompliance with health behaviors. The results showed that noncompliance with health measures was positively related to all dark triads,

especially psychopathy, and to other dark traits, especially moral disengagement. It was while individuals with higher moral disengagement were more likely to break quarantine rules, regardless of who was involved (for themselves or their loved ones). In addition, the dark triad has a strong positive correlation with moral disengagement and impulsivity, especially psychopathy associated with impulsivity and Machiavellianism associated with moral disengagement (50). Additionally, there is supporting evidence indicating a notable association between noncompliance with COVID-19 rules and moral disengagement (54).

Impulsivity, as a less-basic personality trait, is characterized by a deficiency in self-control and a propensity to act upon immediate desires or urges, frequently without taking into account potential risks and an inability to delay gratification (55, 56). Previous studies have shown that dark triad traits, especially narcissism and psychopathy, are associated with impulsivity (57). In simpler terms, narcissistic impulsivity is driven by a desire for venturesome social interactions such as engaging in risky or reckless behavior, whereas psychopathic impulsivity arises due to a lack of self-control (58). A Dutch study has revealed that individuals who demonstrate robust impulse control consistently support and comply with safe distancing measures (59). Other studies have shown that people with high impulsivity are less inclined to adopt general health measures aimed at curbing the transmission of the COVID-19 virus (31). In addition, it was found that narcissism and psychopathy were associated with a lower likelihood of engaging in cleanliness behavior, possibly reflecting their tendency to be impulsive and devalue the future results of their actions. On the other hand, sadism positively predicted cleaning behaviors. In this case, although sadism enjoys events that generally have a negative impact on society, as happened during the pandemic, nevertheless it may be more engaged in its own health-protective behaviors in general (60). They may enjoy the feeling of control and power that comes from keeping themselves clean. Some findings on gender differences also indicated that men tended to have higher scores on dark traits such as impulsivity and anti-normative attitudes toward COVID-19. On the other hand, women scored higher in terms of the likelihood of violating quarantine measures (50). In another comparable study, researchers examined the influence of personality traits on the connection between gender and noncompliance with public health

measures. Overall, the results showed that impulsivity and sensation seeking were positively linked to disregarding stay-at-home and physical distancing guidelines, respectively. Moreover, it was observed that male gender indirectly contributed to lower adherence to stay-at-home advisories due to higher levels of sensation seeking. On the other hand, female gender indirectly led to increased COVID-19 distress as a result of heightened anxiety sensitivity (61).

By emphasizing the individual-focused dark traits such as the dark triad, group-focused dark traits like collective narcissism, and the mediating role of health beliefs about the COVID-19 virus, a study conducted on a sample from Poland showed that individuals with high levels of dark triad traits are less inclined to adopt preventive behaviors. This nonparticipation in preventive measures was attributed to participants' greater levels of perceived barriers against prevention and lower perceived self-efficacy in taking such measures. In addition, they are more likely to engage in hoarding behavior, potentially driven by a desire for self-protection due to their heightened perception of susceptibility to the virus, which was related to more hoarding. On the other hand, while the association between collective narcissism and the expression of certain adaptive beliefs about the coronavirus, such as self-efficacy and perceived benefits, was observed, it was found only to be linked with a greater tendency toward hoarding behavior, with no significant effect on preventive measures (62). These findings were replicated in Brazil and the results were generally similar and provide additional support for the possible mediation of the effects of the dark triad traits on health behaviors by health beliefs (63). The results of another study conducted in Poland on solidarity amidst the COVID-19 crisis suggested that collective narcissism is primarily driven by a shared perception of a threat to self-importance, rather than a sense of shared destiny that fosters social solidarity. Consequently, this disregard for others emerges as a fundamental trait of narcissism, both at the individual and collective levels (64). Some studies have also not shown a significant correlation between collective national narcissism and compliance with COVID-19-related health behaviors (65). Other Polish researchers have suggested that collective narcissism can predict a willingness to cooperate and comply with the COVID-19 prevention measures implemented by the government. Research indicates that collective narcissism can coexist with both negative and positive attitudes toward other countries and

international organizations, and its impact on behavior may vary depending on the specific context, such as the threat of a pandemic (66).

Several other findings also support the association between narcissism and its key aspects, such as entitlement and greater self-interest and low adherence to preventive health measures (25, 65, 67). In particular, self-interest was associated with less engagement in social distancing and more hoarding (25). Moreover, negative responses to preventive health and safety measures have also been associated with grandiose narcissism (21). Although, narcissists are characterized by a grandiose self-image, belief in invulnerability, and low concern for others (68). However, some studies have shown that narcissism positively predicts prosocial behaviors such as helping those affected by the COVID-19 pandemic. These findings may reflect the tendency of narcissists to opportunistically engage in selfish acts to please others (60). Moreover, the endorsement of a specific behavioral pattern during the COVID-19 situation by narcissists may stem from their compelling desire to cultivate and uphold a favorable social image. For instance, they may strive to be perceived as responsible citizens who diligently adhere to pandemic restrictions (69). Similarly, another Polish study also revealed that individuals who reported nonadherence to public health restrictions demonstrated higher levels of psychopathy than did those who reported adhering to such restrictions. Conversely, higher levels of subclinical narcissism were found to predict greater compliance with these rules (69). Additionally, a study involving Spanish and Portuguese participants revealed a correlation between the belief in following government health advice and lower levels of psychopathy and Machiavellianism. In return, narcissism showed a positive association with beliefs about following advice from scientists and trusting their expertise (70). This finding may be attributed to the fact that people with higher levels of narcissism are more likely to value intelligence and competence, as previous studies have shown (71, 72). Narcissists tend to have a higher level of trust in scientists. This can be attributed to their belief that scientists possess exceptional knowledge and expertise, aligning with their grandiose self-perception. However, it is essential to note that this trust may be motivated by self-interest rather than genuine respect for the scientific process.

Indeed, it is important to note that the relationship narcissism with concern for others as well as helping behavior can be complex, depending on the nature of

the manifested form of narcissism. In this regard, intriguing findings showed that Narcissists may be motivated to help others for both egoistic and altruistic reasons. In fact, Individuals with higher levels of grandiose narcissism tended to engage in helping behaviors during the COVID-19 quarantine mainly for self-promotion and admiration. Conversely, those with higher levels of communal narcissism were more likely to help others during the quarantine driven by a desire to make a positive impact and assist others. However, vulnerable narcissists were less willingness to help and demonstrated a lack of concern for others (73). The results can be inferred from the narcissist's perception of placing trust in others. It has been determined that Grandiose narcissists tend to harbor a low level of trust in others, mainly driven by their negative perception of others' trustworthiness, and self-image as benevolent. While communal narcissists display a more optimistic outlook on trusting others due to the communal self-enhancement (74).

On the other hand, it has been suggested that grandiose narcissists anticipate the outcomes of their behaviors in a more self-interested manner and may not perceive health and safety precautions as integral to social responsibility. Hence, they might view such measures as unfairly imposed personal restrictions that could potentially have detrimental effects on the prevention of COVID-19 (21). Additionally, it has been found that individuals with grandiose narcissism tend to exhibit decreased adherence to social distancing measures. This reduced willingness to observe social distance is specifically linked to a diminished sense of responsibility in protecting others from potential infections (11). Although, narcissists show disobedience to hygiene guidelines, but they may be more inclined to hoard and do so due to self-centeredness and fear of COVID-19 (25, 62). On the contrary, it has been proposed that cultures and countries with a strong sense of collectivistic identity, along with high levels of patriotism and nationalism, may also display elevated levels of collective and national narcissism. Consequently, this could contribute to a more pronounced association between collective narcissism and PHBs (65). Therefore, a distinction can be made between collective narcissism, characterized by strong and unquestioning dependence on one's group, and dark triad traits, which pertain to individuals who are self-centered and solely focused on themselves. Notably, dark triad personalities may exhibit reduced engagement in prevention efforts due to their lack of

belief in the utility of preventive measures, and harbor doubts about the effectiveness of these behaviors. As a result, they perceive more barriers to their adoption (75).

Several studies have also highlighted the importance of situation perception. A Polish study discovered that individuals displaying characteristics of the dark triad, such as lacking concern for others (psychopathy), being cynical and power-seeking (Machiavellianism), and exhibiting rivalry (narcissism), were less inclined to follow COVID-19 restrictions. However, individual's perception of the COVID-19 situation played a more significant role in compliance than their personality traits (76). The perception of highly critical situations like the COVID-19 crisis by individuals with dark triad traits can have a mediating effect on their reaction. Consequently, individuals with dark triad traits may view the COVID-19 situation as an opportunity for exploitation, as they perceive lower costs such as interpersonal harm. Moreover, these individuals may perceive the pandemic situation as less threatening, leading them to interpret strict restrictions as inadequate and, consequently, not taking them seriously (76). Other researchers have also supported the hypothesis of "Strong Situations," proposing that the influence of personality traits on behavior diminishes when situational cues overshadow dispositional tendencies. Their findings did not show a significant relationship between dark triad traits and adherence to social distancing (60). Instead, it has been observed that narcissism and Machiavellianism are linked to increased negative emotions and a perception of the pandemic as an extremely threatening situation. In contrast, antisocial traits such as psychopathy and sadism did not significantly predict fear or a sense of threat in relation to the social instability caused by COVID-19. However, these traits were found to predict the experience of positive emotions during the pandemic (60). Meanwhile, two other studies have also shown that Machiavellianism and psychopathy were negatively correlated with the adoption of healthy behaviors, such as social distancing and wearing masks (77, 78). They did not perceive the pandemic situation in such a threatening way. On the contrary, they tended to continue one's personal life "as if nothing had happened" (78).

In particular, it has been suggested that the emotional reactions expressed from psychopathy and sadism in a crisis situation such as COVID-19 may stem from a breakdown, called disintegration, in the

information processing systems that are responsible for assessing reality, which subsequently leads to incoherent and distorted thoughts, emotions, and actions, and as a result antisocial tendencies arise (79, 80). Disintegration has been characterized as a personality trait-like disposition that causes variations in psychotic-like behavior (articulating psychosis proneness) (81). Recent evidence has shown that individuals with a high Disintegration tendency were not only less willing to comply with recommended health behaviors, but also more engaged in pseudoscientific measures aimed at preventing COVID-19 infection such as inhaled a saline solution, consumed garlic, consumed colloidal silver, and inhaled a saline solution. This relationship was mediated by a decreased propensity for rational thinking and an increased inclination towards an experimental thinking style (82). Given that previous studies have demonstrated the association between high disintegration trait and various indicators of criminal recidivism (83) and psychopathy, including manipulative and antisocial tendencies (84, 85), it is plausible to consider that the "dark aspects of personality" can indeed contribute to non-compliance with recommended measures in crisis situations such as the COVID-19 pandemic.

A number of studies have particularly emphasized the role of psychopathic traits in the risk of spreading the COVID-19 virus due to engaging in high-risk behavior and disregarding health regulations. For instance, research has revealed that within the dark triad traits, particularly psychopathy, and within the triarchic model of psychopathy, specifically disinhibition and meanness, are associated with lower engagement in hygiene behaviors and a deliberate intention to put others at risk (86). Moreover, a recent study with a similar focus has indicated that psychopathic traits, notably disinhibition, were more influential in predicting reduced adherence to public health guidelines (87). In general, antisocial traits overlap with psychopathic or dark triad traits. In this case, individuals with high levels of antisociality took fewer social distancing measures (88). In another study, antisocial traits, including a lack of empathy and increased levels of callousness, deceitfulness, and risk-taking, were found to be associated with reduced compliance with containment measures such as social distancing, hand washing, and mask use (89). Moreover, Additional evidence suggested that non-compliance was more prevalent among young adults who had previously scored high on indicators of "antisocial

potential" (54). Other interesting findings showed that the genetic overlap between COVID-19 and antisocial behavior was stronger for the personality trait of psychopathy. This suggests that people who score high on psychopathy are genetically predisposed to risky health behaviors and can spread the virus by disregarding public health guidelines (90).

Other authors have posited that within the dark triad, two constructs, namely psychopathy and narcissism, generally exhibit maladaptive tendencies, leading to reduced compliance with health measures. In contrast, the construct of Machiavellianism encompasses both adaptive traits such as careful planning and goal-directed behavior, as well as maladaptive traits characterized by selfishness and callousness. There was an expectation that the adaptive aspects of Machiavellianism might be more closely associated with COVID-19 related health behaviors. Their intriguing discoveries revealed that specific facets within the dark triad, notably the irresponsible and antisocial behaviors of psychopathy, self-interest and callousness associated with the maladaptive aspects of Machiavellianism, and entitlement stemming from grandiose narcissism, directly hinder adherence to social distancing guidelines. Conversely, a positive influence was observed in terms of planfulness, which reflects the capacity to delay immediate gratification. However, when analyzing the endorsement of lockdown policies, a comparable pattern emerged. Notably, not only were there direct influences from the paths of antisocial behavior, grandiose narcissism, and specific components of Machiavellianism (antagonism and planfulness), but several indirect effects through ideology were also evident (91). There is also evidence that Machiavellianism cannot be reliably identified as a predictor of law-breaking behaviors related to COVID-19 (92). It has been suggested that some of the more adaptive features of Machiavellianism, which are related to careful planning, being strategic, being calculating, long-term reasoning, and cautiousness, could predict greater vigilance in committing to pervasive rules compared to psychopathic and narcissistic personality traits (91, 92). A recent study has also brought attention to there may be different motivations behind people with dark traits in adhering to the preventive measures of COVID-19. This study revealed that elevated scores in primary psychopathy traits (callousness, low empathy and manipulativeness), secondary psychopathy traits (antisocial, neurotic and impulsive), grandiose narcissism, and borderline personality disorder (BPD)

were associated with a diminished perception of the seriousness of pandemic situation, which in turn led to reduced compliance with COVID-19 prevention behavior. Furthermore, Individuals with higher grandiose narcissistic traits and BPD tended to endorse COVID-19 conspiracy theories. Interestingly, they were more likely to follow preventive measures when they felt a greater risk of contracting the virus (self-concern) (93).

3.4. The Five-Factor Model of Personality

The big five personality traits, also known as the FFM, are a widely accepted framework for understanding human personality. It is based on the idea that there are five broad dimensions of personality that can be used to describe and understand individual differences in behavior, thoughts, and emotions. The five factors are openness, conscientiousness, extraversion, agreeableness, and neuroticism (94). Evidence suggests that the big five personality dimensions are heritable to some degree and may represent the structure of universal human personality influenced by genetics that transcends language and other cultural differences (95, 96). A growing number of studies so far show that the big five traits can determine how people react biologically to stressful situations (97-99). Over the past decade, several theorists and researchers have suggested that the FFM may be important in advancing understanding of the relationship between personality and health. For example, previous research found that each of the five factors was differentially associated with several health-related variables, including coping (100), medication adherence (101) risky health behaviors (102, 103), self-reported illness (104-106), hygiene measures (107, 108), cold symptomatology (such as susceptibility to acute respiratory tract infections) (106, 109), hospitalization (110), health-related quality of life (111), and mortality risk (112). Recent evidence also supported the validity and effectiveness of the big five framework in predicting Health-Related Lifestyle Profiles during the COVID-19 crisis (113) as well as comprehending the diverse responses to the COVID-19 pandemic, termed pandemic personality (114). A series of studies conducted during the COVID-19 pandemic have investigated the impact of the big five personality dimensions on compliance with health-protective behaviors. These studies will be discussed in more detail below.

Numerous independent studies carried out in Iran have consistently indicated that conscientiousness played a significant role as a predictor of PHB during the

COVID-19 pandemic (115-118). However, the findings varied regarding the other dimensions of the big five model and the mediating variables. Accordingly, the results of one of these studies showed that people with the characteristics of agreeableness and openness also are more likely to observe health protocols related to COVID-19, and empathy also strengthens this relationship (115). It was also found that being conscientious and agreeable through the Practice of religious beliefs had a positive and indirect effect on compliance with the protocols, but openness showed a negative and indirect effect through religious beliefs (116). On the contrary, another study reported a weak correlation between openness and compliance with hygiene and quarantine, and only neuroticism showed an inverse correlation with adherence to the protocols (117). A study in Israel also found that individuals with higher conscientiousness are less prone to reporting behavioral failures, particularly in terms of noncompliance-violations. Consequently, these individuals display a strong dedication to adhering to crucial COVID-19 prevention measures (119). Other researchers from Croatia have highlighted the mediating role of motivation and found that high approach motivation and lack of avoidance motivation underlie the correlation between conscientiousness and agreeableness to COVID-19 concerns and adherence to guidelines. In fact, conscientious people are more disciplined in wearing masks, gloves, and social distancing due to their tendency to pursue long-term goals (approach motivation). Additionally, their proneness to experience reduced anxiety and fear related to COVID-19 (lack of avoidance motivation) further supports their adherence to these measures. Regarding agreeableness, there was a significant mediating role of a stronger willingness to respond to rewards (approach motivation) in relation to social distancing and reduced mobility (2). This incentive to receive rewards may play an important role in shaping these individuals' adherence to recommended guidelines. Similarly, two studies found that individuals who were higher in agreeableness and conscientiousness engaged in more social distancing because they more effectively perceived the importance and value of guidelines as a function of their concerns about the well-being of communities (120, 121). In addition, it has been found that agreeableness and conscientiousness are the mediators of the gender-compliance link, so that women with a higher score in these characteristics are more inclined to comply with a

set of PHB than men (122). Comparably, a study from Iran demonstrated that highly conscientious women were more likely to engage in self-care behaviors related to Coronavirus (118). Agreeableness and conscientiousness strongly predicted individuals' support for social distancing and hygiene practices, as well as their receptiveness to health messages (86). Additionally, conscientiousness and agreeableness were identified as predictors of prosocial behavior in coping with the pandemic (123). In other words, young people who have high scores in conscientiousness and agreeableness were more likely to engage in prosocial and responsible behavior, including cooperate with others, offer help, volunteer, and are willing to follow certain health routines for the greater good, especially during health crises like the COVID-19 pandemic (123).

Some existing studies have found mixed results regarding the relationship between extraversion, agreeableness, and neuroticism with adherence to guidelines. A recent study conducted among Arab residents in Qatar revealed that individuals with higher levels of conscientiousness, who displayed a greater inclination to comply with social norms, and individuals with higher levels of neuroticism, who tended to perceive greater risks associated with COVID-19 and experienced anxious and fearful feelings, were more likely to adhere to social distancing measures. The authors emphasized that this trend to conform to protective behaviors serves as a coping mechanism, prompted by the amplified risk perception in neurotic individuals. It is worth noting, however, that the study findings indicated that individuals categorized as agreeable displayed less compliance to social distancing measures (124). However, some evidence supporting the important role of agreeableness characteristics in following recommended guidelines during the COVID-19 pandemic to reduce mobility and maintain social distance. Also, neuroticism was emerged as a positive predictor of COVID-19 concerns while exerting a negative influence on the willingness to leave home (2). Additional studies has consistently indicated that individuals with lower agreeableness traits were more prone to displaying noncompliance with behavioral instructions (13, 76). Instead, findings from a Greek study showed that only conscientiousness and neuroticism, among young adults, were associated with a positive attitude towards diligently adhering to precautionary measures such as social distancing and other prevention measures (123).

An American study also showed that higher baseline agreeableness, conscientiousness, and extraversion were more related to frequent adherence to basic health guidelines, while lower neuroticism predicted more conservative beliefs and greater guideline adherence intention, and more frequent guideline adherence (17). Likewise, it was found that women with conservative personalities and lower risk aversion were more likely to follow health protocols out of concerns for COVID-19 (5). Interestingly, a Swedish study also found that agreeableness, neuroticism, and openness were indirectly related to compliance through trust to the public health agency of Sweden, and confirmed the direct association of conscientiousness with compliance (125). Conversely, other researchers from Sweden found that people who were less agreeable and perceived less adversity in the COVID-19 situation complied more. These results, according to the researchers, may have been due to Sweden's less strict restrictions and recommendations than many other countries. It leaves room for people to make their own decisions and responsibilities, so those who agreeable may follow those around them rather than the guidelines enforced by the Swedish authorities (126). In a similar vein, one study also suggested that individuals with a higher agreeableness trait tend to gravitate towards participating in social events. As a result, they may be more likely to conform to the preferences and opinions of significant others and may prioritize social interactions, engaging in social practices, and consequently feel less inclined to strictly adhere to social distancing measures (124).

Some researchers argue that implementing health measures can have adverse effects on both the economy and overall well-being, leading to them being seen as burdensome and costly endeavors. Consequently, they proposed that considering individuals' perceptions of the costs and challenges associated with following health guidelines, as opposed to relying solely on self-reported intentions, provides a more accurate prediction of actual behavioral outcomes (127). In this regard, it was found that all the big five traits, except extraversion, had a positive relationship with general health measures and distancing. But extraversion, neuroticism and agreeableness were positively linked to the higher perceived personal cost of compliance, whereas conscientiousness exhibited a negative relationship. In fact, Conscientious individuals may perceive that taking these measures is aligned with their personality and less challenging to incorporate into

their daily routines (127). A large population-based survey of older adults in Europe also found that COVID-19 precautionary behaviors were consistently associated with higher openness, conscientiousness, and neuroticism, suggesting that the pattern of compliance with precautionary behaviors may be driven by their multiple psychological differences. In other words, these characteristics reflect individual differences in the ease of adapting to new situations or trying new things for open-minded individuals, the tendency to be responsible and follow social norms for conscientious people, and the tendency to experience negative emotions such as fear, anxiety and perceived threat for Neuroticism. However, those with high agreeableness were less likely to limit in-person contacts. Also, no correlation was found between extraversion and COVID-19 preventive behaviors (128).

A study conducted in Slovenia (129) also obtained a variation of individual differences in adherence to health measures, similar to the previous findings (128) to some extent. Specifically, conscientiousness was the strongest predictor in determining people's adherence to measures and guidelines for mitigating COVID-19. People who were high in conscientiousness adhered to a wide range of measures, including those that the majority took less often, such as disinfecting shared surfaces and wearing a mask in enclosed spaces outside of home. Individuals with high scores in openness were more likely to engage in certain behaviors. They tended to prefer alternative shopping methods like online, which reflects their positive attitude towards experiencing new things. Additionally, they often limit physical contact to their own household, indicating that they actively seek health-related information and follow medical advice. Maintaining safe interpersonal distance was not only significant for neuroticism. However, emotionally stable individuals were more likely to practice basic protective measures such as washing/disinfecting hands, avoiding touching the face/mask with unwashed hands, and maintaining safe interpersonal distance. Although, agreeable and extraverted individuals maintained safe interpersonal distance, however, unlike high openness and conscientiousness, they did not limit physical contact to their household members. These two traits were also associated with some basic health practices, not as much as conscientiousness (129).

The findings of an American study also showed that the associations between personality traits and adherence to COVID-19 measures may differ based on

age, gender, and race/ethnicity (130). In terms of age, it was found that the connection between agreeableness and wearing a mask and frequent handwashing was less significant among older individuals compared to younger ones. Regarding gender, extraversion had a stronger correlation with wearing masks among men than women. When considering race/ethnicity, the associations between agreeableness and handwashing as well as physical distancing were weaker among Hispanic older adults. On the other hand, Hispanic older adults showed stronger associations between extraversion and physical distancing and using sanitizers compared to non-Hispanic White older adults (130). A team of Swiss researchers recently found that the effects of the big five personality traits on the COVID-19 pandemic vary significantly across countries and stages of the epidemic. They conducted an extensive study empirically in three important stages of the coronavirus epidemic in six European countries that were severely affected at the beginning of the pandemic. In this way, their important results showed that Neuroticism was clearly associated with threat perceptions of the pandemic and negative emotional responses to the COVID-19. Moreover, Conscientiousness was recognized as a prominent trait during the pandemic, especially when it came to protecting against the virus. Conscientious people were less infected with COVID-19 due to compliance with hygiene measures. They were also more likely to prioritize collective security over individual freedoms and not tolerate epidemiologically undesirable behaviors. Also, the pandemic was perceived by extroverts as a major social threat, which was not surprising given their social nature. However, extroverts were more at risk of the epidemic, especially in the countries of Italy and Spain during the severe stages of the COVID-19 crisis (114).

Some study, in particular, focused on the possible relationship between Being extroverted and the risk of getting infected with COVID-19. Results showed that those who had contracted COVID-19 were more sociable and tend to be conservative compared to those who had not, due to their tendency to seek out social opportunities and disregard social distancing measures (131). In support of these findings, it has been found that higher extroversion can negatively predict non-observance of social distancing and reduced mobility (2). Similarly, a study from Brazil also found that people who score high in extroversion are likely less to adhere to social distancing while high conscientiousness was linked to social distancing and wash handwashing (132).

However, in another study, the initial negative associations extraversion with social distancing, and health outcomes diminished upon controlling for other relevant traits (86). Fascinating discoveries from a recent study have also revealed that individuals with higher levels of extroversion were more inclined to receive the COVID-19 vaccine when it becomes available to them. It appears that extroverts may exhibit a greater willingness to be vaccinated as a proactive measure to mitigate the risks associated with social interactions (133).

A number of other studies have highlighted the significance of the interaction between the big five dimensions in predicting health behavior. For instance, individuals high in neuroticism tend to exhibit unfavorable patterns in adopting current health behaviors, such as maintaining social distance, particularly when their levels of conscientiousness are low compared to those with higher levels (86). Moreover, the correlation between higher conscientiousness and the adoption of greater precautions was notably more pronounced among individuals with lower levels of neuroticism (134). Also, conscientiousness and agreeableness interacted synergistically in predicting future health behaviors. In other words, higher levels of agreeableness enhanced the predictive power of conscientiousness with regard to the willingness to effectively perform social distancing (86).

In another group of studies, HEXACO personality traits were used to predict adherence to health measures. In a study, it was discovered that honesty-humility and openness, were positively correlated with recommended hygiene practices like hand washing, social distancing, and refraining from touching one's face (82). Another study also revealed that individuals who scored higher in honesty-humility, conscientiousness, and openness were more likely to adhere to social distancing guidelines while extraversion was negatively associated (91). Furthermore, it is found that those who possessed high levels of honesty-humility and agreeableness were more inclined to follow hygiene and physical distancing recommendations, whereas individuals with high conscientiousness generally exhibited behavior in accordance with the guidelines (8).

On the other hand, Japanese researchers have investigated hoarding behavior as a pressing social problem in the midst of the COVID-19 pandemic, because many people were not unable to access

essential and mutually beneficial products, thereby increasing the risk of infection. The results indicated that agreeableness, neuroticism, openness and greediness had significant positive effects on hoarding behavior. Additionally, the preliminary results also showed that hoarding behavior has a positive correlation with extroversion. However, a non-significant negative relationship was observed between conscientiousness and hoarding behavior (135). In a parallel study conducted in America, it was demonstrated that individuals with higher extraversion scores and lower agreeableness and conscientiousness scores were found to engage in more preparatory behaviors, such as Hoarding of sanitary supplies. The other traits, including neuroticism and openness, were unrelated to preparatory behaviors. But when controlling for the other personality traits, higher conscientiousness was significantly associated with fewer preparations. Interestingly, these associations varied significantly by age. Some of the responses were associated more strongly in older adults, a group at risk for complications of COVID-19. For example, higher openness, conscientiousness, and Agreeableness were associated significantly with more preparations among older adults than among younger adults (134).

4. Conclusions

This review highlights the impact of personality traits on individuals' adoption of preventive behaviors crucial for mitigating the spread of the COVID-19 pandemic. Studies in this field suggest that personality typology, categorized into three groups (benevolent traits, malevolence, and general traits like the FFM), can play a crucial role in individuals' adherence to health measures.

In terms of benevolence, individuals with high prosocial personality traits, characterized by traits such as empathy, altruism, honesty, humility, and a strong sense of personal and social responsibility, are less likely to endanger others and more likely to engage in PHB. Conversely, individuals with malevolent traits, commonly referred to as the 'dark triad,' which includes narcissism, machiavellianism, and psychopathy, are more likely to disregard health regulations and measures. In addition, the existence of some maladaptive personality tendencies such as anti-sociality, sadism, impulsiveness, disintegration, and moral disengagement, which are often associated with the dark triad, could contribute to the emergence of psychopathic behaviors and therefore lead to non-

observance or breaking of health regulations. Even the genetic predisposition of malevolent individuals (especially psychopaths) to engage in anti-social behavior and against collective norms may make them prone to defying health regulations recommended by governments (90). In sum, the evidences attained from the current review study shows that the presence of dark personality traits can be a risk factor for the spread of a pandemic crisis such as COVID-19. People who score higher on these personality traits may be less likely to adopt healthy behaviors and more likely to continue their normal lives even in the face of a public health crisis, so that by ignoring health protocols they expose others at risk of infection.

Among the big five personality dimensions, conscientiousness was an important and salient trait in following health guidelines and respecting rules and policies to protect oneself and others. Furthermore, as per the HEXACO personality model, individuals with high levels of honesty-humility were predisposed to actively participate in PHBs. Such responses of conscientious and honest-humility individuals can be due to their greater trust in health care providers, awareness of the potential consequences of their health behaviors that help them make healthier choices, and also a sense of duty or responsibility to others. As a result, they are intrinsically motivated to stay on track with their health goals, even when it's difficult. Regarding the other big five dimensions, there were inconsistent findings. In general, although agreeable and extroverted individuals understand the significance of adhering to hygiene measures, particularly when it comes to social distancing. However, they may occasionally prioritize socializing, especially with important individuals (like extended friends and family) nevertheless, they also derive advantages from engaging in preventive measures. In fact, extroverts are looking for activity and dynamism, while those with higher agreeableness value social interactions to realize their personal satisfaction. The inherent compassion of highly agreeable people can help slow the spread of the pandemic, as their genuine concern for others encourages them to take the necessary precautions. In addition, their willingness to cooperate increases their motivation to comply with social requirements. Hence, it is crucial for these two personality traits to perceive the benefits associated with adhering to health measures (124, 129).

There was less consensus on openness to experience and neuroticism. However, open-minded individual

observe health measures due to the importance of health-related issues, in addition, due to the desire for new experiences, they used alternative methods such as online shopping to comply with restrictions. Highly Neurotic individuals, who are prone to experiencing intense fear in critical situations like the COVID-19 pandemic, may perceive themselves as more susceptible to disease or infection. This heightened fear motivates them to prioritize personal hygiene measures. However, it seems that Neuroticism may impact hygiene intention to a certain extent, potentially leading to poor adherence to health measures. There are several explanations for this connection. Firstly, Individuals with high neuroticism often experience intense health-related anxiety, leading them to avoid seeking healthcare and treatments due to a tendency to mistrust in crisis situations. They may resort to Unhealthy coping behaviors as a way to cope with their distress. Secondly, individuals with high neuroticism may struggle with lower levels of self-efficacy, which can make it challenging for them to comply with health measures. Third, the interaction between high neuroticism and other dimensions, particularly low conscientiousness, can be indicative of poor adherence to health behaviors, including social distancing. Lastly, heightened neuroticism can lead to negative emotions, such as anger and frustration, in response to health challenges, making it difficult to stay motivated to adhere to health measures.

Overall, the influence of human personality on the emergence, transmission, and management of global disasters, including pandemics, has consistently proven to be noteworthy. While personality is undoubtedly a factor that influences compliance with health measures, it is essential to recognize that it is not the only determining factor. Other factors, such as age, gender, education, cultures and socioeconomic status, also play a role. But, personality can serve as a substantial predictor of compliance, making it crucial to incorporate this factor when devising interventions aimed at enhancing health behaviors. It is important to consider a comprehensive range of personal characteristics that contribute to individuals' adherence behaviors. By doing so, we can effectively reduce the scale of potential future disasters. Future research endeavors can contribute to a deeper understanding of how personality dimensions play a pivotal role in both the emergence and mitigation of global threats.

Footnotes

Authors' Contribution: O. S.: Conceptualization, wrote the original draft, preparation, review, supervision. E. S., A. S., and N. M. advised on the study selection process. E. S. did the language editing of the manuscript. A. S. and N. M. were in charge of checking the sources. All authors read and approved the final manuscript.

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