



**UNIVERSITY OF
BIRMINGHAM**

**UNDERSTANDING THE PERSONALITY TRAITS OF COVID-19
RULE-BREAKERS**

BY

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Table of Contents

Acknowledgements	III
Table of Contents.....	IV
List of Tables	VI
List of Figures.....	VII
List of Appendices.....	VIII
CHAPTER 1. INTRODUCTION.....	1
CHAPTER 2. THE RELATIONSHIP BETWEEN PERSONALITY TRAITS AND COVID-19 RULE-BREAKING AND RULE-COMPLIANCE IN WESTERN COUNTRIES: A SYSTEMATIC REVIEW OF THE LITERATURE.....	11
Abstract.....	12
Introduction	13
Method.....	18
Results	32
Discussion.....	64
CHAPTER 3. WHO BROKE THE COVID-19 RULES? AN EXAMINATION OF THE PERSONALITY TRAITS OF COVID-19 RULE-BREAKERS USING THE IPDE-SQ AND HEXACO-PI-R-100.....	81
Abstract.....	82
Introduction	84
Methodology.....	101

Results	112
Discussion.....	127
CHAPTER 4. CRITIQUE OF THE SHORT DARK TRIAD (SD3).....	150
Introduction	151
Short Dark Triad Development	154
Reliability	157
Validity	163
Norms	174
Conclusions	178
CHAPTER 5. DISCUSSION	181
References	196
APPENDICES	262

List of Tables

Table 1. Search Terms	20
Table 2. Database Searches	21
Table 3. Subject Heading Searches	21
Table 4. Inclusion/Exclusion Criteria	23
Table 5. Data Extraction Table	33
Table 6. Personality Traits Examined.....	44
Table 7. COVID-19 Rule-Breaking/Rule-Compliance Measurement	46
Table 8. Rule-Breaking Means and SD	113
Table 9. Personality Trait Means and SD	114
Table 10. Two-Tailed Correlational Analysis Between Personality Traits and COVID- 19 Rule-Breaking	115
Table 11. HEXACO Six Multiple Linear Regressions (Enter Method) Results	118
Table 12. ICD-10 Six Multiple Linear Regressions (Enter Methd) Results	123
Table 13. Cronbach's Alpha Across a Selection of SD3 Studies	158
Table 14. Malesza et al. (2017) Test-Retest Results	162
Table 15. Pechorro et al. (2019) SD3 Convergent/Divergent Correlations.....	173
Table 16. SD3 Norms (PsyToolKit, 2021)	174
Table 17. Normative Sample References (OpenPsychometrics, 2021).....	176

List of Figures

Figure 1. Inclusion/Exclusion Application Process Diagram.....30

List of Appendices

Appendix A. Search Terms and Database Hits, Syntax and Subject Heading Searches	263
Appendix B. SPIDER Exclusion/Inclusion Criteria Application (After Initial Sifting)	267
Appendix C. SPIDER Inclusion/Exclusion Form	283
Appendix D. Detailed Data Extraction Table	284
Appendix E. Study Aims	298
Appendix F. Quality Assessment Extraction Form (Downes et al., 2016)	300
Appendix G. AXIS Quality Assessment Studies Not Meeting Cut Off (60% or Lower)	340
Appendix H. Overall AXIS Quality Assessment Scores (Downes et al., 2016)	348
Appendix I. Advertisement/Participant Invitation.....	350
Appendix J. Participant Demographic Information.....	351
Appendix K. Participant Information Sheet	353
Appendix L. Participant Consent Form	355
Appendix M. Demographic Questionnaire.....	357
Appendix N. COVID-19 Rule-Breaking Questionnaire.....	359
Appendix O. International Personality Disorder Examination-Screening Questionnaire (IPDE-SQ; Loranger et al., 1997)	368
Appendix P. HEXACO-PI-R-100 Personality Questionnaire Example Items (Lee & Ashton, 2018)	369
Appendix Q. Participant Debrief Sheet	370
Appendix R. Amazon Prize Draw Form	372

Appendix S. Outcome Variables (Rule-Breaking Types) Further Information 373

Appendix T. Inter-Correlation Table 379

Appendix U. Personality Inventory for DSM-5, HEXACO, ICD-10 Personality Trait
Definitions 380

Abstract

The overarching aim of the present thesis was to explore the personality traits associated with COVID-19 rule-breaking, both to summarise and extend existing research. Since the beginning of the pandemic, numerous academic studies have been published in an attempt to understand the characteristics of individuals who contravened the COVID-19 laws/rules/guidance. Consideration of this research area is crucial in understanding why a person might have broken COVID-19 rules, and in gaining insight regarding whether personality traits play a significant role in whether or not someone broke these rules.

Chapter 1 details the background of the research area, providing the context for the remaining chapters. The chapter includes discussion regarding the COVID-19 pandemic, COVID-19 rule-breaking, the theory and consequences of such behaviour, personality traits and their relationship to low-level crime and COVID-19 rule-breaking.

Chapter 2 presents a Systematic Literature Review (SLR) which examines the relationship between personality traits and COVID-19 rule-breaking in Western countries. The findings of this review identified that agreeableness is the most consistent trait relating to COVID-19 rule-compliance, with mixed findings for other traits. Conclusions derived from this chapter note that personality traits do appear to relate to COVID-19 rule-breaking, however the relationship is tenuous given the number of contrasting findings, and it highlights the over-reliance on using the Big Five model of personality, which provides the rationale for the use of different measures of personality in the study presented in Chapter 3.

Chapter 3 outlines an empirical project which explores the relationship between the International Classification of Diseases-Version 10 (ICD-10) and HEXACO

personality traits and COVID-19 rule-breaking behaviour in the UK (Ashton & Lee, 2007; World Health Organisation (WHO), 1993). Results suggested that higher honest-humility, conscientiousness, agreeableness and openness to experience personality traits significantly predicted COVID-19 rule-compliance, while higher extraverted, paranoid and histrionic personality traits predicted COVID-19 rule-breaking. Overall personality traits were able to predict 19% of the variation associated with COVID-19 rule-breaking. The chapter conclusion highlights the need for further research to explore *what works* to reduce rule-breaking within a pandemic, and given the significant role personality traits played, the need to understand how knowledge of personality traits can be incorporated into policy-making and public health messages.

Chapter 4 provides a critical evaluation of the Short Dark Triad (SD3), which has been commonly used to examine the Dark Triad personality traits associated with COVID-19 rule-breaking (Jones & Paulhus, 2013). Findings regarding the reliability and validity of this measure were not promising and provided one of several rationales for the exclusion of studies, which employed the SD3 tool, in the SLR (Chapter 3). The chapter concludes that further research ought to move forward from the SD3, and research efforts converging towards a new measure would be beneficial.

The thesis concludes with Chapter 5 which discusses the main findings, comments on the strengths and limitations of the thesis, considers the results in relation to forensic practice and provides recommendations for future research.

CHAPTER 1

INTRODUCTION

Introduction

A pandemic is a widespread occurrence of an infectious disease, such as polio, H1N1 flu and Ebola, across a large region of the world (Morens et al., 2009; Piret & Boivin, 2021). One of the most recent pandemics was Coronavirus (COVID-19), an infectious disease caused by the SARS-CoV-2 (Severe Acute Respiratory Syndrome–2) virus. First detected in China in December 2019, COVID-19 spread rapidly throughout the world, and was declared a pandemic on the 11th of March 2020 (WHO, 2020b). By June 2023, there were at least 767 million confirmed cases, 6.9 million recorded deaths, and 14.9 million excess deaths worldwide (WHO, 2023b). The COVID-19 pandemic has been predicted to cost the global economy \$12.5 trillion by 2024, while 1.6 billion students have missed out on education, and 251 million people have been pushed into poverty (Ferreria, 2021; International Monetary Fund, 2022, as cited in Reuters, 2022). Clearly the impact of the pandemic is far reaching, with disproportionate impacts on poorer countries and individuals.

COVID-19 Restrictions

In 2020, countries worldwide employed varying levels of guidance and legislation aimed at controlling people's behaviour to help curb the spread of the virus (Van Bavel et al., 2020). Some introduced *tight* rules (e.g., China), while others adopted *loose* rules (e.g., Brazil; Gelfand et al., 2021). A complex interplay between health and political priorities played out. The terms *social-distancing* and *lockdown* became part of global vocabulary, while many schools, workplaces and non-essential shops and entertainment activities closed to reduce/contain both the spread of the virus and pressure on healthcare systems (Flood, 2020).

Although governments acted on some of these policies unilaterally, for example, restricting international travel and introducing laws/sanctions for misbehaviour, the success of these measures relied on behavioural changes among ordinary individuals (Blais et al., 2021). In February 2022, with infection and death rates in decline worldwide, alongside the development and roll-out of COVID-19 vaccines, most countries eased restrictions/laws/guidance/rules (WHO, 2023a). On the 4th of May 2023, the WHO (2023a) declared COVID-19 as no longer a “public health emergency of international concern” (para. 3), and encouraged movement towards the long-term management of COVID-19, with several recommendations, including the continued support of COVID-19 research.

During the pandemic, governments introduced legal sanctions to deal with rule-breaking. Parallels were noticeable in the patterns of restrictions and severity of penalties, in particular across Western countries. These were comparable to sanctions and measures associated with low-level crimes (also known as summary offences), such as speeding, parking in restricted areas, fly-tipping and other minor antisocial behaviours. For example, in Germany, fines of up to €5000 were introduced for breaking COVID-19 laws, while in Berlin, those who failed to observe 1.5 metres in social-distancing faced fines of €100 to €500 (Kaiser & Hensel, 2021). Meanwhile, in Switzerland, the penalties for those who did not comply with quarantine obligations were up to €8251 (Uhlmann & Scheifele, 2020). In England, COVID-19 rule-breaking fines started at £200, increasing to £3400 for a second offence (Coronavirus Act, 2020). In Australia, first-time offences yielded an \$5000 fine for breaching stay-at-home orders or lying to contact-tracing officials (Reuters, 2021).

In terms of data regarding the enforcement of lockdown restrictions, precise numbers of COVID-19 rule-breakers were hard to ascertain, given authorities inevitably did not apprehend and prosecute all COVID-19 rule-breakers. Nevertheless, some indicative data are available. In England and Wales, for instance, the National Police Chiefs Council (NPCC, 2021), reported that by June 2021, 117,213 Fixed Penalty Notices (FPNs) had been issued for COVID-19 restriction breaches, with the majority (£800 fines; $n=3,440$) served for participating in a gathering of over 15 people, closely followed by 2,765 fines for not wearing face coverings. In Victoria (Australia), fines were issued to almost 1% of the population for breaching restrictions (Australian Associated Press, 2022). By 20th May 2020, early in the pandemic, Spanish authorities had already issued 1,013,747 fines and arrested 8,418 people for breaching lockdown regulations, while France handed out 915,000 fines within five weeks of the first nationwide lockdown (Palmer & English, 2020). Inevitably these examples reflect only a small degree of non-compliance, as authorities applied differing levels of discretion with varied transgressions.

Future Pandemic Likelihood

Notwithstanding advances in healthcare, pandemics have become more prevalent due to factors such as increased travel, urbanisation, climate change, increased human/animal contact, and shortage of healthcare workers (Strand et al., 2022). Modelling, taking these factors into account, has suggested another pandemic is not unlikely, with an occurrence likely every 10-30 years, and an annual probability of 3-7% (Connolly, as cited in Regan, 2021). At a press conference in December 2020, Mark Ryan, head of the World Health Organisation (WHO, 2020b) Emergencies Programme,

said the COVID-19 pandemic was “not necessarily the big one... the next pandemic may be more severe” (Ryan, 2020, as cited in Davey, 2020, para. 10). There is a clear argument for accelerated efforts in the developments of pandemic preparedness.

Personality Traits

Although COVID-19 rule-breaking could have serious health consequences, as well as the potential of a substantial fine or custodial sentence, the data above suggest that many individuals were willing to contravene or ignore guidance. In understanding why individuals broke the COVID-19 rules, research has focused on government policy initiatives. In exploring tight and loose national guidelines, Gelfand et al. (2021) related rule-breaking to culturally adopted fear and threat, finding that in *tight* nations (e.g., China, Western nations), 70% of people feared catching the virus, compared to only 49% in *loose* nations (e.g., Brazil). Unsurprisingly, perhaps, those countries employing loose rules recorded up to five times the number of cases of COVID-19 and nine times the number of deaths (Gelfand et al., 2021). Other academics argued the reasons for rule-breaking arise from the actions of governments and media. Fancourt et al. (2020) related COVID-19 rule-breaking to the Broken Windows Theory, suggesting that rule-breaking among a population has a ripple effect, and it arises from complexity/confusion over the rules, and an *us vs them* mentality towards governments. Although focus on government strategy is important, rule-breaking is also a consequence of individual behaviour. Short (2020, as cited in Wood, 2020) suggested there are three kinds of COVID-19 rule-breakers: those who do not understand the rules, those who do not think the rules are important, and those trying to exert control

by knowingly breaking the rules. Given these varied viewpoints, it is pertinent to examine the particular individual characteristics of COVID-19 rule-breakers.

As COVID-19 rule-breaking data suggest, individuals clearly differ in their level of adherence to COVID-19 guidance. Numerous studies have been published considering why some individuals comply while others do not. Factors such as political ideology, trust in science/government, social capital and the influence of anxiety have helped explain the likelihood of rule-compliance (Blais et al., 2021). However, the origins of these factors have also been the focus of research, with studies suggesting that personality traits capture some of the individual differences in COVID-19 behaviour.

Personality traits are deeply-rooted, enduring characteristics that are inferred from a pattern of behaviours, attitudes, feelings and habits (Ekselius, 2018). Traits are considered on a spectrum, whereby individuals experience more or less of certain traits (American Psychological Association; APA, 2023b). People with different personality traits will focus on different informational cues from their environment, which will in turn create different options to consider, leading to distinct behavioural choices (Hopwood et al., 2011). The study of personality traits can be useful in summarising and explaining an individual's conduct, and can predict interpersonal reactions, problems, and stress within different scenarios (APA, 2023b). Given that personality traits tend to interact with the environment in influencing behaviours, they have been used to understand COVID-19 rule-compliance. Moreover, the influence of personality on behaviour is “amplified in situations marked by uncertainty or crisis” (p. 2) such as a global pandemic (Blais et al., 2021).

Personality Traits and Low-Level Crime

Personality traits have been linked with low-level criminal behaviour, which in countries that imposed legislation to sanction COVID-19 rule-breaking, provides a useful comparison. From a theoretical perspective, Eysenck's Theory of Criminal Personality proposed that the criminal personality is biologically based, and includes personality traits of extraversion and neuroticism (Eysenck & Eysenck, 1970). Later, Eysenck and Eysenck (1977) added a third trait, psychoticism, relating to antisocial, aggressive and uncaring behaviour, asserting that high levels of these traits predispose and increase the likelihood of criminal behaviour. More recent theories have recognised that criminal behaviour is both personality driven and sustained by emotional reactions to environmental stimuli (Moffitt, 1993; 2006a; 2006b). Additional personality research has found relationships between: impulsive, extraverted and neurotic personality traits and driving offences (e.g., speeding); low agreeableness and lower conscientiousness and convictions for misdemeanours; high neuroticism, low conscientiousness and low agreeableness and physical aggression and self-reported vandalism; extraversion and low-level community crime (Faílde-Garrido et al., 2021; Lau, 2013; Miller & Lynam, 2006; Möttus et al., 2012; Wang et al., 2018). Meanwhile, traits such as conscientiousness and agreeableness have been considered protective factors for criminal behaviour (Gleason et al., 2004). It is important to understand whether COVID-19 rule-breakers hold similar personality traits to low-level criminals, as this can provide valuable knowledge, first about whether the personality traits are similar, and second, to understand whether similar sanctions might be helpful in reducing rule-breaking.

Personality Traits and COVID-19 Rule-Breaking/Rule-Compliance

Previous research has examined the personality traits of COVID-19 rule-breakers. This is discussed in detail in Chapters 2 and 3, therefore a succinct overview is provided here. Research into whether personality traits relate to COVID-19 rule-breaking behaviour has predominantly focused on personality trait theories such as the Five Factor Model (alternatively known as the Big Five: extraversion, openness, agreeableness, neuroticism and conscientiousness; Goldberg, 1990), the HEXACO (honest-humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience; Ashton & Lee, 2007) and the Dark Triad (psychopathy, Machiavellianism and narcissism; Paulhus & Williams, 2002). Research has also focused on individual traits such as impulsivity (Wallace et al., 2021). Researchers have tended to agree that personality traits played a significant role in influencing behavioural responses to the COVID-19 pandemic (e.g., Blais et al., 2021; Nowak et al., 2020). Nevertheless, studies reveal discrepancies as to which traits relate to rule-breaking and which relate to rule-compliance.

Rationale

Research examining the personality traits of COVID-19 rule-breakers has expanded significantly since the beginning of the pandemic. Given that COVID-19 rule-breakers likely played a significant role in the spread of COVID-19 and subsequent illness and mortality levels, it is essential that research is conducted with a view to reducing the frequency of rule-breaking behaviour in future pandemics. Understanding the personality traits of COVID-19 rule-breakers would undoubtedly be helpful in a future pandemic, which is considered to be highly likely (Connolly, as cited in Regan,

2021). Moreover, gaining knowledge of the personality traits of rule-breakers may be instrumental in improving public adherence to government rules, for example, by considering how those rules are communicated. Public health officials and policymakers could consider messages tailored to those with certain personality styles, with a view to increase pandemic-related compliance. Understanding whether the characteristics of COVID-19 rule-breakers are distinct or comparable to low-level criminals provides rationale as to whether sanctions for low-level criminals might be effective for pandemic-related rule-breakers. Research regarding personality traits and COVID-19 rule-breaking has been inconclusive and several limitations have been noted, including: use of non-medical model theories of personality, few UK-based research studies and no review summarising current research findings. As such, the ambitions of this thesis are to increase current understanding of whether personality traits are related to COVID-19 rule-breaking, to understand which traits are related to rule-breaking and which are related to rule-compliance, and, theoretically, whether these are comparable to the low-level crime literature.

Thesis Aims

Specifically, this thesis aimed to 1) clarify the relationship between personality traits and COVID-19 rule-breaking thus far, 2) further investigate the personality traits of COVID-19 rule-breakers, using validated personality theories, and 3) examine the psychometric properties of a measure used to assess the personality traits of COVID-19 rule-breakers. To achieve these objectives, the thesis comprises three pieces of work:

Chapter 2 is a Systematic Literature Review (SLR) exploring the relationship between personality traits and COVID-19 rule-breaking/rule-compliance in Western

countries. The review specifically focused on *whole* theories of personality that define a person's entire set of characteristics. The review examined which personality traits have been found to relate to COVID-19 rule-compliance and rule-breaking. The findings were synthesised using a narrative approach, and the results are considered in relation to implications for practice and future research.

Chapter 3 comprises an empirical study examining the personality traits of COVID-19 rule-breakers in the UK using the HEXACO and ICD-10 measures (Lee & Ashton, 2018; WHO, 1993). The study utilised a quantitative approach to explore these traits and COVID-19 rule-breaking behaviours. The study used the HEXACO-Personality-Inventory-Revised (HEXACO-PI-R; Lee & Ashton, 2018) and a medical model (ICD-10) theory of personality, as assessed by the International Personality Disorder Examination-Screening Questionnaire (IPDE-SQ; Loranger et al., 1997; WHO, 1993).

Chapter 4 examines the psychometric properties of the Short Dark Triad (SD3; Jones & Paulhus, 2013). The SD3 has been widely used within COVID-19 research, so it was considered important to analyse and assess the measure's psychometric properties. The findings are discussed in relation to the adequacy of the SD3 in practice and research in the context of COVID-19 rule-breaking and personality trait research.

Chapter 5 draws together the findings to summarise the current understanding of the personality traits linked with COVID-19 rule-breaking/rule-compliance. The overall findings are discussed with reference to implications for practice, and suggestions for future research directions are provided.

CHAPTER 2

THE RELATIONSHIP BETWEEN PERSONALITY TRAITS AND COVID-19 RULE-BREAKING AND RULE-COMPLIANCE IN WESTERN COUNTRIES: A SYSTEMATIC REVIEW OF THE LITERATURE

Abstract

To date, the COVID-19 pandemic has resulted in nearly seven million confirmed deaths worldwide (WHO, 2023b). During the pandemic, most governments across the world implemented social-distancing, self-isolation and sanitation measures to help curb the spread of the virus, and in many countries these were enforced by legislation. Researchers promptly set out to explore the characteristics associated with those who broke COVID-19 rules, and a popular line of research concerned personality traits. This Systematic Literature Review (SLR) examines the personality traits related to COVID-19 rule-breaking/rule-compliance in Western countries. It included 11 studies, assessed in quality using the AXIS tool, with results ranging from 67.5% to 87.5% (Downes et al., 2016). The extracted data were assessed systematically, using a narrative qualitative approach. The review details personality traits from the HEXACO (Ashton & Lee, 2007), Big Five (Goldberg, 1990) and DSM-5 (American Psychiatric Association, 2013) related to COVID-19 rule-breaking/rule-compliance, finding strongest agreement among studies regarding the trait *agreeableness* in relation to rule-compliance. While these studies generally agreed that personality plays a role in rule-compliance/rule-breaking, mixed and contradictory results were evident for a number of traits, so conclusions are tentative. Strengths and weaknesses of the review are explored, implications for the role of personality trait theory within government handling of both public health crises and low-level crime are made, and suggestions for future research are provided.

Keywords: Coronavirus, personality traits, rule-breaking, compliance.

Introduction

COVID-19 is an infectious disease caused by the Severe Acute Respiratory Syndrome-2 virus (SARS-CoV-2; WHO, 2020a). First identified in China in December 2019, it spread rapidly and was declared a pandemic on the 11th of March 2020 (WHO, 2020a). By March 2023 notified worldwide deaths from COVID-19 had surpassed 6.89 million with up to 15 million excess early deaths (WHO, 2023b). Throughout the pandemic, countries employed varying levels of guidance and legislation aimed at controlling people's behaviour to help curb the spread of the virus (Van Bavel et al., 2020). A complex relationship between political, economic, social and cultural factors was evident. In terms of progression of the pandemic, Western countries tended to adopt similar patterns of restrictions responding to both scientific and political priorities (Organisation for Economic Co-operation and Development, 2020).

Motivations for breaking COVID-19 rules have been researched throughout the world. One area of research has focussed on personality traits, which are thought to guide and shape an individual's responses to life events (Kumar & Tankha, 2022). Shokrkon and Nicoladis (2021) suggested willingness to comply with the COVID-19 rules strongly relates to personality traits and how individuals perceive, think, express emotions and understand the world. In recent decades, personality theory has developed significantly, with the most popularised and researched traits described in the International Classification of Diseases 10th and 11th Revisions (ICD-10/11; WHO, 1993, 2019) and Diagnostic Statistical Manual of Mental Disorders-5 (DSM-5; American Psychiatric Association, 2013). According to the ICD-10 there are ten types of personality traits: paranoid, schizoid, dissocial, emotionally unstable (borderline, impulsive), histrionic, narcissistic, anankastic, anxious (avoidant), and dependent

(WHO, 1993). The DSM-5 traits consist of dependent, schizoid, schizotypal, obsessive compulsive, antisocial, histrionic, paranoid, narcissistic, borderline and avoidant, with a further alternative model consisting of, psychoticism, detachment, antagonism, disinhibition and negative affect (known as the PID-5; American Psychiatric Association, 2013; Wright et al., 2012). One of the most widely accepted alternative models of personality is the Big Five (also known as the Five Factor Model; extraversion, conscientiousness, openness to experience, agreeableness, neuroticism; Goldberg, 1990).

Prior to pandemic-related research, many academics had examined links between personality traits and low-level crime. Given that COVID-19 rules across Western countries tended to result in low-level consequences, such as fines, it is arguable that there are similarities in the traits of people who commit low-level crime and those who broke COVID-19 laws. Eysenck's (1964) theory was among the first to explicitly link personality to criminality. Eysenck (1964), employing a biological perspective, determined that arousal levels were directly linked to the personality trait of extraversion, while testosterone levels related to psychoticism, both of which Eysenck (1964) related to criminal behaviour. Advances in brain imaging have found connections between impulsivity and frontal-lobe executive functioning, suggesting poor ability to perceive consequences may result in criminality (Brower, 2001). In response to narrowly deterministic views of biological theories, Moffit (1993; 2006a; 2006b) postulated a socio-biological model whereby they proposed that criminal behaviour is the result of an interaction between personality traits and environmental stimuli. Similarly, recent theories of criminal behaviour have focussed on understanding

the interaction between a person's biology, psychology and social environment (Abrahamsen, 2014).

Most research confirms a general perception that personality and low-level crime are related. Studies regarding low-level crimes, such as speeding and theft, have found positive associations between antisocial, narcissistic, impulsive and extraverted traits (Listwan et al., 2007; Reid, 2011). Individuals with low self-control (i.e., impulsive/antisocial traits) are less concerned with long-term consequences and were found more likely to engage in immediately gratifying activities such as shoplifting and fraud (Burt, 2020). In a meta-analysis of over 60 studies investigating personality and crime, Miller and Lynam (2006) found the largest effect sizes ($>.03$) for psychoticism and novelty-seeking. Interestingly, extraversion was more related to crime in non-prisoner samples (i.e., low-level/community offenders; Miller & Lynam, 2006). The overall findings suggested individuals exhibiting low agreeableness (hostility/indifference) and low conscientiousness (poor impulsive control/motivation) were more likely to engage in low-level criminal behaviour (Miller & Lynam, 2006). Although COVID-19 rule-breaking sanctions in Western countries tended to be similar to low-level crime sanctions, it is important to consider that the personality traits associated with breaking COVID-19 rules could be different from low-level crimes. Indeed, compared with low-level crime, breaching COVID-19 rules had potentially higher self and other health-related consequences.

During the pandemic many academics initiated investigations into personality theory and COVID-19 rule-breaking/rule-compliance, with particular focus on the Big Five, and specific traits were hypothesised to be related to rule-compliance (Honeycutt, 2020). Researchers predicted that individuals scoring high in neuroticism would abide

by COVID-19 rules, given their typical health-oriented characteristics (Shokrkon & Nicoladis, 2021). Additionally, individuals scoring high in agreeableness tend to be prosocial/altruistic, and therefore were likely to comply with the COVID-19 rules to protect others (Nofal, 2020). Conscientious individuals tend to avoid health risks and live in an organised manner, and therefore were likely to comply with rules (Zajenkowski et al., 2020). Carvalho et al. (2020b) found higher scores on conscientiousness were significantly associated with more social-distancing and handwashing due to the organised lifestyles of such individuals. Those with higher honest-humility traits (in the HEXACO personality model; treating others fairly and loyally) were more likely to be rule-compliant as they might have experienced negative reactions to media coverage of those suffering, resulting in personal avoidance of unnecessary gatherings (Blais et al., 2021). However, Carvalho et al. (2020b) predicted the pandemic may evoke heightened levels of compliance among all personality traits to avoid infection.

At the other end of the spectrum, researchers have also examined which personality traits relate to COVID-19 rule-breaking. Researchers predicted extraverted individuals would find it particularly difficult to abide by the COVID-19 restrictions given that geographical data suggested they tend to visit more places in the day, so may find social isolation more difficult (Ai et al., 2019). Furthermore, Honeycutt (2020) predicted that those lower in openness, conscientiousness and agreeableness were more likely to COVID-19 rule-break. Similarly, Blagov (2021) found individuals with lower conscientiousness were less likely to endorse social-distancing guidelines and hygiene advice. This appears to be consistent with the correspondingly contrasting results for COVID-19 rule-compliance.

A substantial amount of research into COVID-19 rule-breaking has focused on the Dark Triad/Tetrad of personality traits (Machiavellianism, psychopathy, narcissism, sadism), which relate to risk-taking behaviour, including speeding, drink-driving and joyriding (Nowak et al., 2020). Research has suggested that psychopathy and Machiavellianism negatively relate to COVID-19 rule-compliance, while psychopathy increases intention to endanger others (Blagov, 2020; Konc et al., 2022). Moreover, narcissism relates to rule-breaking to a lesser extent, while results for sadism are mixed, with such individuals having shown increased COVID-19 hygiene compliance (Hardin et al., 2021; Nowak et al., 2020; Triberti et al., 2021). However, the Dark Triad/Tetrad focuses on traits which share characteristics of lack of empathy, and interpersonal hostility and offensiveness – a relatively limited sample of the personality trait spectrum (McHoskey et al., 1998). Moreover, the Dark Triad psychometrics have been subject to extensive criticism in relation to validity, with some researchers having argued they are based on flawed theoretical concepts that are interchangeable in normal samples (McHoskey et al., 1998).

In considering the Big Five, the HEXACO and the DSM-5 traits, there is a robust research basis for personality traits and COVID-19 rule-breaking/rule-compliance (American Psychiatric Association, 2013; Ashton & Lee, 2007; Goldberg, 1993). Extending knowledge and gathering information about how personality traits interact with COVID-19 rule-breaking/rule-compliance can provide insight regarding individual differences in compliance. This information can provide a basis for policymakers to appraise the potential effectiveness of government laws/rules/guidance, advise further behavioural interventions, and assess the potential strategy of future health and crime measures (Nofal et al., 2020). In the wider context, if similar

personality traits are found for both COVID-19 rule-breakers and low-level criminals, results could add to the understanding of the personality traits of individuals who commit low-level crimes. To clarify this relationship, a SLR is required, with focus on personality traits contained in models/psychometrics that proclaim to encompass all aspects of personality (see Inclusion/Exclusion Criteria for details).

This SLR examined research regarding the relationship between personality traits and COVID-19 rule-breaking/rule-compliance in Western countries. The aims were to determine whether there is a relationship between personality trait theories (i.e., models that provide a whole view of an individual's personality) and behavioural compliance with COVID-19 regulations by:

1. Examining which personality traits relate to COVID-19 rule-breaking.
2. Examining which personality traits relate to COVID-19 rule-compliance.

Method

The search strategy for the literature review adopted a systematic approach. This was the most applicable as the review intended to answer specific questions through gathering/evaluating research papers. An initial search of the general literature was conducted to provide suggestions regarding the search terms, and this confirmed there was substantial research within the topic area. Searches of the Centre for Reviews and Dissemination, the Cochrane Database of Systematic Reviews and the Campbell Collaboration, confirmed the review was novel. The topic was searched on PROSPERO which confirmed no registered SLRs with this research interest. One empirical review was conducted by Preti et al. (2020), however this examined individuals diagnosed with personality disorder as opposed to traits. The search syntax was gathered and reviewed,

run on the databases listed below and studies were collated. The search strategy further included manual reference list searches of the final identified papers ($N=11$). Further details regarding this are at the end of the method section in accordance with the process chronology.

Database Searches

All searches were limited to January 2020 onwards, as the first case of COVID-19 was reported to the WHO in December 2019 (WHO, 2020a). Final searches were conducted on the 4th of February 2023. The automated searches were carried out on the following platforms/databases:

- Web of Science: Core Collection.
- Proquest: Social Sciences Premium Collection.
- Ovid: APA PsychInfo, Embase.
- Scopus.
- EBSCO Host: CINAHL Plus, Medline.
- PubMed.

Subject heading searches:

- Ovid: APA PsychInfo, Embase and Medline.

Search Strategy

Scoping searches were conducted using the phrases ‘COVID-19’, ‘personality traits’ and ‘rule breaking’ to identify available research. Search terms ‘pandemic’ and ‘regulations’ were removed; the former was deemed unnecessary as all research related

to the pandemic included the terms ‘COVID-19’ and ‘coronavirus’, the second was removed as unrelated types of regulation were found within searches (e.g., self-regulation). Subject heading searches were completed to aid with the process of search term decision-making. During subject heading searches, ‘compliance’ was added to the search strategy. This term was searched using a variety of words (i.e., comply, complian* and complies). This overcame issues when the phrase ‘compl*’ was tested and terms such as ‘complaint’ occurred. Searches for individual personality traits (e.g., antisocial, extraversion) were tested and removed due to limited results. The full syntax for each database is provided in Appendix A. The syntax was consistent across databases except for database-specific truncations.

Table 1*Search Terms*

COVID-19 Search Terms	Personality Search Terms	Rule-Breaking/Rule-Compliance Search Terms
Coronav*	Personalit*	Rule break*
Covid 19	Personality trait*	Break rule*
Covid?19	Personality characteristic*	Government guid*
Covid		Coronavirus law*
Sars cov		Coronavirus rule*
Sars?cov?2		Covid law*
Severe acute respiratory syndrome		Covid rule*
		Law*
		Rule*
		Offen*
		Lockdown rule*
		Transmission mitigation behav*
		guidelines
		Adher*
		Comply*
		Complian*
		Complies

After conducting the searches and subject heading searches, the following number of papers were found:

Table 2

Database Searches

Database	Number of Papers
EBSCO Cinhal Plus	19
EBSCO Medline	116
Ovid APA PsychInfo	103
Ovid EMBASE	119
Proquest (Social Sciences Premium Collection)	50
PubMed	128
Scopus	168
Web of Science (Core Collection)	157

Table 3

Subject Heading Searches

Database of Subject Heading Search	Number of Papers
Ovid APA PsychInfo	55
Ovid Embase	1
Ovid Medline	13

In total, 929 papers were found. This reduced to 325, after removal of 604 duplicates. After initial screening of the title and abstracts, papers considered irrelevant to the research question were removed on this basis ($n=216$). A further five papers were removed as they were unavailable in English, while eight were inaccessible through the source and other databases. A total of 229 papers were removed through this process. Therefore, 96 papers remained to be subjected to the full inclusion/exclusion criteria (Figure 1).

Inclusion/Exclusion Criteria

The inclusion/exclusion criteria were decided upon using the SPIDER tool (Sample, Phenomenon of Interest, Design, Evaluation and Research Type; Cooke et al., 2012) given the cross-sectional designs of the studies. After duplication removal and initial sifting, the SPIDER was applied (Table 4).

Table 4*Inclusion/Exclusion Criteria*

SPIDER	Exclusion Criteria	Inclusion Criteria
Sample	Papers will be excluded if the participants are <18 years.	The participants must be aged >18 years.
	Papers will be excluded if the study was conducted in non-Western country or a mix of participants from Western and non-Western countries.	Participant samples must all be within a Western country.
Phenomenon of Interest	Papers will be excluded if they are unrelated to COVID-19, personality traits, and rule-breaking.	Papers will be included if they are related to COVID-19, personality traits and rule-breaking.
	Papers will be excluded if they only examine one, or one strain of personality trait e.g., Dark Triad, impulsivity, narcissism, or only examining one personality trait from a wider questionnaire.	Papers will be included if they include more than one strain of personality trait.
Design	Papers will be excluded if they have not used an explicit standardised psychometric measuring personality traits.	Papers will be included if they have used an explicit standardised psychometric measuring personality traits.
Evaluation	Papers will be excluded if personality traits are statistically analysed within mediator/moderator designs.	Papers will be included if they examine the direct relationship between personality traits and COVID-19 rule-breaking/compliance.
Research Type	No specified criteria.	No specified criteria.
Other	Papers will be excluded if the researcher is unable to obtain a copy in the English language.	Only papers available in the English language will be included.
	Papers will be excluded if they are not peer reviewed.	Papers will be included if they have been peer reviewed (this could include doctoral thesis if passed the viva process).

In terms of *Sample*, studies using participants 18-years-old and over were included. Researchers have argued personality traits are not fully formed until the age of

25 years, and therefore including under-18s may provide unreliable results (Van Dijk et al., 2020).

Within *Population*, only Western countries were included. The rationale being easier comparison of COVID-19 rule-breaking given Western countries generally employed similar *tight* approaches to public restrictions, including lockdowns and hygiene recommendations (Gelfand et al., 2021). Personality theories are generally of Western origin, with similar traits found among these populations, so including only these would likely enhance generalisability of the findings (Benet-Martínez & Karakitapoğlu-Aygün, 2003). The category *Western country* was defined according to modern convention: European Union countries and areas whose populations have a large presence of ethnic groups that have historically experienced significant British influence that has grounded the country to the Western world politically and culturally (i.e., European Union, UK, New Zealand, Australia, US and Canada; Stearns, 2003).

For *Phenomenon of Interest*, included studies should examine both personality traits and COVID-19 rule-breaking/rule-compliance. Initial sifting was based upon this criterion, with the removal of unrelated studies. The remaining papers were fully examined, and further studies, subject to the full inclusion/criteria, were later removed on this basis. A second criteria related to the exclusion of studies if they predominantly focused on one strain/type of personality trait rather than a combination of traits that make-up an individual's entire personality (e.g., studies only examining impulsivity, Dark Triad). The review only included personality models and psychometrics that proclaim to encompass all traits within a person's personality. The rationale for this included:

- A more straightforward synthesis. For example, individual traits can be measured by a wide range of tools, which would increase complexity of collation/comparison. Moreover, there would be a significant volume of studies examining individual traits/moods, which was not within the SLR remit.
- Psychometrics that proclaim to encompass an entire set of traits that cover all aspects of a person's personality are widely used and generally considered robust, for example, the Big Five Inventory (Soto & John, 2017b), the HEXACO-60 (Ashton & Lee, 2009), Million Clinical Multiaxial Inventory (Millon et al., 2015), the Personality Inventory for DSM-5 Brief Form (Krueger, 2013).
- Had studies examining only one personality trait, or one strain of personality traits, been included, the findings may have been biased towards particular personality traits/styles.
- As evidenced in Chapter 4, personality psychometrics examining only an individual's *dark traits* were found to demonstrate poor reliability/validity.

For *Design*, studies were included if they used an explicit, standardised personality psychometric measure. Studies were removed if they made conclusions about personality traits using non-personality measures (e.g., mood inventories).

In terms of *Evaluation*, studies specifically using moderation or mediation analysis were excluded. Each study was hand-searched for the word “mediator” and “moderator” (in relation to the current study, not if the authors were referring to a different study within the introduction/discussion) and excluded if they included these terms. There is a recognition that personality traits and other factors (e.g., mediators)

could have been explored, however, the SLR focused on studies which examined a direct relationship. Further reviews could address the complex interplay between personality traits, COVID-19 rule-breaking and mediating/moderating factors (see the Discussion section).

In terms of *Other*, studies were excluded if the researcher was unable to obtain a copy in the English language. Moreover, for quality purposes, studies were only included if they had been peer reviewed. Figure 1 contains a diagram presenting the number of papers removed at each stage, while Appendix C shows the inclusion/exclusion criteria form used. Although the form in Appendix C was used, the exclusion/inclusion criteria were implemented in this specific order:

1. Removal of papers with non-Western sample/mixed Western/non-Western sample (Sample).
2. Removal of papers with no specific personality trait measure (Design).
3. Removal of papers only examining a specific type/strain of personality trait (Phenomenon of Interest).
4. Removal of papers including under 18-year-olds in the sample (Sample).
5. Removal of papers considered irrelevant to the research question (Phenomenon of interest).
6. Removal of papers examining an indirect relationship (mediator/moderator; Evaluation).
7. Removal of papers not peer reviewed (Other).

Appendix B provides a summary of papers removed. After applying the above inclusion and exclusion criteria to the 96 studies, 83 were removed, and 13 remained.

Quality Assessment

After the application of inclusion/exclusion criteria, quality assessments were completed for all remaining studies ($N=13$). Quality assessment is considered an essential procedure for SLRs to enhance the credibility of results (Ali & Usman, 2018). The majority of studies were of cross-sectional design. Wright et al. (2021) used a larger panel (cohort) study, but considered it to be a cohort cross-sectional design (Hudson et al., 2005).

To assess the quality of the studies, the Appraisal Tool for Cross Sectional Studies (AXIS) was chosen as it is well validated and examines the risk of bias in cross-sectional studies (Downes et al., 2016). The AXIS has the benefit of providing the user with the opportunity to assess each individual design aspect, and it provides flexibility in incorporating risk of bias (Downes et al., 2016).

The AXIS was used for all studies ($N=13$), and considered appropriate for Wright et al.'s (2021) cohort cross-sectional design (Downes et al., 2016). The AXIS was adapted to include a quality percentage to enable comparison and a partial score to provide leniency if the quality criteria had been partially but not fully met:

- Yes=2 (met).
- Partial=1 (partially met).
- No=0 (not met).
- Unclear/N/A/Unknown=0 (unable to rate).

The maximum score for the AXIS was 40 points, with Question 13 and 19 using reverse scoring. On the reverse scored questions, if the answer was rated as “unknown”, the score remained at 0. It appeared arbitrary to score items rated as “unknown” as 2 as this would increase the overall score. Two points were only provided for the reverse scored question if the answer was rated as “no”.

A quality percentage cut-off for inclusion was deemed appropriate given that low quality papers would likely produce less reliable results. Therefore, the cut-off was set at 60% to ensure studies were of robust quality. Quality assessment scores were converted into percentages (i.e., total score divided by the total number of items and multiplied by 100). Papers were excluded if they scored 60% or lower, which removed two papers. Of these, Brouard et al. (2020) was considered of particularly poor quality in terms of lack of discussion regarding ethical consent, minimal discussion of the results, and lack of clear demographic data results. Likewise Kanazawa (2022) lacked detail of the results, demographic information was unclear and the study lacked discussion regarding ethical consent. In total 11 studies met the inclusion criteria and were above the quality assessment cut-off score.

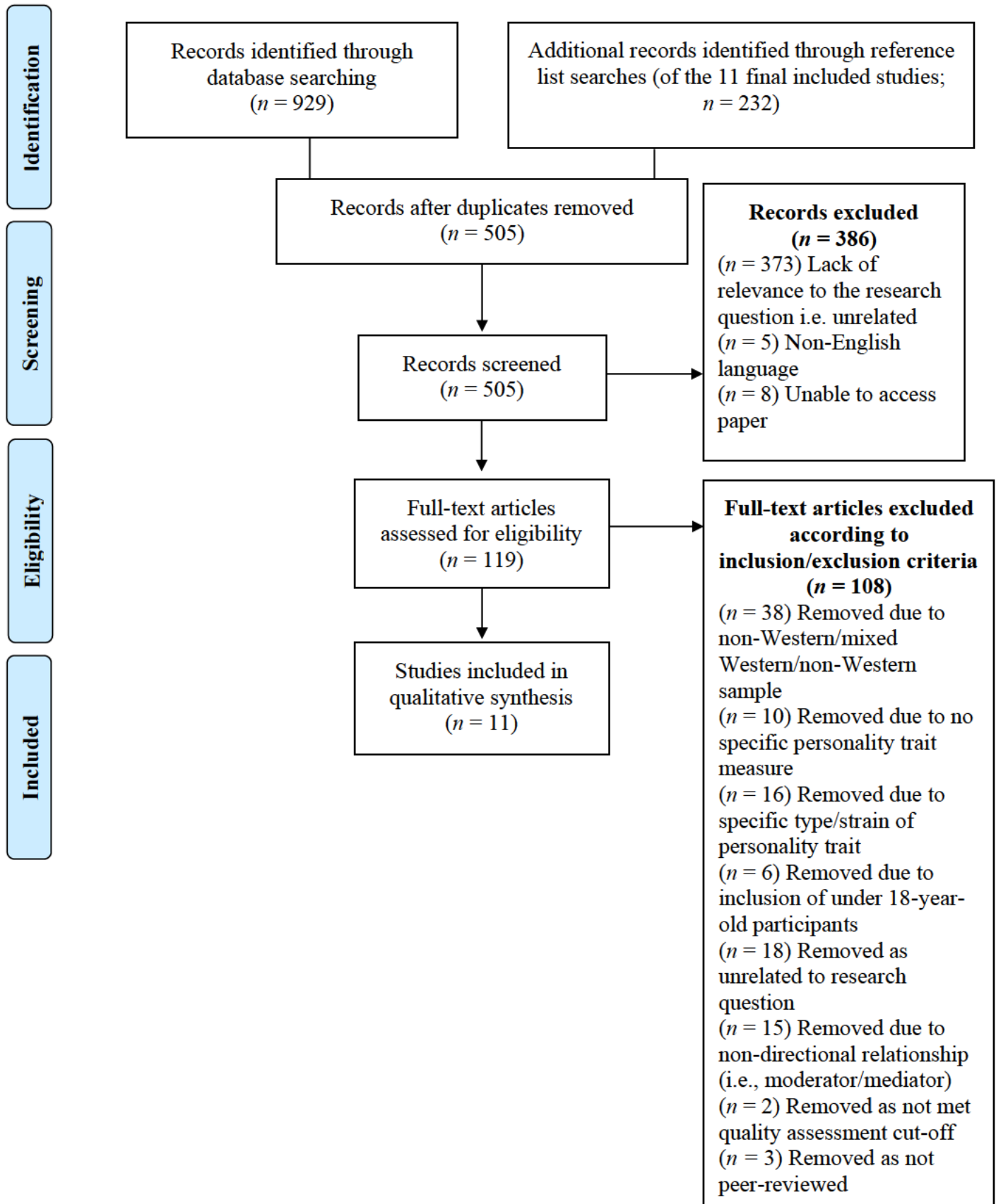
Of the initial 13 studies, three (23.1%) were randomly quality assessed by the academic supervisor to increase objectivity. Inter-rater reliability gives an indication of the accuracy of the quality assessment scoring. Cohen’s Kappa (k), a reliable measure of inter-rater reliability for categorical variables, was used for this assessment (McHugh, 2012). According to McHugh (2012), k ranges from “strong” to “almost perfect”, which suggests 64-100% of the data are reliable, k in the almost perfect range, suggests 82-100% of the data are reliable. The comparison yielded an overall almost perfect Cohen’s Kappa ($k=.907$), which ranged from strong ($k=.796$; Zajenkowski et al., 2020) to almost

perfect ($k=.943$; Smrdu et al., 2021). Quality assessment extraction forms of studies meeting the criteria, not meeting the criteria, and overall quality scores are included in Appendix F and G.

Reference List Searches

Manual reference list searches of the final quality assessed studies ($N=11$) were carried out to identify other potential literature. All papers from the reference lists were extracted by stratifying from 2020 onwards, totalling 232 (180 after duplicate removal). From these, 157 of the studies were removed through initial sifting. The remaining 23 studies were fully examined, however none met the SPIDER inclusion criteria. See Appendix B and Figure 1.

Adding the reference list searches and database searches together, the total number of studies initially found was 1161, while 505 were examined for this review (after duplicate removal). Of these, 386 papers were removed through initial sifting, based on the title and abstract. For the remaining 119 papers, the SPIDER criteria was applied, and a further 106 were removed, with two more studies removed after quality assessment. Despite using reference list searches, no additional papers were identified. This confirmed the relevance of the search terms, and their ability to have sourced applicable studies. See Appendices B and C for details regarding the overall process.

Figure 1*Inclusion/Exclusion Application Process Diagram*

Data Extraction

Information was extracted from the final 11 studies using a data extraction form developed by the researcher, based on Version 3 of the Cochrane Data Collection Form for Random Controlled Trials and Non-Random Controlled Trials; a well-reviewed, pervasive tool (Higgins et al., 2021). Adaptions to the data extraction form ensured it was applicable for cross-sectional studies and produced a clear overview of each paper. If a study examined multiple aspects of a sample's reactions to the COVID-19 pandemic (e.g., personality traits, stress levels, demographic differences), the form only extracted data related to personality traits and COVID-19 rule-breaking/rule-compliance to ensure the information was based on the direct relationship (i.e., Phenomenon of Interest). The data extraction process specifically examined:

- Author/date/location/quality percentage.
- Design: collection/recruitment/design/study design.
- Participant sample: sample size/gender %/age (Mean, Standard Deviation, Range).
- Measures: personality psychometric (internal consistency score if provided); measurement of COVID-19 rule-breaking/rule-compliance (internal consistency score if provided).
- Statistical analysis method.
- Results/Outcome/findings.
- Limitations.

Results

There are commonly two accepted methods of synthesis: grouping of similar data by presenting the results in a table (Table 5) and using narrative methods to examine relationships within and between the studies. This review used a combination to synthesise/compare results.

Descriptive Data Synthesis

As evident in Table 5, the data were extracted/combined. A detailed data extraction table is presented in Appendix D, and study aims are provided in Appendix E.

Table 5*Date Extraction Table*

Author/ Date	Location	Participant Sample	Personality Psychometric	Statistical Analysis	Findings
			COVID-19 Rule- Breaking/ Compliance Measurement		
Biondi et al. (2021)	Italy	Undergraduate students N=1,427	DSM-5 Brief Form/PID-5-BF. Ten questions related to COVID- 19 rule- compliance.	Cluster Analysis then ANOVA/ MANOVA.	Participant data were split: Cluster 1 (tendency to develop dysfunctional levels of psychoticism, negative affect, antagonism), Cluster 2 (high dysfunction i.e., highest in negative affect, psychoticism, detachment) and Cluster 3 (no dysfunction, i.e., low levels of levels of psychoticism, detachment, negative affect, disinhibition, antagonism). Cluster 2 (highest levels of psychoticism, negative affect and antagonism) were most likely to break the COVID-19 rules e.g., shake hands, drink from other's bottles, stay at home. The authors reported that higher psychoticism was the best predictor of rule-breaking. Cluster 3, low levels of all DSM-5 traits, associated with COVID-19 rule-compliance.
Bogg and Milad (2020)	USA	Public population signed up to Prolific N=500	Big Five Inventory (44 items). Guideline adherence questionnaire.	Correlational then PATH Analysis.	Higher conscientiousness and openness were directly related to increased COVID-19 guideline adherence. Lower neuroticism was associated with higher perceived self-control and self-efficacy, but lower perceived risk exposure, however it was unrelated directly to guideline adherence. Individuals with higher agreeableness were also more likely to follow guidelines, however this was due to endorsement of norms and attitudes, self-efficacy and perceived health consequences and a direct association was not present (although the authors concluded individuals higher in agreeableness were more likely to COVID-19 rule-comply). Extraversion was unrelated to COVID-19 rule-breaking/rule-compliance.
Čavojová et al. (2022)	Slovakia	General population N=1,024	Big Five Inventory-30 Short Form (BFI-2-S) Avoiding Prevention Measures against COVID-19 questionnaire.	Correlation then Hierarchical Regression Analysis.	Individuals higher in extraversion tended to COVID-19 rule-break (e.g., avoiding curfew, less strict mask-wearing, avoiding social-distancing) but extraversion was unrelated to hygiene rules. Individuals higher in agreeableness abided with the COVID-19 rules (e.g., wearing face-masks, increased social-distancing, abiding by hygiene measures), except rules related to curfew. Although the supplementary information suggests that individuals high in conscientiousness were more likely to wear face-masks, overall it was unrelated to COVID-19 rule-compliance. Negative emotionality predicted increased curfew rule-breaking, but was unrelated to other rule-breaking types. The in-text results report that openness to experience correlated positively with increased hygiene rule-compliance, despite non-significant results in

					the table provided. Openness was unable to predict any type of COVID-19 rule-breaking. Overall, lower agreeableness and higher extraversion predicted COVID-19 rule-breaking and accounted for 2.4% of the variance.
Kleitman et al. (2021)	Published in Australia, and included participants from UK, US, Canada, Australia	General population/ students. Australia: <i>N</i> =609 Canada: <i>N</i> =303 UK: <i>N</i> =366 US: <i>N</i> =297	Mini International Personality Item Pool (20 items, Big Five). COVID-19 Behaviour Questionnaire.	Latent Profile Analysis then Cluster Analysis, followed by T-Tests and ANOVA between groups.	90% of participants were in the compliant group, and 10% in the non-compliant group. The non-compliant group were significantly lower on agreeableness and intellect/openness, and significantly higher on extraversion (e.g., individuals higher in extraversion planned to visit family/friends on the forthcoming week). Conscientiousness and neuroticism were unrelated to COVID-19 rule-breaking/rule-compliance, and there was no significant difference between the groups. Overall, individuals higher in agreeableness, intellect/openness, and lower in extraversion were more likely to rule-comply, while those lower in agreeableness, intellect/openness and higher in extraversion were more likely to rule-break.
Milad and Bogg (2021)	US	General population signed up to Prolific. <i>N</i> =500 for baseline data, <i>N</i> =451 for follow-up Study is a follow-up from Bogg and Milad (2020).	Big Five Inventory (44 items). Guideline Adherence Questionnaire.	Correlation then PATH Modelling, followed by T-Tests between groups.	Higher openness was positively correlated with more frequent guideline adherence and mask-wearing, however prediction analyses were non-significant. Higher agreeableness, conscientiousness and extraversion correlated with increased guideline adherence, but also did not predict compliance, and unlike openness, they did not associate with mask-wearing. Neuroticism was initially not correlated with greater guideline adherence or mask-wearing, however greater baseline neuroticism significantly predicted both greater guideline adherence and mask-wearing. Results overall suggest some association between greater agreeableness, conscientiousness, extraversion and openness and increased rule-compliance, however only those higher in neuroticism were more likely to COVID-19 rule-comply and engage with mask-wearing from a prediction perspective.
Muccia et al. (2022)	France	Healthcare Workers <i>N</i> =299	HEXACO-60 Compliance with Health Measures questionnaire.	Correlation then Multiple Linear Regression.	Honest-humility was positively correlated with and predicted rule-compliance with the health measures. Openness to experience was negatively correlated with and predicted rule-compliance. Emotionality, extraversion and conscientiousness were unrelated to COVID-19 rule-breaking/rule-compliance. The authors concluded that, among healthcare workers, individuals higher in honest-humility were more likely to rule-comply, while individuals higher in openness to experience were more likely to rule-break.
Smrdu et al. (2021)	Slovenia	Public population <i>N</i> =963	Big Five Questionnaire (132 items; Slovenian version).	Linear Regression Models and correlation analysis.	Abiding by the COVID-19 hygiene measures was associated (from a correlational perspective) with higher extraversion, agreeableness, conscientiousness and openness. Abiding by social-distancing rules was associated with higher conscientiousness and openness, however extraversion, agreeableness and emotional stability were unrelated. Regarding all COVID-19 preventative measures higher agreeableness, conscientiousness, emotional stability and openness associated with increased

			Adherence to COVID-19 measures to 25 guidelines.		compliance, however extraversion was unrelated. These results suggest that higher levels of certain traits related to differing behaviour depending on the specific COVID-19 guideline examined, for example individuals higher in extraversion were more likely to abide by hygiene measures, but were not more likely to comply/not comply with social-distancing measures. The authors concluded that conscientiousness was the most relevant <i>predictor</i> of rule-compliance (despite basing the findings on correlational analysis).
Turk et al. (2021)	Slovenia	Public population. N=963 Study used same participant sample from Smrdu et al. (2021), and was published several months before	Big Five Questionnaire (132 items, Slovenian version). Adherence to COVID-19 measures to 25 guidelines.	Correlation analysis and post-hoc multiple comparison tests.	Increased adherence to the COVID-19 guidelines was associated with higher conscientiousness (e.g., safe interpersonal distance). Of the 25 guidelines investigated, 13 guidelines positively correlated with higher conscientiousness. The authors concluded that higher conscientiousness was the best <i>predictor</i> of COVID-19 rule-compliance (despite using correlation for this assumption). Openness was the second best <i>predictor</i> of compliance, with positive correlations between higher openness and seven adherence items (e.g., regular hand washing). Higher neuroticism positively correlated with four adherence items (e.g., rules of cough hygiene). Higher agreeableness positively correlated with five adherence items (e.g., regular and thorough hand washing). Extraversion positively correlated with five items (e.g., indoor ventilation), however it negatively correlated with having shopping done by a less vulnerable person (individuals high in extraversion took precautions but struggled to resist socialisation i.e., extraversion was a risk factor for rule-breaking).
Wallace et al. (2021)	USA	Psychology undergraduate students N=1,374	Ten Item Personality Inventory (Big Five). COVID-19 Containment Behaviour questionnaire.	Correlation and Structural Equation Modelling using Linear Regression.	Higher extraversion predicted more COVID-19 rule-breaking, while those lower in extraversion were more likely to rule-comply. Lower agreeableness predicted less engagement in containment behaviour, while those higher in agreeableness were more likely to rule-comply. Individuals higher in emotional stability were more likely to break the COVID-19 rules, while those with less emotional stability were more likely to rule-comply. Openness to experience and conscientiousness were unrelated to COVID-19 rule-breaking/rule-compliance. The study concludes that higher extraversion and emotional stability were risk factors for rule-breaking, while higher agreeableness was a protective factor.
Wright et al. (2021)	UK	General population part of a wider panel study N=20,947	Big Five Inventory. Compliance Behaviour Questionnaire.	Maximum Likelihood Estimation then Regression.	Participants were split into classes of full compliers, frequent compliers, occasional compliers and household mixers. The household mixing group had the highest levels of extraversion i.e., individuals with higher extraversion were more likely to break the COVID-19 rules such as indoor/outdoor mixing. Individuals with higher levels of openness and conscientiousness were more likely to rule-comply. Higher neuroticism related to social-distancing rule-breaking, but also to increased mask-wearing and hand sanitisation compliance (i.e., individuals with higher neuroticism were more likely to break social-distancing rules, but kept safe by wearing a mask and sanitising hands). High agreeableness generally related to increased rule-compliance, although such individuals were more likely to mix with others indoors and outdoors.

Zajenkowski et al. (2020)	Poland	General population <i>N</i> =263	International Personality Pool (Polish version, Big Five). Single item: participants their compliance with government restrictions.	Correlation then Multiple Regression.	The Big Five traits accounted for 2.4% of the variance of COVID-19 rule-breaking. Agreeableness was associated with compliance through correlation and prediction, i.e., higher agreeableness predicted higher COVID-19 rule-compliance. Openness and conscientiousness were associated with rule-compliance through correlation, but did not predict rule-compliance. Neuroticism and extraversion were unrelated to COVID-19 rule-breaking/compliance behaviour. The authors concluded that agreeableness was the only/best predictor of COVID-19 rule-compliance.

Study Characteristics Descriptive Synthesis

Population

The total number of participants across samples ranged from 263 (Zajenkowski et al., 2020) to 20,947 (Wright et al., 2021). Total sample size across the 11 studies was 29,786 ($M=2,707.8$, $SD=5,784.3$). Given Smrdu et al. (2021) and Turk et al. (2021), and Bogg and Milad (2020) and Milad and Bogg (2021) used the same participant samples within different studies, not including duplicated samples, yielded a total sample of 28,372 ($M=3,152.4$, $SD=6,308.1$).

Three studies used undergraduate student samples, totalling 3,671 ($M=1,223.7$, $SD=251.0$; Biondi et al., 2021; Kleitman et al., 2021; Wallace et al., 2021). As a whole (not including the two duplicated samples), 12.3% of the total sample were students, and 1.1% were healthcare workers as specified in Muccia et al.'s (2022) study, while the majority (89.1%) were from the general population (Biondi et al., 2021; Bogg & Milad, 2020; Čavojová et al. 2022; Kleitman et al., 2021; Smrdu et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020).

Considering gender, all studies had a majority female population. The female population totalled nearly three-quarters of the sample ($n=21,461$, 71.9%), while the male population represented one-quarter ($n=8,366$, 28.0%), and six (0.02%) considered themselves as “other” (using Milad & Bogg's (2021) baseline data given they did not provide follow-up gender details; Biondi et al., 2021; Bogg & Milad, 2020; Kleitman et al. 2021; Smrdu et al., 2021; Turk et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020). Given Bogg and Milad (2020) and Milad and Bogg (2021), and Smrdu et al. (2021) and Turk et al. (2021) used the same samples twice, it was important to examine the data without duplicating these participants. Excluding these,

the female population continued to represent nearly three-quarters of the sample ($n=20,571$, 72.5%), while the male population represented one-quarter ($n=7,793$, 27.5%) and six participants classified themselves as “other” (0.02%; Biondi et al., 2021; Bogg & Milad, 2020; Čavojová et al., 2022; Kleitman et al. 2021; Muccia et al., 2022; Smrdu et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020).

Location

The selected studies were conducted in a range of Western countries in line with the definition used, including: Italy (Biondi et al., 2021), US (Bogg & Milad, 2020; Milad & Bogg, 2021; Wallace et al., 2021); UK (Wright et al., 2021), France (Muccia et al., 2022), Slovenia (Smrdu & Turk, 2021; Turk & Smrdu, 2021), Slovakia (Čavojová et al., 2022) and Poland (Zajenkowski et al., 2020). Kleitman et al.’s (2021) study was conducted in Australia, although recruited participants from the UK, US, Australia and Canada. Given Wright et al.’s (2021) largest sample size and Kleitman et al.’s (2021) participants, the UK held the widest population across all studies ($n=21,313$), while the smallest population represented was Polish ($n=263$; Zajenkowski et al., 2020). There were three American studies, perhaps indicating American institutions have been most active in undertaking such research; however the US was geographically the largest country so this could be expected (Bogg & Milad, 2020; Milad & Bogg, 2021; Wallace et al., 2021).

Recruitment

All studies used online survey methods, and 10 out of 11 of the studies employed convenience/snowball strategies. Given that the research was conducted

during a pandemic, it was understandable that all studies were conducted online. Wright et al. (2021) used a cross-sectional sample of a wider COVID-19 Social Study using 70,000 participants (Wright et al., 2021). The wider study commenced on the 20th of March 2020 and involved weekly data collection, but no information was provided as to when the personality data were collected (Wright et al., 2021).

Regarding data collection methods, studies varied. Kleitman et al. (2021) used both Prolific and university student recruitment, while Biondi et al. (2021) and Wallace et al. (2021) used only university recruitment. Unfortunately, neither Wright et al. (2021) nor Zajenkowski et al. (2020) provided details regarding the online platform, while Muccia et al. (2022) relied on social media for data collection. In examining popularity of recruitment methods, both Prolific and university recruitment methods were favoured. University recruitment methods are easily accessible, while Prolific has the benefit of being able to stratify data based on age, gender and race. Bogg and Milad (2020) and Milad and Bogg (2021) used Prolific data and comparison US Census data to stratify their sample by age, race and gender. Čavojová et al. (2022) used an unknown participant recruitment agency, although reported they used quotas to ensure the data were gender and age representative of the Slovakian population. Given the stratifying benefits of using a specific sampling frame, it was expected these studies would be of higher quality during quality assessment. However, the four studies were of differing quality (67.5-77.5%; Čavojová et al., 2022; Bogg & Milad, 2021; Kleitman et al., 2021; Milad & Bogg, 2021) and relatively low compared with the two studies using student samples (75-87%; Biondi et al., 2021; Wallace et al., 2021).

Data Collection

The data collection timeframe is an important aspect of investigation, given differences in COVID-19 guidance. Studies were kept open for recruitment from three to 122 days ($M=50.2$, $SD=48.7$), with the majority conducted during the initial pandemic wave. Muccia et al. (2022) did not provide a specific data collection period, noting mid-April to mid-May 2020, and therefore was unable to be included in the mean above. Within the *first wave* of infections, Smrdu et al. (2021) and Turk et al. (2021) were the first authors to collect data, starting in March 2020. They were closely followed by Bogg and Milad (2020) and Milad and Bogg (2021; who both used the same participant sample). Wallace et al. (2021), Muccia et al. (2022) and Wright et al. (2021) collected data during the *second wave* of infections in the latter part of 2020.

Personality Psychometrics

Different personality psychometrics were used within the included studies. Biondi et al. (2021) used the Personality Inventory for DSM-5 Brief Form (PID-5-BF; Krueger et al., 2013), while Muccia et al. (2022) used the HEXACO-60 (i.e., brief version of the HEXACO-100; Ashton & Lee, 2009). The remainder of the studies used psychometrics that examined the Big Five traits. Bogg and Milad (2020) and Milad and Bogg (2021) used the Big Five Inventory-44 (BFI-44) quoting the reference as John et al. (2008), however the original BFI-44 reference is John et al. (1991). Both Smrdu et al. (2021) and Turk et al. (2021) used an updated Slovenian translation of the 132-item Big Five Questionnaire (Caprara et al., 2012; original English version: Caprara et al. 1993). Wright et al. (2021) used the Big Five Inventory-2 (Soto & John, 2017b), although it was unclear whether they used the long or short form, while Čavojová et al.

(2022) used the Big Five Inventory-2 Short Form (Soto & John, 2017a). Kleitman et al. (2021) used the 20-item Mini International Personality Pool (Donnellan et al., 2006), like Zajenkowski et al. (2020), who used the Polish version (Topolewska et al., 2017). Finally, Wallace et al. (2021), used the Ten Item Personality Inventory (TIPI; Gosling et al., 2003).

Excluding the two studies using the same participant sample (and therefore the same psychometric) as well as Wright et al.'s (2021) study given it was unknown whether they used the long/short form, out of the eight remaining studies 75% used brief personality psychometrics (Biondi et al., 2021; Čavojová et al., 2022; Kleitman et al., 2021; Muccia et al., 2022; Wallace et al., 2021; Zajenkowski et al., 2020). Only two authors discussed this as a limitation within their studies (Kleitman et al., 2021; Wallace et al., 2021). In total, six studies reported the overall internal consistency of the personality psychometric, ranging from *acceptable* to *very good* ($\alpha=0.64$ to $\alpha=0.85$) levels of reliability (Biondi et al., 2021; Čavojová et al., 2022; Kleitman et al., 2021; Muccia et al., 2022; Smrdu et al., 2021; Turk et al., 2021).

Personality Traits Examined

There was considerable overlap between the examined traits due to similarities in the psychometric focus on the Big Five traits (Goldberg, 1993). Given two sets of studies (Bogg & Milad, 2020; Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021) used the same sample, the following information, unless specified otherwise, focuses on nine of the studies to reduce potential bias.

Eight of the nine studies examined agreeableness (HEXACO and Big Five version), extraversion and conscientiousness (Bogg & Milad, 2020; Čavojová et al.,

2022; Kleitman et al. 2021; Muccia et al., 2022; Smrdu et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020). Notably, although separately defined in Table 6, Muccia et al. (2022) used the HEXACO version of agreeableness, which, similar to Big Five agreeableness, it includes characteristics of patience and leniency, but HEXACO agreeableness also includes low levels of anger in the definition (Howard & Zandt, 2020).

Seven of the nine studies examined openness, however variation was noted as Zajenkowski et al. (2021) termed it “openness/intellect”, while Kleitman et al. (2021), termed it “intellect” (Bogg & Milad, 2020; Čavojová et al., 2022; Muccia et al., 2022; Smrdu et al., 2021; Wallace et al., 2021; Wright et al., 2021). Researchers have agreed openness and intellect share significant similarities and are often used interchangeably (DeYoung et al., 2013; DeYoung, 2015).

Research has acknowledged there is overlap between emotionality, emotional stability, negative emotionality and neuroticism definitions (Howard & Zandt, 2020). Big Five neuroticism (also known as low emotional stability) and HEXACO emotionality are conceptually similar, however Big Five neuroticism includes characteristics of anxiety, anger, impulsiveness and depression, while HEXACO emotionality is defined by sentimentality, anxiety and fearfulness (but not anger; Howard & Zandt, 2020). Smrdu et al. (2021) and Turk et al. (2021), despite using the same participants/personality psychometric, used differing terms for neuroticism and emotional stability (i.e., conceptual opposites), while Bogg and Milad (2021) and Milad and Bogg (2021) employed the same sample and used the same personality trait definitions. Therefore, not including the latter, over half of these studies (60%) examined neuroticism/negative emotionality (Bogg & Milad, 2020; Čavojová et al.,

2022; Kleitman et al. 2021; Turk et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020). Meanwhile, two studies examined emotional stability (Smerdu et al., 2021; Wallace et al., 2021), and Muccia et al. (2022) examined HEXACO emotionality.

The other Big Five and HEXACO traits (extraversion, conscientiousness and openness also known as openness to experience) are conceptually similar in comparison. Honest-humility, only examined by Muccia et al. (2022) is a new, stand-alone trait – an addition to the HEXACO from the original Big Five (Lee & Ashton, 2009).

Biondi et al. (2021) used the DSM-5-BF personality psychometric, and therefore was the only study to examine the alternative model/theory of personality, containing, antagonism, detachment, psychoticism, disinhibition and negative affect (Krueger et al., 2013). Positively, DSM-5 traits are contained within a widely-used diagnostic manual published by the American Psychiatric Association, and have been generally subject to less criticism than the Big Five (Krueger et al., 2013). Table 6 provides a visual summary of the personality traits examined within the studies.

Table 6*Personality Traits Examined*

Author	Negative Affect	Detachment	Antagonism	Disinhibition	Psychoticism	Intellect	Openness (Big Five)/Openness to Experience (HEXACO)	Conscientious	Extraversion	Agreeableness	Neuroticism	Emotional stability	Honest-humility	Emotionality (as defined by the HEXACO)	Agreeableness (as defined by the HEXACO)
Biondi et al. (2021)	X	X	X	X	X										
Bogg & Milad (2020)							X	X	X	X	X				
Čavojová et al. (2022)							X	X	X	X	X (termed negative emotionality)				
Kleitman et al. (2021)						X		X	X	X	X				
Milad & Bogg (2021)							X	X	X	X	X				
Muccia et al. (2022)							X	X	X				X	X	X
Smrdu et al. (2021)							X	X	X	X		X			
Turk et al. (2021)							X	X	X	X	X				
Wallace et al. (2021)							X	X	X	X		X			
Wright et al. (2021)							X	X	X	X	X				
Zajenkowski et al. (2020)						X (partial)	X (partial)	X	X	X	X				

Note. “Partial” relates to when a study interchangeably termed two personality traits e.g., openness and intellect.

COVID-19 Rule-Breaking/Rule-Compliance Measurement

All researchers designed their own questionnaire regarding COVID-19 rule-breaking/rule-compliance (see Table 7 for an overview). The number of questions ranged from 1-39; excluding the two studies using the same sample population, the mean number of questions asked was 14.4 ($SD=11.5$). Understandably, peer-reviewed published scales to examine COVID-19 rule-breaking/rule-compliance were non-existent at the beginning of the pandemic. Moreover, when creating a standardised measure, issues arise due to differing laws/rules across countries.

Table 7*COVID-19 Rule-Breaking/Rule-Compliance Measurement*

Author	Measure to assess rule-breaking/compliance	Number of items	Internal consistency (if provided)	Example question
Biondi et al. (2021)	Created their own measure related to compliance with government's recommended health measures.	10 questions, measured on five-point Likert scale from 1 (hardly) to 5 (extremely).	$\alpha=.82$.	"It is suggested that all persons avoid crowded places. Are you complying with this?"
Bogg & Milad (2020)	Created their own measure pertaining to guideline adherence (during past 7 days).	10 items, measured on a five-point scale 1 (never) to 5 (excellent).	$\alpha=.79$.	"Avoided eating/drinking out"
Čavojová et al. (2022)	Created a questionnaire asking participants about their behaviour related to specific examples of breaking the recommendations or misusing exceptions related to preventative measures against the COVID-19 pandemic.	17 questions in total. Seven items related to curfew, four related to hygiene, three related to mask-wearing and three to social-distancing. A total and mean were calculated as a total preventative measure score. Each rule-breaking behaviour scored as "yes" received a point.	Avoiding curfew regulations $\alpha=.50$. Avoiding hygiene regulations $\alpha=.39$. Avoiding facial masks $\alpha=.66$. Avoiding social-distancing $\alpha=.73$. Avoiding regulations (total) $\alpha=.84$.	Not provided.
Kleitman et al. (2021)	Newly-developed scales regarding COVID-19 behaviour and attitudes.	39 questions examining self-reported compliance: four items, 1 (strongly disagree) 5 (agree). Protective behaviours: 12 items, 0 (does not apply to all) to 100 (applies very much).	Not provided.	"I follow my government's restrictions to protect myself"

		Prosocial and antisocial behaviours: eight items, 0 (does not apply to all) to 100 (applies very much). COVID-19 worry: five items, 1 (does not apply to all) to 5 (strongly applies). COVID-19 beliefs: 10 items, 1 (strongly disagree) to 5 (strongly agree).		from COVID-19.”
Smrdu et al. (2021)	Created a questionnaire about participant adherence to the COVID-19 mitigation measures and health-promoting guidelines.	Participants rated their adherence to 25 guidelines. Scaled from never, rarely, sometimes, often, to always.	Not provided.	Related to infection, hygiene, and mask and glove use.
Turk et al. (2021)	Created a questionnaire about participant adherence to the COVID-19 mitigation measures and health-promoting guidelines.	Participants rated their adherence to 25 guidelines. Scaled from never, rarely, sometimes, often, to always.	Not provided.	Related to infection, hygiene, and mask and glove use.
Milad & Bogg (2021)	Created a questionnaire measuring guideline adherence for the past seven days.	10 items, measured on a five-point scale 1 (never) to 5 (always).	$\alpha=.81$ at baseline and $\alpha=.87$ at follow up.	“Avoided eating/drinking out.”
Muccia et al. (2022)	Created a questionnaire regarding compliance with health measures.	First subscale examined compliance with health measures on a five-point Likert scale ranging from “yes, every time” to “never”, and scored from 0-4. Scores could range from 0-28 (seven questions). Second subscale questioned participants about their perception of the utility of health measures using a 10-point Likert scale ranging from “totally disagree” to “totally agree”, so scores range from 7-70. The last item asked participants if they thought the government was able to handle the crisis on a	First subscale: $\alpha=.60$ (and all items correlated). Alpha termed “sufficient/satisfactory”. Second subscale $\alpha=.82$ Alpha termed “robust”.	First subscale example: “Do you use a mask or gloves?” Second subscale example “Do you agree with the use of a mask?”

		10-point Likert scale ranging from “totally unable” to “totally able” (seven questions). In total, 14 items.		
Wallace et al. (2021)	Created a self-report scale over the past two weeks.	Eight items in total. Seven items measured from 1 (every time) to 5 (never). One item entering number of days 0-14 related to attending a party/event.	$\alpha=.83$.	Not provided.
Wright et al. (2021)	Analysed six compliance behaviours: hand washing, face mask-wearing, social-distancing, household mixing indoors, household mixing outdoors and compliance with other guidelines over the past seven days.	All six items scored: never, rarely, occasionally, frequently and always. Household mixing items were reverse coded/scored.	Not provided.	“Wearing a facemask or other face covering where it is currently recommended.”
Zajenkowski et al. (2020)	Created a measure to examine individual differences in compliance with governmental restrictions aimed to reduce the spread of the COVID-19 virus.	Single item. On a scale of 1-100 to which they complied with restrictions implemented by the Polish government.	Not provided.	Not provided.

Interestingly, Zajenkowski et al. (2020) used only one question to measure COVID-19 rule-breaking/rule-compliance, whereby participants self-rated compliance with Polish government restrictions on a scale of 1 to 100 (Zajenkowski et al., 2020). Other studies focused questions on specific government restrictions/guidance. Seven studies (63.6%) used five-point Likert scales to score COVID-19 rule-breaking/rule-compliance (Biondi et al., 2021; Bogg & Milad, 2020; Milad & Bogg, 2021; Muccia et al., 2022; Turk et al., 2021; Smrdu et al., 2021; Wright et al., 2021). Wallace et al. (2021) and Kleitman et al. (2021) used a mixed scoring system, while Čavojová et al. (2022) employed a binary scoring system (i.e., “yes” equalled one point, “no” equalled zero points). Six of the 11 studies (54.6%) examined internal consistency of the entire questionnaire, ranging $\alpha=.79-.87$, suggesting *acceptable* to *good* internal consistency (Nunnally & Bernstein, 1994) across the questionnaires (Biondi et al., 2021; Bogg & Milad, 2020; Čavojová et al., 2022; Milad & Bogg, 2021; Muccia et al., 2022; Wallace et al., 2021).

All studies used self-report questionnaires. This raises concerns regarding socially-desirable responding whereby participants may answer questions in a way that they believe will be viewed favourably which may mean an over-reporting of *good* behaviour and under-reporting of *bad* behaviour (Krumpal, 2011). In general, social desirability poses a significant problem and bias interferes with the interpretation of average tendencies (Krumpal, 2011). Only five out of 11 of the studies noted social desirability as a limitation (Bogg & Milad, 2020; Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021; Wright et al., 2021).

Narrative Synthesis of Findings Regarding the Relationship Between Personality Traits and Rule-Breaking

Using a narrative approach, it was important to examine each individual personality trait included within the overarching theory/models, in order to review the relationship between personality and COVID-19 rule-breaking/rule-compliance. A narrative approach was deemed appropriate given the use of different personality and COVID-19 psychometrics, and to examine relationships within and between the studies. Narrative synthesis guidance for SLRs, produced by Popay et al. (2006), was followed.

Conscientiousness

Five studies found a positive relationship between conscientiousness and COVID-19 rule-compliance (Bogg & Milad, 2020; Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021; Wright et al., 2021). Using multiple regression, Bogg and Milad (2020) found higher conscientiousness was associated with greater guideline adherence ($\beta=.191$; 95%, CI[.092, .290]), reporting the same result in their follow-up study using correlational analysis ($r=.18$, $p<.01$; Milad & Bogg, 2021). Smrdu et al. (2021) reported similar findings using a correlational approach: conscientiousness positively correlated with abiding by COVID-19 avoidance measures ($r=.01$, $p<.01$). Of all the Big Five personality traits, Smrdu et al. (2021) claimed that conscientiousness was the best predictor of health-promoting behaviours, concluding that conscientious individuals adhered to most COVID-19 guidance, such as social-distancing and hygiene measures. Turk et al. (2021), in using the same participant sample, found COVID-19 guideline adherence such as hand disinfection, avoiding touching of the mask/face, and limiting physical distancing, significantly related to conscientiousness; this trait was the best predictor of adherence with mitigation measures. Similarly, Wright et al. (2021) found

“frequent compliers” (who mostly followed the rules), compared with “full compliers” (who followed the rules all the time), scored less in conscientiousness, suggesting lower conscientiousness was a significant factor in more frequent COVID-19 rule-breaking (in particular for social-distancing, indoor/outdoor mixing and hand sanitisation rule-breaking, but not mask wearing). Overall, Wright et al.’s (2021) results suggested higher levels of conscientiousness related to less rule-breaking. Of these studies, Turk et al. (2021) and Smrdu et al. (2021) based their results on correlational analysis. Therefore, the results do not indicate a causal pathway which may limit Turk et al.’s (2021) and Smrdu et al.’s (2021) claims that conscientiousness was the greatest *predictor* of compliance.

Only five out of the 10 studies that examined conscientiousness found a positive relationship between conscientiousness and COVID-19 rule-compliance (Bogg & Milad, 2020; Milad & Bogg 2021; Smrdu et al., 2021; Turk et al., 2021; Wright et al., 2021). However, Kleitman et al. (2021) found no difference for conscientiousness between compliant and non-compliant groups, $t(1573)=-0.81$, $p=.42$. Similarly, Čavojová et al. (2022) found conscientiousness was unrelated to overall preventative measures, while hierarchical regression suggested conscientiousness did not predict adherence to preventative measures. Although Čavojová et al. (2022) found an association between low conscientiousness and avoidance of facemasks, $\beta=-.08$, $CI[-.15, .00]$, $p<.001$. Moreover, Muccia et al. (2022), Wallace et al. (2021) and Zajenkowski et al. (2020) found conscientiousness was not associated with greater compliance. These results contradicted the hypothesis which predicted conscientious individuals visit a relatively small number of places during the day (according to daily spatial behaviour data), therefore restrictions would be easier to follow (Ai et al., 2019).

Nevertheless, two studies reported conscientious individuals exhibited a high sense of duty despite no evidence of increased COVID-19 rule-compliance (Kleitman et al., 2021; Zajenkowski et al., 2020). Considering all the studies, it appears likely the relationship between conscientiousness and COVID-19 rules lies somewhere between *no relationship* and *COVID-19 rule-compliant*, given no studies provided evidence of high conscientiousness in relation to COVID-19 rule-breaking. Nevertheless, caution ought to be taken in interpreting the results of the studies that found conscientiousness related to COVID-19 rule-compliance, given a tendency to over-rely on correlation/association rather than prediction (e.g., Turk et al., 2021). It is of note that the studies tended not to use more sophisticated statistical methods to examine the relationship between personality traits and COVID-19 rule-breaking/rule-compliance. Nevertheless, in averaging the quality assessment scores for studies that found a relationship and those that did not, results were similar: 75.5% average quality for those that found a relationship, 75.0% average quality for studies that did not find a relationship. As such, differences in methodological quality do not provide an explanation for the contradicting findings.

Openness

Openness/openness to experience characterises a person who enjoys trying new things; those with low openness prefer routines and have a narrower range of interests (Harris, 2004). Bogg and Milad (2020) found higher openness related positively to following guidelines using tests of total effects ($\beta=.10, p<.05$). Although openness was positively associated with endorsement of guideline-related social cognitions and perceived health consequences, there was no association with actual guideline

adherence (Bogg & Milad, 2020). Following up, Milad and Bogg (2021) found higher openness was positively correlated with more frequent guideline adherence ($r=.12$, $p<.01$) and mask-wearing ($r=.12$, $p<.01$). Likewise, Smrdu et al. (2021) found openness correlated positively with adherence ($r=.09$, $p<.01$), hygiene measures ($r=.10$, $p<.01$) and “all measures” ($r=.08$, $p<.01$), albeit with extremely small correlation coefficients. Using the same participant data as Smrdu et al. (2021), Turk et al. (2021) claimed the second most relevant predictor of compliance (specifically hygiene guidelines and limiting physical distancing) was openness, with significant positive correlations seen for seven out of 25 guidelines investigated. Similarly, Čavojová et al. (2022) found openness to experience correlated with abiding by hygiene recommendations, although the authors neglected to provide the exact statistic. Wright et al. (2021) also found evidence that, compared with “full compliers”, “frequent compliers” and “occasional compliers” had lower trait openness (i.e., lower openness related to less COVID-19 rule-compliance, in particular for social-distancing, indoor/outdoor mixing mask wearing and hand sanitation). This provides support that higher openness related to more COVID-19 rule-compliance, while lower openness related to COVID-19 rule-breaking.

However, such results were not consistent across all studies. Wallace et al. (2021), using the Ten Item Personality Inventory, found openness to experience did not significantly predict COVID-19 rule-compliance ($B[52]=-0.01$, $p>.05$), although no explanation was provided. Zajenkowski et al. (2020) did not find associations between openness and COVID-19 rule-compliance. Although Čavojová et al. (2022) claimed to have found a correlation between openness and following hygiene recommendations, openness was not significantly associated with avoiding overall preventative measures,

as demonstrated through both correlation and hierarchical regression ($r = -.05$, $p > .05$; $\beta = -.05$, 95% CI[-0.11, 0.01], $p > 0.5$).

In contrast, Muccia et al. (2022) found contradictory results using the HEXACO-60; openness to experience related to higher levels of COVID-19 rule-breaking. Indeed, openness to experience negatively correlated with compliance ($r = -.12$, $p < .05$) and demonstrated significant results in the linear regression ($\beta = -.12$, $p < .05$). These results suggest that the higher the levels of openness to experience, the poorer the compliance, with Muccia et al. (2022) concluding that openness to experience is associated with risky health behaviours.

Overall, five of the nine studies (albeit two pairs of studies used the same participant sample) found significant associations between higher openness and COVID-19 rule-compliance overall, while three studies found no significant results, and in direct contrast, Muccia et al. (2022) found it related to rule-breaking. Like conscientiousness, the results suggest the relationship between higher openness and COVID-19 rule-compliance may lie on a scale between *no relationship* and *COVID-19 rule-compliant*, although this is a tentative conclusion given that Muccia et al. (2022), with a sample of healthcare workers, found opposing results. The relationship seems complex, and may relate to Muccia et al.'s (2022) sample of healthcare workers who could have endorsed different behaviours given their working situation during the pandemic. Moreover, in quality assessment, limitations arose regarding the fact that 96% of the sample identified as female (Muccia et al., 2022). It would have been beneficial for Muccia et al. (2022) to have commented on personality trait representation across genders in order to understand whether this may have influenced the results.

Intellect

The personality trait *intellect* has been viewed as being similar to openness, i.e., it is concerned with a preference for imagination, artistic and educational activities (Grohol, 2019). Although openness and intellect have been used interchangeably, they are discussed separately, given that one study considered intellect a stand-alone trait (Grohol, 2019). Zajenkowski et al. (2020) combined the term as *openness/intellect*, therefore their results were discussed in the openness section above. Kleitman et al. (2021) hypothesised an uncertain relationship between intellect and COVID-19 rule-breaking/rule-compliance; although intellect is characterised by dealing positively with change, it is also linked with risk-taking. In using an independent samples t-test, Kleitman et al. (2021) found individuals with higher intellect scored significantly higher on COVID-19 rule-compliance ($t[1,573] = -.20, p < .05, M = 11.8, SD = 3.6$), with the intellect mean as higher among the compliant group ($M = 15.2, SD = 3.1$), than the non-compliant group ($M = 14.7, SD = 2.8$). Kleitman et al. (2021) concluded that COVID-19 rule-compliance was related to higher intellect, while lower intellect was related to COVID-19 rule-breaking. These findings, along with the results for openness, suggest a possible relationship between higher openness/intellect and greater COVID-19 rule-compliance.

Extraversion

Ten out of 11 studies investigated extraversion (Bogg & Milad, 2020; Čavojová et al., 2022; Kleitman et al., 2021; Milad & Bogg, 2021; Muccia et al., 2022; Smrdu et al., 2021; Turk et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020). Extraversion characteristics include outgoingness, talkativeness and

energeticness; these individuals thrive on social contact (Cherry, 2020). Given these typical characteristics, the rationale for investigation within the studies is clear – such individuals may struggle with COVID-19 social isolation/distancing. Surprisingly, Bogg and Milad (2020) found no significant association between extraversion and COVID-19 rule-breaking/rule-compliance. In a follow-up study, using the same participant sample, Milad and Bogg (2021) found significant positive correlations ($r=.15, p<.01$) between higher extraversion and COVID-19 rule-compliance, but not mask-wearing ($r=.05, p>.05$), suggesting those high in extraversion demonstrated more frequent baseline guideline adherence, but not increased hygiene behaviour (Milad & Bogg, 2021). Smrdu et al. (2021) found opposite results, (i.e., extraversion was positively correlated with measures related to hygiene; $r=.07, p<.05$; albeit a small correlation coefficient), but little association with guideline adherence. Turk et al. (2021) found extraversion was significantly positively correlated with regular increased indoor ventilation, but negatively with allowing a less vulnerable person to go shopping for them, although exact correlation coefficients were not provided. It seems that high extraversion related to keeping safe, and such individuals were less likely to limit physical contacts (i.e., they were aware of COVID-19 measures, but struggled to resist socialisation; Turk et al., 2021). Wallace et al. (2021) found higher extraversion related to less engagement with COVID-19 rule-compliance ($B[52]=.24, p<.05$), considering extraversion as a *risk factor*. Similarly Wright et al. (2021) found that out of all the Big Five personality traits, extraversion was most strongly related to lower COVID-19 rule-compliance regarding household indoor mixing ($OR=0.75[0.69, 0.81]$), outdoor mixing ($OR=0.65[0.61, 0.7]$), mask wearing ($OR=0.85[0.75, 0.96]$) and social-distancing ($OR=0.91[0.85, 0.97]$). Although Wright et al. (2021) found that higher extraversion

positively related to hand sanitisation (OR=1.1[1.03, 1.17]). Čavojová et al. (2022), using correlation and hierarchical linear regression, found higher extraversion was positively related to less strict mask-wearing (similar results to Bogg and Milad (2021)), avoiding social-distancing recommendations and overall avoiding preventative measures ($r=.10$, $p<.01$, $\beta=.10$, 95% CI[.03, .16], $p<.001$). Like Wright et al. (2021), Čavojová et al. (2022) concluded that extraversion was the most important personality factor in predicting avoidance of COVID-19 preventative measures, supporting the initial hypothesis predicted by most studies.

In contrast, Bogg and Milad (2020), Muccia et al. (2022) Zajenkowski et al. (2020) found no significant relationship between extraversion and COVID-19 rule-breaking/rule-compliance. Although high extraversion was predicted to be related to COVID-19 rule-breaking, the results are mixed, with stark differences between Milad and Bogg (2021), and Wright et al. (2021) and Čavojová et al. (2022), reporting opposite effects of extraversion and its relationship to COVID-19 rule-compliance and rule-breaking.

Agreeableness

High agreeableness has typical characteristics of kindness, cooperativeness and considerateness, while low agreeableness relates to selfishness and lack of empathy (Thompson, 2008). Ten out of 11 studies (90.9%) examined agreeableness (Bogg & Milad, 2020; Čavojová et al., 2022; Kleitman et al. 2021; Milad & Bogg, 2021; Muccia et al., 2022; Smrdu et al., 2021; Turk et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020). In using correlational, and then PATH analysis, Bogg and Milad (2020) found agreeableness was related to both intention and behaviour of

COVID-19 rule-compliance ($\beta=.06$; 95% CI[.01, .12]). Similarly, Kleitman et al. (2021) found compliance was significantly related to agreeableness ($t[1,573]=-3.88$, $p<.001$, $M=15.7$, $SD=3.1$). Smrdu et al. (2021) also found agreeableness was positively correlated with following hygiene measures ($r=.06$, $p<0.05$) and COVID-19 rule-compliance ($r=.01$, $p<.01$); although they reported the predictive ability was not as strong as conscientiousness. Using the same participant sample, Turk et al. (2021) found similar results: higher agreeableness positively correlated with social-distancing and hygiene guidelines, although the authors comment this was not as prominent as found in other studies (e.g., Bogg & Milad, 2020). Wallace et al. (2021) found lower agreeableness related to less engagement with containment behaviour ($B=-.04$, $p<.001$), while higher agreeableness was related to COVID-19 rule-compliance (i.e., agreeableness was considered a *protective factor*). Caution must be taken here, given the agreeableness factor within Wallace et al. (2021) showed the lowest internal consistency across all personality traits (Spearman-Brown coefficient .37, considered unacceptable; Nunnally & Bernstein, 1994). Zajenkowski et al. (2020) found agreeableness was the only personality trait associated with COVID-19 rule-compliance ($\beta=.20$, $p<.01$), and the variance accounted for 7.4%. Moreover, Čavojová et al. (2022) found a negative correlation between high agreeableness and not washing hands and not avoiding crowded spaces, while hierarchical regression and correlation suggested agreeableness was negatively related to avoidance of overall preventative measures ($r=-.17$, $p<.001$; $\beta=-.11$, 95% CI[-0.17, -0.05], $p<.05$). The authors concluded that agreeableness was one of the most important personality factors related to COVID-19 rule-compliance (i.e., negatively related to avoidance of the preventative measures).

Wright et al. (2021), found agreeableness was higher among the “full complier” compared to the “frequent” and “occasional” complier groups. Although higher agreeableness was predictive of increased face mask use, hand sanitisation procedures and social-distancing compliance, in contrast, the regression analysis also found higher agreeableness related to increased household mixing. Moreover, Wright et al.’s (2021) multivariate ordinal regression graph suggested the influence of agreeableness on COVID-19 rule-breaking/rule-compliance appeared less than other traits (such as openness and conscientiousness) for household mixing, social-distancing and hand sanitation. Moreover, the authors do not report on agreeableness in the discussion section (tending to focus on the more influential personality traits), perhaps suggesting a rather minimal relationship. Similarly, Muccia et al. (2022), using HEXACO agreeableness, found no significant association between agreeableness and compliance. Both studies demonstrated relatively high quality, and as the quality assessment noted, Wright et al. (2021) used a large sample size, while Muccia et al. (2021) used a more modern personality psychometric (the HEXACO-60), compared to the other studies focusing on the Big Five theory. Given these factors, it is difficult to analyse the relationship between agreeableness and COVID-19 rule-breaking, as these two quality assessment factors are important when considering the wider picture. Despite this, eight of the 10 studies which examined this trait, firmly concluded agreeableness was related to COVID-19 rule-compliance, which suggests these results may be more convincing. Given consistency across the majority of studies, agreeableness appears to be the personality trait most associated with COVID-19 rule-compliance.

Neuroticism

Six out of the 11 studies examined the relationship between neuroticism and COVID-19 rule-breaking/rule-compliance (Bogg & Milad, 2020; Milad & Bogg, 2021; Kleitman et al., 2021; Turk et al., 2021; Wright et al., 2021; Zajenkowski et al., 2021). Neuroticism relates to an increased likelihood of experiencing emotions such as fear, anger and sadness (Lahey, 2009). Bogg and Milad (2020) used correlational analysis, and then PATH analysis and found no significant association between neuroticism and COVID-19 rule-breaking/rule-compliance, except for correlations demonstrating lower neuroticism related to lower perceived risk. These findings also reflected Kleitman et al.'s (2021) lack of significant results of neuroticism for the non-compliant group, $t(1,573)=-1.04$, $p=.30$, $M=11.5$, $SD=3.8$. In their follow-up study, Milad and Bogg (2021) found greater baseline neuroticism showed a positive correlation with higher symptom count (i.e., perceived health risk; $r=.26$, $p<.01$), but not guideline adherence (i.e., behaviour; $r=-.09$, $p>.01$). Turk et al. (2021) found no relationship between neuroticism and social-distancing, but found positive Kendall Tau correlations between neuroticism and handwashing, adherence to the rules of cough hygiene and appropriately discarding potentially infected apparel (mask, gloves), although the authors did not provide the exact correlation coefficient. Wright et al.'s (2021) multivariate multinomial regression graph, suggested those higher in neuroticism scored higher on indoor/outdoor mixing and social-distancing rule-breaking, although they were more likely to comply with regulations to sanitise their hands and wear masks. In statistically grouping the sample, Wright et al. (2021) found neuroticism was higher among the "occasional compliers" compared to the "frequent compliers" and "full complier" groups, suggesting neuroticism related to COVID-19 rule-breaking. Although

Zajenkowski et al. (2020) predicted neuroticism would be associated with COVID-19 rule-compliance to increase a sense of safety, no significant result was found ($\beta=.02$, $p>.05$). The relationship with neuroticism appears tenuous, with the majority of studies concluding no relationship with overall rule-breaking/compliance.

Emotional Stability/Emotionality

Similar to the overlap between openness and intellect, emotional stability is considered comparable to low neuroticism (i.e., neuroticism is considered negative emotionality; Widiger & Oltmanns, 2017). Given the studies used the terms separately, emotional stability, HEXACO emotionality and negative emotionality (higher neuroticism) are discussed individually. Smrdu et al. (2021) found higher emotional stability positively correlated with higher COVID-19 rule-compliance ($r=.07$, $p<.01$). However, Wallace et al. (2021) found higher overall emotional stability predicted greater COVID-19 rule-breaking ($B[52]=.03$, $p<.001$). They concluded that those higher in emotional stability tended to experience less anxiety than those low in emotional stability, which translated into greater rule-compliance for those low in emotional stability (due to COVID-19 anxiety), while those higher in emotional stability (who likely did not experience as much COVID-19 anxiety) were more likely to rule-break. However, caution ought to be taken here given the sample was of young adults, and personality traits were likely still developing within the age range examined, and baseline COVID-19 anxiety was not investigated. Čavojová et al. (2022) found contrasting results that negative emotionality predicted avoidance of curfew ($\beta=.08$, $CI[.00, .16]$, $p<.01$), suggesting the higher the negative emotionality the greater the curfew avoidance (these data were only available in the supplementary information).

Čavojská et al. (2022) claimed they found positive correlations between negative emotionality and higher compliance with social-distancing rules, however the correlational table (Table 10, Chapter 3) suggests this was not the case ($r = -.04$, $p > .05$). Moreover, the results suggested negative emotionality was not a significant predictor of overall health regulation avoidance ($\beta = -.01$, $CI[-.08, .06]$, $p > .05$), similar to specific types of rule-breaking, including avoiding social-distancing, masks and hygiene guidelines. The results presented in this study, and as commented on in the quality assessment (Appendix F), are inconsistent, questioning whether they were accurately reported. Finally, in considering HEXACO emotionality, Muccia et al. (2022) did not find any significant results with rule-compliance/rule-breaking.

Overall, the four studies that examined emotional stability/emotionality/negative emotionality, produced contrasting results, as such, inferences are inconclusive (Čavojská et al., 2022; Muccia et al., 2022; Smrdu et al., 2021; Wallace et al., 2021). There are theoretical similarities between these traits (high emotionality/low emotional stability and high negative emotionality) and neuroticism. Considering the results for neuroticism, similar themes of inconsistency among the findings are evident (i.e., whether the traits relate/do not relate to COVID-19 rule-breaking/rule-compliance).

Honest-Humility

Muccia et al. (2022) was the only study to use the HEXACO-60 psychometric, and therefore the only study to examine honest-humility, which represents a propensity to be fair and genuine towards others (Howard & Zandt, 2020). Muccia et al. (2022) found that the only HEXACO personality trait that related positively to compliance was honest-humility, both in correlation and linear regression analysis ($r = .14$, $p < .05$; $\beta = .15$,

$p < .05$). This is in line with research that theoretically links the HEXACO honest-humility trait and the Big Five agreeableness trait, which results summarised in this review suggest are linked to COVID-19 rule-compliance (Muccia et al., 2022). However, caution must be exercised in making firm conclusions, given only one study examined this trait, and only among a healthcare worker population.

DSM-5 Traits

The remainder of the personality traits explored: antagonism, negative affect, detachment, disinhibition, and psychoticism, were examined in one study by Biondi et al. (2021). Biondi et al. (2021) used the PID-5 and combined the traits into clusters; Cluster 1: dysfunction in psychoticism, negative affect and antagonism; Cluster 2: dysfunction in negative affect, psychoticism and detachment, and Cluster 3: no dysfunction (Krueger et al., 2013). Cluster 2 showed the lowest COVID-19 rule-compliance, with the lowest frequency of avoidance in shaking hands, staying at home, social-distancing and face-touching (Biondi et al., 2021). Biondi et al. (2021) concluded that those with higher levels of negative affect, psychoticism and detachment related to COVID-19 rule-breaking. Caution must be taken in interpreting this result given the research used a university sample, with maximum age of 27 years. Concerningly, Van Dijk et al. (2020) has argued personality traits are still developing before this age. The results presented cannot be compared to the other studies in this review given the use of different personality traits, however links could potentially be made between negative affect and neuroticism, as both have characteristics of low mood (Miller et al., 2009). Therefore, Biondi et al.'s (2021) results could be viewed as similar; those with higher traits of neuroticism, negative affect (and low emotional stability) would be more likely

to break COVID-19 rules, although, as demonstrated in this review, this is a tentative relationship.

Discussion

Using a narrative approach, the review aimed to examine the relationship between personality traits and COVID-19 rule-breaking/rule-compliance. Specifically, to determine whether there is a relationship between personality trait theories (i.e., models that provide a whole view of an individual's personality) and behavioural compliance with COVID-19 regulations by:

1. Examining which personality traits relate to COVID-19 rule-breaking.
2. Examining which personality traits relate to COVID-19 rule-compliance.

Which Personality Traits are Related to COVID-19 Rule-Breaking and Which are Related to Rule-Compliance

Given evidence of contradictory results found both between and within the studies, disentangling COVID-19 rule-breaking and rule-compliance is complex. Therefore, the combined aims are addressed. The discussion considers each personality trait, and then provides an overview of the findings in a wider context.

Personality Trait Discussion

Examining which traits relate most to COVID-19 rule-breaking/rule-compliance is complex. Although only tentative conclusions can be drawn, general themes and preliminary inferences are possible. Collectively, the findings demonstrate consensus of a relationship between agreeableness and COVID-19 rule-compliance (Biondi et al.,

2021; Bogg & Milad, 2020; Čavojová et al., 2022; Kleitman et al. 2021; Milad & Bogg, 2021; Muccia et al., 2022; Smrdu et al., 2021; Turk et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020). Of the 10 studies examining this trait, only two found non-significant/differing results (Muccia et al., 2022; Wright et al., 2021). Of note, Wright et al. (2021) found that higher agreeableness predicted household mixing, although it also related to increased compliance (e.g., social-distancing). A possible explanation is that household mixing was dependent upon individual circumstances, for example, an agreeable individual may have mixed households to care for others. Nevertheless, combining the results of the majority of the studies, it would appear prudent to conclude that higher agreeableness does predict/associate more with COVID-19 rule-compliance. Caution ought to be taken as Wright et al. (2021) used the largest sample size and scored relatively high on the AXIS Quality Assessment, so their findings could carry more weight (Downes et al., 2016). Moreover, in the context of overall sample bias, females are more likely to self-report higher agreeableness than males, potentially causing a gender-related bias towards certain personality traits (Costa et al., 2001). The results regarding agreeableness are comparable to those indicated by low-level crime research. For example, Miller and Lynam (2006) found individuals low in agreeableness were more likely to engage in criminal behaviour. Given the finding that high agreeableness relates to COVID-19 rule-compliance, it is reasonable to consider that low agreeableness relates to rule-breaking, concurring with low-level crime literature.

The results regarding other personality traits are mixed. For conscientiousness, five out of the 10 studies examining this trait suggested it was associated with COVID-19 rule-compliance (Milad & Bogg, 2021; Kleitman et al., 2021; Smrdu et al., 2021;

Turk et al., 2021; Wright et al., 2021). Both Turk et al. (2021) and Smrdu et al. (2021) claimed conscientiousness was the greatest predictor of COVID-19 rule-compliance. In the studies that found a relationship between high conscientiousness and rule-compliance, themes were identified around certain COVID-19 rules such as following hygiene guidance, face-mask adoption and social-distancing (Milad & Bogg, 2021; Kleitman et al., 2021; Smrdu et al., 2021; Turk et al., 2021; Wright et al., 2021). It is notable that Wright et al. (2021), with the largest sample size, concluded there was convincing evidence that high conscientiousness was related to COVID-19 rule-compliance. In contrast to their hypotheses, five studies found no overall relationship between conscientiousness and overall COVID-19 rule-compliance, although Čavojová et al. (2022) found an association between low conscientiousness and avoidance of face-masks (Kleitman et al., 2021; Muccia et al., 2022; Wallace et al., 2021; Zajenkowski et al., 2021). Unfortunately, Wallace et al. (2021) provided no explanation regarding their non-significant findings, which is potentially reflective of a bias towards only discussing significant results. The mixed results are perhaps surprising given conscientious individuals tend to exhibit higher levels of self-discipline and prefer to follow a plan (Ai et al., 2019). A possible explanation is that COVID-19 rule-breaking is dependent upon individual circumstances, for example, a conscientious individual may want to look after others (e.g., neighbours) or feel duty bound or responsible to support others, which could result in rule-breaking. However, studies examining conscientiousness related this trait to COVID-19 rule-compliance, with no suggestion of a relationship between high conscientiousness and rule-breaking. The results suggest that, a) there is no relationship or b) higher conscientiousness relates to COVID-19 rule-compliance while low conscientiousness relates to COVID-19 rule-breaking (Čavojová

et al., 2022). The results are somewhat similar to low-level crime research, which found low conscientiousness (poor impulse control) related to a higher likelihood to engage in criminal activity, similar to Čavojová et al.'s (2022) results (Miller & Lynam, 2006). Despite mixed results, most studies found that higher conscientiousness relates to COVID-19 rule-compliance (Bogg & Milad, 2020; Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021; Wright et al., 2021); similar to the contrastingly corresponding low-level crime literature (Miller & Lynam, 2006).

The task of comparing results regarding openness was complicated by authors interchangeably using openness and intellect. Six studies claimed to find higher openness/intellect related to some types of COVID-19 rule-compliance (Bogg & Milad; Čavojová et al., 2022; Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021; Wright et al., 2021), while two studies found no relationship (Wallace et al., 2021; Zajenkowski et al., 2020). Turk et al. (2021) claimed openness was the second highest predictor of COVID-19 rule-compliance. However, one study found that HEXACO openness to experience related to COVID-19 rule-breaking, and it was associated with risky health behaviours and poorer threat appraisal (Muccia et al., 2022). This result should be regarded with caution given Muccia et al. (2022) used a sample of healthcare workers, whose professional experience may have influenced perceived severity or threat of COVID-19, and thus may have impacted rule-breaking behaviours. With theoretical similarities to openness, intellect was also examined in one study, in which Kleitman et al. (2021) found a positive relationship between intellect and COVID-19 rule-compliance. This seems plausible given that intellect relates to a sense of curiosity about the world, willingness to detect, comprehend, utilise and appreciate sensory and abstract information (De Young, 2015). Therefore, an individual of high intellect may

have shown a higher tendency to understand/seek out information about the COVID-19 rules, and therefore more likely to rule-comply. Nevertheless, the overall results provide evidence of a mixed relationship, with contradictions evident about whether or not openness/intellect relates to COVID-19 rule-compliance/rule-breaking.

One of the most surprising findings related to extraversion. Given emphasis for such individuals to socialise, one would expect predictions to relate to COVID-19 rule-breaking. However, three out of the 10 studies that examined extraversion found it related to COVID-19 rule-compliance (Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021), while four found it was related to rule-breaking (Čavojová et al., 2022; Kleitman et al., 2021; Wallace et al., 2020; Wright et al., 2021) and three studies found no relationship (Bogg & Milad, 2020; Muccia et al., 2022; Zajenkowski et al., 2020). For example, Milad and Bogg (2021) found higher extraversion correlated with greater guideline adherence, but not mask-wearing, unlike Smrdu et al. (2021) who found it correlated with increased hygiene preventative measures, but not general COVID-19 rule-compliance. Conversely, Kleitman et al. (2021) and Wallace et al. (2021) found higher extraversion related to COVID-19 rule-breaking. A similar result was found by Wright et al. (2021) regarding increased household mixing and Čavojová et al. (2022), who concluded extraversion was the most-related personality trait to COVID-19 rule-breaking. Wright et al. (2021) used a larger sample size, so findings could carry more weight, although had a majority female sample (compared to Milad and Bogg (2021), who had an almost equal gender balance). As such, although Wright et al. (2021) had a larger sample size, results might not necessarily be generalisable across gender. Studies that found extraversion related to COVID-19 rule-compliance tended to score lower on the AXIS quality assessment (Downes et al., 2016), with an average quality of 70.8%

(Bogg & Milad, 2020; Smrdu et al., 2021; Turk et al., 2021). The studies that found extraversion related to COVID-19 rule-breaking had a higher average quality score of 75.0% (Čavojová et al., 2022; Kleitman et al., 2021; Wallace et al., 2020; Wright et al., 2021), while those that found there was no relationship had an average quality of 78.3% (Bogg & Milad, 2020; Muccia et al., 2022; Zajenkowski et al., 2020). Given the lower quality assessment scores, caution ought to be taken in interpreting results that found extraversion related to COVID-19 rule-compliance. Moreover, all studies (Bogg & Milad, Smrdu et al., 2021; Turk et al., 2021) that found extraversion related to COVID-19 rule-compliance relied on correlational analysis, i.e., linear relationships between variables, as opposed to prediction/cause and effect (Dancey & Reidy, 2017). Meanwhile, the studies that found extraversion related to COVID-19 rule-breaking, or found no relationship, tended to use more sophisticated analyses (e.g., Wallace et al. (2021) used regression analysis).

The results that found extraversion related to COVID-19 rule-breaking (e.g., Wright et al., 2021) are similar to low-level crime research from a biological perspective, suggesting that arousal levels linked to extraversion increase the likelihood of low-level crime involvement (Eysenck, 1964). Interestingly, in Bogg and Milad's (2020) baseline study, extraversion was associated with guideline adherence, yet in their follow up study (Milad & Bogg, 2021), extraversion was unrelated to guideline adherence. However, this relationship was only found via correlation, which does not suggest cause-and-effect, therefore these results are tenuous. The differing findings among studies may be explained by Moffit's (1993; 2006a; 2006b) theory, postulating that low-level criminal behaviour is not driven entirely by personality traits, but also dependent upon emotional reactions to environmental stimuli. Moreover, Čavojová et

al.'s (2022) results suggested that extraverted individuals exhibit a higher need to socialise (and therefore broke COVID-19 social-distancing rules), but as Smrdu et al. (2021) suggested, such individuals might be more willing to protect themselves by following hygiene guidance.

Like openness/intellect, the relationship between neuroticism and COVID-19 behaviour is complicated given the difference in terms between neuroticism, emotionality and emotional stability. Of the seven studies specifically examining neuroticism, five found it was unrelated to both overall COVID-19 rule-breaking and rule-compliance (Bogg & Milad, 2020; Čavojová et al., 2022; Kleitman et al., 2021; Milad & Bogg, 2021; Zajenkowski et al., 2020). However, Turk et al. (2021) found higher levels of neuroticism related to increased hygiene practises, but not overall guideline adherence. Similarly, Wright et al. (2021) found that higher neuroticism generally related to COVID-19 rule-breaking behaviour, such as increased social-distancing and household mixing, but it also related to increased mask wearing and hand sanitation, suggesting those with high neuroticism broke the rules, but were more likely to protect themselves. Given the typical characteristics of those high in neuroticism, individuals may cope differently in a pandemic context, dependent on current mood levels (Miller et al., 2009). Most of these studies disagree with research regarding low-level crime, which suggests higher neuroticism relates to criminal behaviour (Moffit, 2006a). Neuroticism has previously been loosely linked to low-level criminal behaviour in females, and given the majority of the overall sample was female, it is surprising similar results were not found (Costa et al., 2001). Overall, the results regarding neuroticism suggest that COVID-19 rule-breaking behaviour differs from

general low-level criminal behaviour, and other mitigating factors may be involved (e.g., stress; Miller et al., 2009).

The personality traits of emotional stability and HEXACO emotionality were examined in several studies. Smrdu et al. (2021) found emotional stability (i.e., low neuroticism) correlated with abiding by all measures, but it was unrelated to specific hygiene measures. Caution ought to be taken here, given that Smrdu et al. (2021) used the same Big Five psychometric and participant sample as Turk et al. (2021), but examined emotional stability, and did not provide an explanation regarding whether they reversed scored the neuroticism trait on this psychometric to conceptualise it as emotional stability. Meanwhile, Wallace et al. (2021) found those high in emotional stability were more likely to break COVID-19 rules. However, Muccia et al. (2022) did not find a significant relationship between HEXACO emotionality and rule-compliance/rule-breaking. Given differing findings for emotional stability and HEXACO emotionality, and considering the results for neuroticism, a conclusive relationship is not viable. There may be mitigating factors in the relationship between emotional stability/neuroticism and COVID-19 rule-breaking/rule-compliance behaviour. Smrdu et al. (2021) presented that stress may be a mitigating factor, concordant with Moffitt's (2006a; 2006b) theory that general low-level crime is not entirely driven by personality traits, but related to environmental factors.

Making conclusions regarding the personality traits of psychoticism, negative affect, detachment, disinhibition and antagonism is difficult, given only Biondi et al. (2021) examined these. Although, Biondi et al.'s (2021) study used a well-respected personality trait theory (DSM-5), comparisons across studies could not be made. Biondi et al. (2021) found higher levels of psychoticism was one of the personality traits

involved in a cluster related to COVID-19 rule-breaking behaviour, similar to low-level crime research that suggests individuals exhibiting high psychoticism are more impulsive and more likely to commit low-level crime (Sinha, 2016). The extent of Biondi et al.'s (2021) psychoticism findings is relatively unknown given the traits are clustered together (psychoticism, negative affect and detachment), although higher levels (compared to lower levels) of all three traits demonstrated COVID-19 rule-breaking behaviour. Further research is needed to examine these DSM-5 traits at an individual level in relation to COVID-19 rule-breaking/rule-compliance (Krueger et al., 2013). Even though results are difficult to synthesise in this review given no studies used the same personality model, credit should be given to Biondi et al. (2021) for using personality traits contained within the DSM-5, which are considered better validated than the Big Five (Krueger et al., 2013). Similar comparison difficulties apply to Muccia et al.'s (2022) study given this was a singular study examining honest-humility and its positive relationship to rule-compliance. Although research agrees higher honest-humility is related to reduced risk-taking behaviour in health and ethical domains, given the sample was of healthcare workers, participants were perhaps generally more likely to comply with protective measures if they were at higher risk of contracting the virus (Muccia et al., 2022).

Results Overview

Within models that encompass a person's entire personality traits, the results suggest that some traits are more related to COVID-19 rule-breaking/rule-compliance than others. It is important to note that all included studies found some relationship between personality traits and COVID-19 rule-breaking/rule-compliance. Positively,

this suggests the review achieved its aim of confirming that there is a relationship between personality traits and COVID-19 rule-breaking/rule-compliance. Zajenkowski et al.'s (2020) study demonstrated the most tenuous relationship between personality traits and COVID-19 rule-breaking/rule-compliance, finding only agreeableness to be related to COVID-19 rule-compliance, while Muccia et al. (2022) found only two out of six investigated traits (honest-humility and openness to experience) related to overall rule-compliance/rule-breaking. Moreover, Čavojová et al. (2022) argued personality traits held a relatively weak relationship with COVID-19 rule-compliance/rule-breaking. From these studies alone it is questioned whether, as a whole, personality traits play a substantial role in COVID-19 rule-breaking/rule-compliance behaviour, and whether other factors may assume greater importance in the relationship. This is perhaps reflective of recent research focusing on examining the indirect relationship (e.g., mediators/moderators) between personality traits and COVID-19 rule-breaking/rule-compliance, as evidenced in the number of studies using these methods within this review's excluded papers. Although different conclusions could be drawn for each stand-alone study, taken together, the studies agree personality traits impact health-promoting and health-risk behaviours within a pandemic context. The extent of this significance clearly varies according to specific traits, and would rely on further research including/excluding other covariates/mediators.

Themes of Bias

One theme of bias related to the use of online survey methods. Schaurer and Weiß (2020) found the COVID-19 outbreak has generated numerous online surveys whereby participants select themselves. They found a “nonignorable amount of

selection bias” (p. 103) for online survey respondents, i.e., those who did not comply with COVID-19 measures tended to participate. Generalising results to the general population risks an over representation of participants who COVID-19 rule-broke (Schaurer & Weiß, 2020). Dubiously, the studies used in this review viewed the samples as comparable to the general population, and this was compounded by the fact that, within the quality assessment, few studies provided information regarding non-participants (Schaurer & Weiß, 2020).

For the 11 studies, a common theme of bias related to question seven on the AXIS quality assessment (i.e., whether measures were undertaken to address/categorise non-responders; Downes et al., 2016). This was only included by two studies: Milad and Bogg (2020) scored “partial” given they acknowledged 10% of the responders did not complete a follow-up questionnaire; and Wright et al. (2021) was given a “partial” score, given they acknowledged a substantial attrition rate; unlike other studies. Muccia et al. (2022) acknowledged there were non-responders, but did not discuss this as a limitation and therefore, like the majority of the studies, scored no points on this question. In accordance with the research by Schaurer and Weiß (2020), this raises concerns about whether the papers included in this review can be generalised as the characteristics of the non-participants or those who dropped out are unknown.

Study Limitations

Several limitations were observed within the studies. All studies lacked discussion regarding personality trait representation within the general population. The results found nearly three-quarters (71.9%) of the overall sample were female, while the global proportion of females is 49.6% (United Nations, 2019). Prior research

investigating COVID-19 suggested males were more likely to rule-break, so it is questionable whether the male sample within this review is proportionate (Smith et al., 2021). Furthermore, Costa et al. (2001) found among 23,000 men/women in 26 countries, females reported themselves as higher in neuroticism and agreeableness compared to men, whereas men rated themselves higher in openness (Costa et al., 2001). This casts doubt on whether the results discussed in this review are generalisable to the wider male population and caution is advised in result interpretation.

It is worth noting the implications (and potential limitations) of the studies conducted during the second wave of COVID-19 infections (i.e., when there were varying amendments to governmental COVID-19 laws; Čavojová et al., 2022; Wright et al., 2021; Wallace et al., 2021). Wright et al.'s (2021) study commenced on the 17th of November 2020, when England was two weeks into a month-long lockdown, and then a regional Tier System was introduced on the 2nd of December 2020 (Coronavirus Act, 2020; Laydon et al., 2021). It is questionable, with continuing rule changes across the country, whether the authors were able to gauge accurate rule-breaking/rule-compliance behaviour. Wright et al. (2021) argued, however, that although laws/rules differed, guidance messages were similar (e.g., hands, face, space, stay alert; Coronavirus Act, 2020). In discussing their surprising results that conscientiousness did not relate to overall rule-compliance, Čavojová et al. (2022) hypothesised that the second wave of infections in Slovakia was marked by frustration/doubt regarding governmental decisions, with mandatory nationwide testing introduced around the time of data collection, and curfew bans shortly before a religious festival. Therefore, Čavojová et al. (2022) concluded that factors other than personality style played a more important role in rule-compliance behaviour, for example how individuals perceived the situation.

Regarding changes in the COVID-19 rules, similar concerns regarding time/geographical differences in guidance are noted for the US, where COVID-19 restrictions were largely state-led decisions, and rule discrepancy may have impacted participant responses in Wallace et al.'s (2021), Bogg and Milad's (2020) and Milad and Bogg's (2021) studies.

Methodological Limitations of this Review

First, this review used a narrative/descriptive synthesis which can be more subjective than a meta-analytic synthesis (Mengist et al., 2020). In terms of the approach, constraints were identified regarding having a single reviewer (Waffenschmidt et al., 2019). Secondary reviewing of the quality assessment was prioritised as it was expected to have beneficial influence on the included studies. Moreover, a quality screening form was completed to increase objectivity and clarity for the extracted information (Appendix C, F and G).

Another limitation was the exclusion of non-English language studies. Five studies were removed on this basis, creating a form of selection bias (McDonagh et al., 2013). Likewise, only Western studies were included in the review. Western countries tended to employ *tighter* COVID-19 rules, but research has suggested that in *looser* countries (e.g., Brazil), personality traits may be more observable due to increased behavioural options (Gelfand, 2021). It is recommended a further review examines whether there is a stronger relationship between personality traits and COVID-19 rule-breaking/rule-compliance in loose nations. However, such a review would need to overcome the difficulties of investigating COVID-19 rule-breaking/rule-compliance in areas where fewer/no government rules were implemented. Review of specific non-

Western countries would need to account for cultural differences associated with personality theory that might not be comparable to Western ideology/theory. For example, non-Western countries are regarded as more collectivist cultures and therefore less extraverted in general, while Europeans tend to score higher, for example, in neuroticism (Benet-Martínez & Karakitapoğlu-Aygün, 2003). A separate review of non-Western countries could incorporate cultural differences in personality. This would offer a more sensitive approach rather than attempting to compare personality traits of COVID-19 rule-breakers across the world, given inherent cultural differences in personality style, compounded by Westernised views of personality theories.

A disadvantage of this review was the inclusion of student populations, given that most personality theorists argue traits are still developing until the age of 25 years (Van Dijk et al., 2020). However, obtaining studies with only participants over the age of 25 years would have been difficult/impossible to stratify. Van Dijk et al. (2020) have also argued that personality traits are more likely to be revealed during unpredictable situations, when there is pressure to behave in a particular way. Therefore, even for those under 25 years, traits may have been more evident within the pandemic context. Similar concerns are raised by the inclusion of healthcare workers in Muccia et al.'s (2022) research. The motivation to rule-comply/rule-break might be different among healthcare employees compared to the general population. This may reflect limitations in the PESCO criteria, which did not specify the exclusion of such samples. However, healthcare workers would likely have been included within other studies, including Wright et al.'s (2021) large sample. Moreover, Muccia et al. (2022) acknowledged they did not capture the specific job role of healthcare workers or the extent of their patient

contact. They could have included healthcare workers such as administrators who may have contact with patients remotely, but not in person.

Finally, the review was perhaps limited by excluding studies examining mediators/moderators. As discussed, factors such as stress or government trust may impact the relationship between personality and COVID-19 rule-breaking/rule-compliance (Tagini et al., 2021). Overall, 15 studies were excluded based on mediator/moderator inclusion, and given the recent increase in this field of research, it would be beneficial for a future review to specifically examine themes among mediators/moderators that impact the personality trait rule-compliance/rule-breaking relationship.

Implications

All 11 studies included in this SLR provided evidence for a relationship between personality traits and COVID-19 rule-breaking/rule-compliance behaviour. Personality traits such as agreeableness, conscientiousness and openness were found to hold some relationship. More tenuous relationships were evident for extraversion, neuroticism, emotional stability, intellect, honest-humility, negative affect, psychoticism, disinhibition, detachment and antagonism. The strongest relationship observed related to high agreeableness and COVID-19 rule-compliance. Throughout this review, parallels have been found between COVID-19 rule-breaking/rule-compliance and low-level criminal behaviour.

This review is a contribution to research in this field by examining the relationship between personality and rule-breaking. The review indicates a direction for future research: to focus on *what works* to reduce rule-breaking behaviour. In the age of

“big data” (p. 12), where psychological targeting is popularised, health messages targeted at individual personality traits represents a viable and powerful mean to encourage effective pandemic rule-compliance (Blais et al., 2021). This review provides evidence that personality traits need to be carefully factored into government strategy, and research suggests that messages aimed at increasing rule-compliance for some individuals may decrease compliance among others, dependent upon personality style (Wright et al., 2022b). Within the COVID-19 pandemic, communication focused on the value of group persuasion (e.g., “stay at home, protect the NHS, save lives”; Department of Health and Social Care, 2021; Figure 1). However, there is validated research to suggest that message design strategy tailored to individual personality traits can increase the effectiveness of health messages, while persuasive messages are more effective when custom-tailored to reflect the interests and concerns of the intended audience (Blais et al., 2021; Freimuth & Quinn, 2004; Hirsh et al., 2012). For example, De Vries et al. (2017) found that those high in extraversion traits found motivational text messages tailored to increasing alternatives for their *problem* behaviour more beneficial than messages motivated to increase knowledge of the causes, consequences and cures. It appears essential to investigate which messages are persuasive for individuals, conditional on personality traits within a pandemic context (Carfora & Catellani, 2021).

This review provides evidence that personality played a role in COVID-19 rule-compliance/rule-breaking, and therefore using personality theory to guide behaviour interventions (including government messages), if done effectively, has the potential to reduce risk-related behaviours (e.g., pandemic rule-breaking, low-level criminal behaviour). Effective, evidence-based communication regarding pandemic rules is of

the utmost importance as “health communication has relevance for virtually every aspect of health and wellbeing, including disease prevention, health promotion and quality of life” (Rimal, 2009, p. 1).

CHAPTER 3

WHO BROKE THE COVID-19 RULES? AN EXAMINATION OF THE PERSONALITY TRAITS OF COVID-19 RULE-BREAKERS USING THE IPDE-SQ AND HEXACO-PI-R-100

Abstract

In 2020, countries throughout the world introduced measures aimed at reducing both the spread of the COVID-19 virus and pressures on their healthcare systems. Identifying motivations for breaking COVID-19 laws has been a popular line of research. This cross-sectional study examines the personality traits associated with COVID-19 rule-breaking (as defined/advised by the Health Protection Coronavirus Regulations 2020) in the UK. Previous studies predominantly examined the Big Five and HEXACO personality traits, yielding varying results, with some relationships seen for traits such as agreeableness, openness and conscientiousness with COVID-19 rule-compliance. The current study accounts for limitations in the Big Five, incorporating more recent psychological and medical theory of personality. Using a survey design, data from 469 participants, aged 18-88 years, were used to examine the role of personality traits using the HEXACO Personality Inventory Revised-100 (HEXACO-PI-R; Lee & Ashton, 2018), the ICD-10 version of the International Personality Disorder-Screening Questionnaire (IPDE-SQ; Loranger et al., 1997; WHO, 1993), and a novel COVID-19 Rule-Breaking Questionnaire (Appendix N). Correlational and Linear Multiple Regression results indicated conscientiousness, openness to experience, agreeableness and honest-humility significantly predicted COVID-19 rule-compliance. Impulsive, histrionic and extraverted traits significantly predicted several specific types of rule-breaking behaviour including hygiene, isolation, travel, and social-distancing/social-activity. In general, regression models found personality traits explained up to 19% of the variance associated with COVID-19 rule-breaking (ranging from 2-19% across the different types of COVID-19 rule-breaking; with the highest percentage of variance explained by the HEXACO traits for total scores on the COVID-

19 Rule-Breaking Questionnaire). The study demonstrates that personality traits do influence COVID-19 rule-breaking/rule-compliance, therefore individual differences in personality style are a valuable focus point in reducing pandemic-related rule-breaking. Conclusions and implications to inform the direction of future policy initiatives are discussed within a behavioural health and criminal behaviour context.

Keywords: Coronavirus, personality traits, rule-breaking, rule-compliance.

Introduction

The first case of COVID-19 was recorded in China in December 2019 and the WHO declared a pandemic on 11th March 2020 (WHO, 2020a). In the UK, on the 26th of March 2020, the Coronavirus Act (2020) was passed in law. People were required to stay at home, and non-essential travel and contact with others outside households was prohibited, while most places of work, education and leisure were effectively closed (Coronavirus Act, 2020). As COVID-19 spread, the UK Government introduced three nationwide lockdowns: March to June 2020, November 2020 (followed by a Tier System on 14th October 2020 to provide consistent COVID-19 control measures with geographical adaptability) and January to July 2021 (Institute for Government Analysis, 2021; Laydon et al., 2021). Following roll-out of the UK COVID-19 vaccination programme, starting in December 2020, all restrictions and provisions of the Coronavirus Act (2020) were revoked by March 2022.

To provide context for the current research, this introduction discusses UK COVID-19 rule-breaking sanctions/data, personality theory and low-level crime, previous research regarding the personality traits associated with COVID-19 rule-breaking, previous research limitations and the rationale for the current study.

UK COVID-19 Rule-Breaking

The Coronavirus Act (2020) set out a framework whereby temporary restrictions could be legally enforced. Fixed Penalty Notices (FPNs) were the most common sanction, starting at £50 and rising to £6,400 for prolific offenders (NPCC, 2021). Organising a gathering of over 30 people could attract a maximum FPN of £10,000 (NPCC, 2021). FPNs for failing to self-isolate after close contact with an infected

individual ranged from £4,000 for the first offence to £10,000 for the second (NPCC, 2021).

By May 2022, police forces in England and Wales processed a total of 118,978 FPNs for breaches under the Health Protection (Coronavirus Restrictions) Regulations (2020) and its subsequent amendments (NPCC, 2022b). Of these, 2,755 were contested by recipients and 51,353 were not paid within the statutory 28-day period, which became a matter for the criminal courts (NPCC, 2022b). ACRO Criminal Records Office (2022) collected £8.2 million from FPNs, which was held independently for the Home Office, prior to distribution to Local Authorities.

The NPCC (2022a) reported the majority of the public abided by the regulations, and for those who did not, police engaged the Four E's approach: Engage, Explain, Encourage and Enforce (Brown, 2021). Enforcement was a last resort, and in most cases, police officers successfully encouraged law abidance (NPCC, 2022a). It is likely, therefore, the number of prosecutions regarding COVID-19 rule-breaking represent a small minority of its true extent (NPCC, 2022a).

Despite the expiration of the Coronavirus Act (2020) measures, police have continued to investigate COVID-19 rule-breaking. Investigations found a number of public figures broke the COVID-19 laws, including Prime Minister Boris Johnson, such that 10 Downing Street became the most fined address in the country for COVID-19 rule-breaking (Evans & Riley-Smith, 2022). Meanwhile, an investigation by Sue Gray of the Cabinet Office concluded the government demonstrated significant failures of leadership and judgement (Gray & Prime Minister's Office, 2022).

In analysing specific data, almost all FPNs were issued in England up to the 19th of July 2021 when most restrictions were lifted (NPCC, 2022a). In England and Wales,

the most common FPNs were issued to individuals who “contravene a requirement to not participate in a gathering in the Tier 4 area of two or more people – private dwelling/indoor space” (NPCC, 2022a, p. 3), with a total of 32,051 FPNs in England and 3,889 in Wales. Of these, 70% were issued to males, 76% to under 35s, 48% to 18-24 year olds, 16% to 25-29 year olds and 12% to 30-34 year olds (NPCC, 2022a). Moreover, 76% of individuals were White, 12% Asian and 7% Black (NPCC, 2022a). A total of 624 FPNs were issued under the “Wearing of Face Coverings on Public Transport Regulations” (NPCC, 2022a, p. 14) between the 15th of June 2020 and the 18th of July 2021, with 57% of these individuals aged 18-29. Meanwhile, 831 FPNs were issued under the International Travel Regulations between the 8th of June 2020 and the 27th of February 2021 (NPCC, 2022a). True non-compliance rates were unlikely reflected in FPN data, given that police avoided FPNs unless absolutely necessary, and there was a lack of sanctions for some types of rule-breaking, for example, how often an individual left the home per day.

In a large study of 53,880 UK residents, Smith et al. (2021) evaluated adherence to the NHS Track and Trace system. They found that compliance with self-isolation laws was low and ranged from 42.5 to 51.8% in January 2021. Smith et al. (2021) found COVID-19 rule-breaking was associated with the male gender, younger age, lower socio-economic status and, interestingly, keyworker status. Due to the widely known consequences of COVID-19 rule-breaking, such as putting oneself and others at health risk, and financial loss (by FPN), it is of interest that despite clear guidance, some individuals chose not to comply with the rules. As such, the characteristics of COVID-19 rule-breakers are a valuable research area. The consequences of pandemic rule-breaking can be severe, and therefore every effort needs to be made to increase

pandemic-related compliance, particularly as research suggests the annual probability of a pandemic is 3-7% (Connolly, as cited in Regan, 2021). As such, it is important to investigate why individuals broke COVID-19 rules in order to increase rule-compliance in the context of a future pandemic. One area that previous research has suggested would be worth exploring is the relationship between individual differences in personality traits and rule-breaking.

Personality Theory and Low-Level Crime

COVID-19 rule-breaking has been categorised as a form of low-level crime, particularly given that sanctions in the UK were similar to those used to manage low-level criminal behaviour. Arguably, individual differences in COVID-19 behaviour and low-level crime could be comparable. For centuries, social researchers have debated the significance of situational and environmental factors in influencing behaviour, while personality researchers have studied the function of individual characteristics (McCrae & Sutin, 2018). Personality traits, characteristic patterns of thoughts, feelings and behaviour, are continuously distributed, and distinct from personality disorders, which represent extreme deviations (Ekselius, 2018). Even in the absence of a disorder, traits alone shape how individuals respond to and engage with certain situations, including criminal behaviour (Reid, 2011).

Eysenck's Theory of Criminal Personality is one of the most widely discussed and influential models (Eysenck & Eysenck, 1970). Eysenck and Eysenck (1970) claimed that the *criminal personality* is biologically-based, and includes personality traits of extraversion and neuroticism. Eysenck and Eysenck (1970) proposed extraversion is caused by arousal in an individual's central and autonomic nervous

system, which determines their reactions to environmental stimuli. Individuals with high extraversion exhibit low arousal, requiring more stimulation/excitement, such as criminal behaviour, to fuel them (Eysenck & Eysenck, 1970). They referred to a person high in neuroticism as reactive and changeable, and more likely to engage in criminal behaviour (Eysenck & Eysenck, 1970). Later, Eysenck and Eysenck (1977) added a third trait, psychoticism, relating to antisocial, aggressive and uncaring behaviour, and asserted high levels of these traits predispose a criminal personality. Researchers have argued Eysenck and Eysenck's (1970; 1977) theory is outdated and reductionist in suggesting an entirely biologically-based criminal personality (Soliemanifar et al., 2018). Therefore, theories such as Moffitt's (1993; 2006a; 2006b), recognise criminal behaviour is both personality driven and sustained by emotional reactions to environmental stimuli. Current theories of criminal behaviour focus on understanding the interaction between a person's biology, psychology and social environment (Abrahamsen, 2014).

Characteristics and Personality Traits of Low-Level Criminals

Low-level crimes of a similar nature to COVID-19 rule-breaking, and also sanctioned using FPNs, provide a useful comparison. FPNs are predominantly used for driving offences (e.g., driving without insurance, speeding; Driver & Vehicle Standards Agency, 2019). Faílde-Garrido et al. (2021) used a cross-cultural shortened version of the Zuckerman-Kuhlman Personality Questionnaire to examine aggression-hostility, impulsive sensation seeking and neuroticism-anxiety traits among driving offenders (Aluja et al., 2006). They found impulsive and sensation-seeking personality traits positively predicted dangerous driving. Similarly, using the Zuckerman-Kuhlman-Aluja

Personality Questionnaire, Martí-Belda et al. (2019) found the strongest relationship was between traffic offenders and sensation-seeking personality traits (Aluja et al., 2010). Moreover, Wang et al. (2018), using the Big Five Inventory, found extraversion and neuroticism showed a positive relationship with risky driving styles, while higher conscientiousness and agreeableness were associated with careful driving styles (Soto & John, 2017b). Similarly, Alavi et al. (2017) found high neuroticism increased the likelihood of traffic offences.

Low-level antisocial behaviour can be considered similar to COVID-19 rule-breaking behaviour, in that both could result in similar sanctions (such as fines), and could be associated with similar personality traits. In a longitudinal study with 1,919 Estonian boys between 2001-2005, Mõttus et al. (2012) found men who were later convicted of misdemeanours had lower agreeableness, lower conscientiousness and higher neuroticism; similar traits found in those with driving offences. Romero et al. (2001) reported similar findings: extraversion, neuroticism, psychoticism, impulsivity and sensation-seeking were associated with criminal behaviour. In terms of self-reported vandalism and physical aggression, Gleason et al. (2004) found a relationship with higher neuroticism, lower agreeableness and lower conscientiousness.

Research has found relationships between low-level crime and antisocial, narcissistic, impulsive and extraverted personality traits (Lau, 2013). Individuals exhibiting impulsive personality traits have been found to be less concerned with the long-term consequences, and more likely to engage in gratifying activities such as shoplifting and fraud (Tharshini et al., 2021). In a meta-analysis of over 60 studies investigating personality and crime, Miller and Lynam (2006) found extraversion was related to low-level community crime, while low agreeableness (i.e., hostility and

indifference) and low conscientiousness (i.e., poor impulse control) also related to criminal behaviour. Similarly, a meta-analysis by Jones et al. (2011) found that low self-control and high impulsivity related to low-level criminal behaviour. Convincingly, Jones et al. (2011) asserted that personality traits were significant predictors of criminal behaviour, regardless of age, gender, race or geographical placement.

Interestingly, during the Swine Flu epidemic, Gaygisiz et al. (2012) used the Zuckerman-Kuhlman Personality Questionnaire, and found impulsiveness actually predicted avoidance behaviour (e.g., handwashing; Zuckerman, 2002). They concluded that impulsiveness may be common in a busy and active person who would not wish to reduce their social activities, which resulted in protecting themselves by adhering to the recommended guidance (Gaygisiz et al., 2012). Such results may differ from low-level crime literature given there were no penalisations/sanctions for non-engagement with recommended Swine Flu measures. This difference demonstrates that additional variables/factors are important to consider when looking specifically at pandemic-related rule-breaking. It seems that theories of low-level crime cannot be assumed the same for pandemic rule-breaking, therefore further investigation is required.

With reference to the low-level crime literature, an interesting avenue that is theoretically considered throughout the study, is whether the relationship between personality traits and COVID-19 rule-breaking is similar/different to the personality traits of low-level criminals.

Personality Traits and COVID-19 Rule-Breaking

The impact personality has on behaviour can be “amplified in situations marked by uncertainty or crisis” (Blais et al., 2021, p. 2), such as a global pandemic. Caspi and

Moffitt (1993) asserted that personality differences are revealed during unpredictable scenarios, whereby individuals attempt to control unpredictable situations to appear more recognisable. COVID-19 was termed an *unprecedented* situation by the UK Government (Organisation for Economic Co-operation and Development, 2020), and applying Caspi and Moffitt's (1993) viewpoint, it is likely that personality traits were magnified within the pandemic, creating a pragmatic research topic.

At the start of the COVID-19 pandemic, researchers quickly initiated studies examining personality traits and behaviour. This has proved a popular line of research which, although relatively new, provides comparatively wide scope. Appendix U contains personality trait definitions.

Big Five and COVID-19 Rule-Breaking

Most research examining personality traits and COVID-19 rule-breaking/rule-compliance behaviour has focused on the Big Five personality traits. The Big Five (or the Five Factor model) was developed in the 1980s, and includes neuroticism extraversion, conscientiousness, agreeableness and openness (Goldberg, 1990). Götz et al. (2020) suggested there was a plausible link between the Big Five and COVID-19 rule-compliance. Götz et al. (2020) sourced their sample from the "Measuring Worldwide COVID-19 Attitudes and Beliefs Sample" (p. 3) and used the Ten Item Personality Inventory (TIPI; Gosling et al., 2003). Individuals low in openness and neuroticism were less likely to follow guidelines, while agreeableness, conscientiousness and extraversion related to COVID-19 rule-compliance (Götz et al., 2020). The authors suggested individuals lower in openness were less willing to seek out information regarding COVID-19 guidance and were slower at adapting to new

situations (Götz et al., 2020). In terms of neuroticism, individuals low on this trait were likely insensitive to threats and experienced less anxiety, increasing the likelihood of COVID-19 rule-breaking (Götz et al., 2020). However, those high in neuroticism and openness were more likely to read COVID-19 related information, see it as a threat, and behave as advised (Götz et al., 2020). Götz et al. (2020) asserted that personality has the power to influence behaviour even when it goes against stringent government policy.

Research has consistently shown that agreeableness is most likely related to COVID-19 rule-compliance. In a large-scale panel survey in Germany, Rammstedt et al. (2021) found high agreeableness showed the most significant association with behavioural changes to prevent infection. Moreover, a Polish study found that only agreeableness related to COVID-19 compliance (Zajenkowski et al, 2020). Critically, however, Zajenkowski et al. (2020) asked participants to self-report rule-breaking using only one question, on a scale of 1-100, which seems unlikely to capture the full extent of a behaviour. Conversely, Airaksinen et al. (2021) observed no associations between agreeableness and rule-compliance and found individuals with this trait were less likely to adhere to social-distancing. Moreover, they found weak relationships between COVID-19 rule-compliance and higher openness, conscientiousness and neuroticism (Airaksinen et al., 2021). As a result, Airaksinen et al. (2021) argued that personality explains only a small portion of behavioural change. Critically, the authors used the short version of the Big Five Inventory, whereby the conceptualisation of agreeableness may lack sensitivity (Soto & John, 2017a).

In terms of the Big Five, the extraversion trait has shown mixed results. Most researchers predicted extraversion would increase the likelihood of COVID-19 rule-breaking, given that such individuals thrive off social interaction (Wright et al., 2021;

Zajenkowski et al., 2021). However, Milad and Bogg (2020) found instead that COVID-19 rule-compliance was associated with higher extraversion. Contrastingly, in a large study of over 22,000 participants, Wright et al. (2021) found extraversion was the strongest predictor of COVID-19 rule-breaking. Reasons for the discrepancy are unknown, however this could be reflective of the acknowledged shortcomings of the Big Five model.

Studies examining the Big Five traits and COVID-19 rule-breaking/rule-compliance have been conducted worldwide, (e.g., US, Europe, Brazil), however UK research has been relatively limited. Wright et al. (2021) is one of the few to have examined Big Five traits and COVID-19 behaviour in the UK. Including over 22,000 participants from a large panel cohort study, Wright et al. (2021) compared levels of compliance. Compared with “full compliers”, those who only “frequently complied” had lower trait openness, lower conscientiousness, higher neuroticism and higher extraversion (Wright et al. 2021). Individuals who “occasionally complied” had higher neuroticism, higher extraversion, lower openness and lower conscientiousness (Wright et al., 2021). Individuals described as “household mixers” had higher neuroticism, higher extraversion, lower openness and lower conscientiousness (Wright et al., 2021).

Despite some evidence that agreeableness, conscientiousness and openness may be related to COVID-19 rule-compliance, while neuroticism and extraversion may be related to COVID-19 rule-breaking, results have varied. This could relate to limitations in the Big Five model, the most common criticism being that each trait is too broad, over-simplifying personality (Boyle, 2008). McAdams (1992) stated the Big Five model describes the “psychology of a stranger” (p. 329) because private and context-dependent aspects of personality are not captured. Moreover, the Big Five was developed using

factor analysis (i.e., certain traits clustered together), however this does not mean the factors are true, and the theoretical basis is lacking (Boyle, 2008). Despite such criticisms, the Big Five is one of the most popularised personality theories, potentially due to its simplicity. Due to the recognised shortcomings of the Big Five, there is a clear need for research to investigate the personality traits of COVID-19 rule-breakers using measures which are robust, reliable and theoretically valid.

HEXACO and COVID-19 Rule-Breaking

Some COVID-19 researchers, who acknowledge the Big Five's limitations, have opted to use the HEXACO model (e.g., Branovački et al., 2021; Garbe et al., 2020). The HEXACO, developed by Ashton and Lee (2007), is said to account for the shortcomings of the Big Five. It retains the original Big Five traits, but adds an additional sixth trait: honest-humility (i.e., the extent to which a person places others' interests above their own; Ashton & Lee, 2007). Thielmann et al. (2021) completed a meta-analysis comparing the Big Five and HEXACO, concluding the HEXACO's notable theoretical differences resulted in a comprehensive range of traits and reduced redundancy between facets.

Compared to the Big Five, fewer studies have examined the relationship between HEXACO personality traits and COVID-19 rule-breaking/rule-compliance. Importantly, most agree, the additional trait, honest-humility, stands out as the most significant predictor of COVID-19 rule-compliance (Costantini et al., 2022). Like Big Five measure results, studies using the HEXACO in the US, France, Brazil and in mixed international samples, found that agreeableness and conscientiousness were associated with COVID-19 rule-compliance (Zettler et al., 2021). Moreover, research

using the HEXACO has found extraversion was generally related to COVID-19 rule-breaking, concordant with initial Big Five predictions (Zettler et al., 2021).

In a large study of over 1,700 participants, Blais et al. (2021) found COVID-19 rule-compliance was associated with higher HEXACO honest-humility, emotionality and agreeableness. These traits typically relate to altruistic behaviour; honest-humility relates to fair treatment of others, emotionality relates to harm prevention, and agreeableness relates to treating others kindly (Lee & Ashton, 2018). Comparative results were found in Branovački et al.'s (2021) sample of 471 Serbian citizens; honest-humility related to COVID-19 rule-compliance, lower conscientiousness and lower agreeableness related to a reduced fear of COVID-19 and rule-breaking behaviour. Like Blais et al. (2021), Oljača et al. (2020) found higher emotionality and conscientiousness related to COVID-19 rule-compliance, but they also found extraversion related to rule-compliance (Oljača et al., 2020).

As for studies using the Big Five traits in relation to COVID-19 rule-breaking, HEXACO findings have also been variable. In terms of HEXACO openness to experience, Martin (2020) found individuals high in this trait rated themselves as lower risk and exhibited incautious behaviour. Martin (2020) concluded government prevention messages ought to focus on individuals with high openness to reduce the COVID-19 spread. This contrasts with Big Five results regarding openness, which generally suggested openness related to COVID-19 rule-compliance. Moreover, the results to the SLR (Chapter 2) generally suggested that, more often than not, higher openness related to COVID-19 rule-compliance, although some discrepancy was evident (Bogg & Milad, 2021, Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021; Wright et al., 2021).

Unlike the Big Five, the HEXACO contains facets within each personality trait, and researchers have found these useful to explain contrasting results (Lee & Ashton, 2018). Costantini et al. (2022) found conscientiousness related to general COVID-19 rule-compliance, however, in examining a facet of conscientiousness, it was also predictive of “going out” (p. 5). Costantini et al. (2022) proposed that conscientiousness related to organisation, a motivating factor to engage with activities such as stockpiling provisions. In another study, Martin (2020) found rule-breaking by highly conscientious individuals was due to lower estimation of infection risk. However, research on the whole suggests conscientious individuals were more likely to COVID-19 rule-comply.

Although the HEXACO model has been considered more valid than the Big Five, limitations exist. De Raad et al. (2010) argued that only three of the traits (extraversion, agreeableness and conscientiousness) have been detected cross-culturally, while the additional trait, honest-humility, has been inconsistently validated (De Raad et al., 2010). Despite limitations, studies using the HEXACO have supported the usefulness of all its dimensions (Costantini et al., 2022).

Current Study

The current study aimed to examine the relationship between personality traits and COVID-19 rule-breaking. Given the varied research thus far, the study aimed to provide greater clarity and accuracy regarding which traits relate to such behaviour. This research broadens the relatively limited focus of UK research. Moreover, there is a need to ensure that measures used in this area of research are theoretically sound, reliable and valid. There is an argument that measures used would benefit from accounting for medical theory guidelines (i.e., personality traits included in the DSM-5

or ICD-10/11), which were developed in collaboration with world-leading experts and finalised after testing by researchers and clinicians in practice (American Psychiatric Association, 2013; WHO, 1993). For example, the ICD-10 was finalised and tested by clinicians and researchers in 32 countries, while the Big Five was only developed by four sets of researchers using different methods (Cattell, 1945; Goldberg, 1990; McCrae & Costa, 1987; Tupes & Christal, 1992; WHO, 1993). Accordingly, this study used a personality measure which, to the knowledge of the author, has not been used before within this scope of research, namely the ICD-10 International Personality Disorder Examination-Screening Questionnaire (IPDE-SQ; Loranger et al., 1997). Given the research developments over the Big Five, this study also used the HEXACO-PI-R-100 measure, to provide clarity on research previously discussed (Lee & Ashton, 2018). As such, this study examined two separate personality models/theories, and investigated whether, and how, these relate to COVID-19 rule-breaking behaviour.

International Personality Disorder Examination-Screening Questionnaire (IPDE-SQ; Loranger et al., 1997)

The IPDE comprises a semi-structured clinical interview, originally designed to assess the personality disorders described in the DSM-IV and ICD-10 (Loranger et al., 1997). Developed for the WHO (1993), the IPDE is a complex clinical tool useful for personality disorder diagnosis and case formulation (Banerjee et al., 2009). Within the IPDE process, there is a Screening Questionnaire which provides information regarding prominent (but not necessarily clinically significant) personality traits (Loranger et al., 1997). In clinical settings, if high scores are present, an IPDE clinical interview is administered (Banerjee et al., 2009). The questionnaire represents a useful screening

tool to identify which personality traits an individual presents with. Unlike the Big Five or HEXACO, the personality traits included within the IPDE-SQ are concordant with the DSM-IV and ICD-10, and underpinned by significant psychological and psychiatric theory (Loranger et al., 1997). There are two versions of the IPDE-SQ, one for the DSM-IV traits, and another for ICD-10 traits (Loranger et al., 1997). This study used the ICD-10 version, which screens for nine traits: paranoid, schizoid, dissocial, impulsive, borderline, histrionic, anankastic, anxious and dependent (see Appendix U for definitions). In the current study, the IPDE-SQ was used to examine singular personality traits (not a disorder), like the HEXACO.

Regarding the ICD-10 traits, only a minority have been examined in relation to COVID-19 rule-breaking. For example, similar to the low-level crime literature, several studies have related impulsivity to an inability to abide by the COVID-19 rules. This has been demonstrated predominantly through studies examining the Dark Triad traits (that share characteristics of impulsivity; Nowak et al., 2020; Zajenkowski et al., 2020). Moreover, using the Reinforcement Sensitivity Theory Personality Questionnaire in a Mexican study, Frías-Armenta et al. (2021) found that impulsivity inhibited healthy COVID-19 practices. Considering other traits, antisocial (dissocial as according to the ICD-10) has been linked to risk-taking and lower COVID-19 rule-compliance (Miguel et al., 2021). Miguel et al. (2021) concluded that antisocial traits partially explain the reason why individuals rule-break even in the face of increasing numbers of COVID-19 cases.

The other ICD-10 traits, including paranoid, schizoid, borderline, histrionic, anankastic, anxious and dependent, are likely to show some relationship to COVID-19 rule-breaking/rule-compliance. Theoretically, schizoid individuals, given they

experience less pleasure from social interaction, are likely to show greater COVID-19 rule-compliance, similar to higher anankastic traits due to its relationship with high conscientiousness and values related to social norm adherence (WHO, 2016). Moreover, those with higher anxious traits tend to avoid social situations and may restrict their lifestyle to prioritise comfort, which may relate to greater COVID-19 rule-compliance (WHO, 2016). In considering histrionic traits, these are considered similar to narcissistic traits, given overlapping characteristics of attention seeking and provocation for attention, which have been related to increased criminal behaviour (Dawood et al., 2020; Lau, 2013). Fakhrzadegan et al. (2017) examined histrionic traits and low-level crime directly and found that higher histrionic levels relate to a higher likelihood to commit low-level crimes such as theft, but a lower likelihood to commit severe crimes such as murder and rape. Traits such as borderline, dependent and paranoid are theoretically more complicated when linking with COVID-19 rule-breaking. For example, paranoid individuals might be suspicious of the rules and not abide by them, or, alternatively, due to increased worry about catching the virus, might increase their protective behaviours (WHO, 2016). Although it has been found that those with paranoid personality disorder are more likely to commit violent crime, there has been a lack of research regarding paranoid and borderline traits (as opposed to the disorder) and their relationship with lower-level types of crime, so the relationship remains relatively unknown (Fakhrzadegan et al., 2017). Similarly, those with higher dependent traits might prioritise spending time with others (COVID-19 rule-break), yet are submissive within social situations, so could also rule-comply (WHO, 2016).

In summary, the ICD-10 traits are yet to be tested as a whole theory to examine their relationship with COVID-19 rule-breaking. Although research indicates potential links, an exact measure of these traits has not been used within research. The specific hypotheses are concordant with the research suggestions discussed above.

Research Aims/Hypotheses

Based on the inconsistent findings described, the current study aimed to examine and clarify which personality traits relate to COVID-19 rule-breaking. In the current research rule-breaking is expressed as a continuous variable from rule-breaking on one end of the spectrum, and rule-compliance on the other. The current research aimed to explore the validity of the claims discussed in the introduction and extend them by performing correlational and regression analyses to explore the relationship between the HEXACO and ICD-10 personality traits and COVID-19 rule-breaking.

HEXACO Hypotheses. Based on the aforementioned research into the HEXACO traits and COVID-19 rule-breaking, two directional hypotheses were developed for regression analyses:

1. Hypothesis 1 (H1): There will be a negative linear relationship between individuals' scores on agreeableness, conscientiousness, openness to experience, honest-humility and emotionality traits and COVID-19 rule-breaking.
2. Hypothesis 2 (H2): There will be a positive linear relationship between individuals' scores on extraversion traits and COVID-19 rule-breaking.

ICD-10 Hypotheses. Research supports the relationship between COVID-19 rule-breaking and some ICD-10 traits, while for other traits, from a theoretical perspective, the direction of the relationship is relatively unknown, and therefore exploratory in nature (non-directional). The following hypotheses relate to regression analyses for COVID-19 rule-breaking and the ICD-10 traits:

3. Hypothesis 3 (H3): There will be a positive linear relationship between individuals' scores on dissocial, histrionic and impulsive traits and COVID-19 rule-breaking.
4. Hypothesis 4 (H4): There will be a negative linear relationship between individuals' scores on schizoid, anxious and anankastic traits and COVID-19 rule-breaking.
5. Hypothesis 5 (H5): There will be a linear relationship between individuals' scores on paranoid, borderline and dependent traits and COVID-19 rule-breaking (non-directional).

Methodology

Sample

An a-priori G-power, for linear multiple regression (the main statistical analysis method used) with the 15 predictors (each personality trait), found 199 participants would be needed for a .15 (small) effect size and to reach a power level of .95 (Faul et al., 2009). In using Tabachnick and Fidell's (2012) multiple regression equation ($N > 104 + M$; M =number of explanatory variables (15)), 119 participants were required. The HEXACO authors noted that a moderately large sample size ($N=250$) was needed to provide a stable component solution (Ashton & Lee, 2018). The final sample size

($N=469$) represented a larger participant pool than required, according to G-power (Faul et al., 2009), Tabachnick and Fidell (2012), and Lee and Ashton (2018). This related to an eager participant sample, rather than research design manipulation. A post-hoc G-Power analysis for the final sample ($N=469$) found the current study had .99 power, to account for a small effect size of .15.

Between the 16th of August 2022 and the 2nd of February 2023, 602 participants completed the survey. They were required to be over the age of 18 and to have lived in the UK prior to or since December 2019. Participants were recruited via a variety of means, including social media (Facebook, NextDoor), Prolific (an online participant recruitment platform) and the University of Birmingham's Research Participation Scheme. After removal of non-completers ($n=125$), but before exclusion of outliers and a participant reporting to be 10 years old, 137 responses were collected from the general population (using social media), 269 were collected from students through the Research Participation Scheme and 71 were collected from Prolific (i.e., members of the general population). Participants who did not fully complete the questionnaires were excluded from the analysis ($n=125$), one participant was excluded as they said their age was 10 years, and a further seven were identified as outliers (see statistical analysis section). All participants who did not fully complete the survey only answered the initial 1-2 questions (including consent) and it was assumed that they had withdrawn consent by closing their browser. In addition, most of the non-completers were duplicated students, whose same ID code was used for a fully completed survey at a later time, hence it was assumed they started the survey, but then opted to re-start and fully complete the survey on another day/time. A total of 469 participants remained for analysis.

Sample Characteristics

Of the final sample ($N=469$), 80% identified as female ($n=375$), 19.2% as male ($n=90$), 0.6% as other ($n=3$) and one did not wish to disclose (0.2%). The participants age ranged 18-88 years, with the most reported age (mode) as 19 years ($M=31.6$, $SD=17.7$). For further demographic information see Appendix J.

In considering specific COVID-19 sample characteristics, 67% said they had been infected with COVID-19. Of these, 63.5% were confirmed with a test, 11.9% reported severe COVID-19 symptoms, while 50.3% said they experienced mild symptoms and 4.7% were asymptomatic. Moreover, 98.1% said they knew family/friends who had been infected, and 14.1% had family/friends who died from COVID-19. 23% of the sample classified as keyworkers, 11.3% were clinically vulnerable, of which the most commonly reported reason was due to a health condition (9.2%). In considering understanding of the COVID-19 government guidance, 89.3% of the sample said they had understood it, 9.8% said they had only understood some of the guidance, while 0.9% said they had not understood the guidance at all.

Regarding forensic history, 1.1% of the sample had been convicted of a criminal offence, with 0.6% having served a sentence. Moreover, 2.6% had received a caution/reprimand/warning and 3.5% had received a FPN in the past. Two participants disclosed having received a FPN specifically for COVID-19 rule-breaking.

Participants were asked why they broke COVID-19 laws, and out of categorical response options of psychological, social, political, cultural, practical and exercise, *social* was the most commonly reported reason (45%). When specifically asked why, 42.4% said they needed to leave the house more than once a day to see family/friends. *Social* reasons for rule-breaking were closely followed by *psychological* (reported by

34.8% of the sample). This related to specific reasons, such as “needing to leave the house to see family/friends for mental health reasons” (reported by 30.5% of the sample) and “needed to leave the house for mental health reasons” (reported by 23% of the sample). *Exercise* was also reported as a common categorical rule-breaking reason (reported by 27.1%).

Design and Procedure

The study was approved by the University of Birmingham Science, Technology, Engineering and Mathematics Ethics Review Committee on the 20th of December 2021, ERN-21-0616. The research followed a quantitative, cross-sectional design and collected data using a convenience/snowball sampling strategy. The design was between-subjects, examining individuals’ personality traits and the relationship with COVID-19 rule-breaking.

The study was conducted using a Qualtrics survey data collection platform. After reading the web-based advert and selecting the website link, participants were directed to the Qualtrics survey. Participants were presented with the Information Sheet (Appendix K) which included the study’s purpose, estimated completion time (30 minutes), confidentiality rights, anonymity and data storage information. Participants provided consent at the beginning of the study and could withdraw by closing their browser at any stage during the survey. Participants were not told the survey directly examined personality traits, but “behavioural characteristics and the COVID-19 pandemic”, to encourage honest answering. Participants then completed a demographic characteristics questionnaire, COVID-19 Behaviour Questionnaire, the ICD-10 IPDE-

SQ and the HEXACO-PI-R-100 (Lee & Ashton, 2018; Loranger et al., 1997; Appendices J, N, O, P).

Participants were debriefed at the end of the Qualtrics survey. Within the debrief information they were informed the study examined personality traits. To maintain confidentiality/anonymity regarding potential disclosures of *breaking the law* during the COVID-19 pandemic, participants were not able to contact the researcher to withdraw at a later date. Given this (and the deception related to what the study examined), participants were repeatedly asked for their consent at the end of the survey, to ensure they were happy for their answers to be included. Those who wished to be enrolled for the three £20 Amazon prize draws and/or receive feedback regarding the study results were directed to a separate Qualtrics form to enter their email address. The Amazon prize draw was not available for Prolific participants as these individuals were paid £3.00 for completion of the 30-minute survey. The students using the Research Participation Scheme were also rewarded with research credits.

Measures

In addition to the demographic questionnaire, participants completed three psychometrics within the survey.

COVID-19 Rule-Breaking Questionnaire (Appendix N)

Participants completed a questionnaire, developed by the researcher, relating to COVID-19 rule-breaking. This questionnaire consisted of two sections: demographic information and COVID-19 rule-breaking behaviour. The first 13 questions capture specific demographic COVID-19 behaviour (e.g., did the participant contract COVID-

19; keyworker status). The remaining questions were based on specific rule-breaking types: isolation, travel, social-distancing/social-activity and hygiene (see Appendix S). Each type contained four related questions, for example, in relation to travel rule-breaking “during the COVID-19 pandemic, did you follow the law to *stay local* to your area when leaving the house?”, while an example question for isolation rule-breaking was “during the COVID-19 pandemic, if you had been in contact with someone who tested positive for COVID-19, did/would you abide by the self-isolation laws?”. Participants provided responses on a four-point Likert scale ranging from “always” (four points; very low-level of rule-breaking) to “never” (one point, very high level of rule-breaking). Therefore, participants were able to score from 4 to 16 points on each rule-breaking type; with higher scores indicating less COVID-19 rule-breaking. For the purpose of clarity in the analysis, these values were reversed, such that higher scores indicated stronger COVID-19 rule-breaking behaviours. For example, for an individual who scored a maximum of 16 on “travel rule-breaking”, the high score formerly indicated low COVID-19 travel rule-breaking, which was then reversed to a minimum score of 4, such that the lower the score, the lower the level of COVID-19 rule-breaking (and vice versa). A total score for the four rule-breaking types/outcome variables was calculated (by the researcher) for each participant, which ranged from 16-64 points (given the previous reverse scoring undertaken, this indicated the higher the score, the stronger the rule-breaking). These overall scores created the outcome variable, “total rule-breaking”.

Cronbach’s Alpha was used to assess internal consistency across the rule-breaking types and for the questionnaire overall, which resulted in $\alpha=.91$, suggesting *excellent* internal consistency, according to Nunnally and Bernstein’s (1994) criteria.

Individual internal consistency scores for the rule-breaking types ranged from *questionable to good*: social-distancing/social-activity rule-breaking achieved $\alpha=.84$; isolation rule-breaking $\alpha=.80$; hygiene rule-breaking $\alpha=.66$; and travel rule-breaking $\alpha=.81$ (Nunnally & Bernstein, 1994).

An additional question asked participants to record/estimate the total number of times they believed they had broken the COVID-19 rules throughout the pandemic. This was referred to as “self-reported rule-breaking” and was used as one of the rule-breaking outcome variables to assess personality traits and COVID-19 rule-breaking. The purpose was to enable comparison between participant self-reported estimates and questionnaire totals, and to provide participants with the autonomous opportunity to record how many times (in total) they believed they broke the COVID-19 rules. This outcome variable was differentiated from the outcome variable “total rule-breaking” which was calculated (by the researcher) as an overall score on the 16 COVID-19 rule-breaking questions, while “self-reported rule-breaking” was a direct question to the participants.

This questionnaire consisted of all the outcome variables that remained consistent throughout the analysis, including a travel rule-breaking score (1), isolation rule-breaking score (2), hygiene rule-breaking score (3), social-distancing/social-activity rule-breaking score (4), a total rule-breaking score (comprising travel, isolation, hygiene, social-distancing/social-activity scores added together; 5) and a self-reported rule-breaking score (6). See Appendix S.

International Personality Disorder Examination-Screening Questionnaire (IPDE-SQ; Loranger et al., 1997; WHO, 1993; Appendix O)

The IPDE-SQ screens for the nine ICD-10 personality traits (paranoid, schizoid, dissocial, impulsive, borderline, histrionic, anankastic, anxious and dependent, i.e., nine predictor variables). The IPDE-SQ contains 59 items and identifies an individual's notable personality traits (Loranger et al., 1997). Participants rate each question on a two-option response (true/false), which are scored as 0 and 1, dependent upon reverse scoring. Participants can score up to 5-9 points on each trait, according to the number of questions posed (which is dependent upon how that trait is represented in the population; Appendix O contains example items). The higher the score, the higher the likelihood that person exhibits that personality trait. Research has generally focused on examining the reliability and validity of the entire IPDE process (incorporating the Screening Questionnaire). Loranger et al. (1997) found reliability ranged from Cohen's Kappa (κ).73 to .91 across the ICD-10 traits. In one of the few studies examining the internal consistency of the IPDE-SQ alone, in a prison sample, Slade and Forrester (2013) found the histrionic (α =.31), borderline (α =.41), schizoid (α =.44) and paranoid (α =.44) traits held low internal consistency, while the other traits were above acceptable levels (Nunnally, 1967).

Regarding the current study, this is the first time internal consistency has been measured specifically for the IPDE-SQ alone in a community/student sample. Internal consistency, as measured by Cronbach's Alpha, was found to be α =.87 for the overall questionnaire (i.e., in the "good" range, as according to Nunnally's (1967) criteria). For individual personality traits the Cronbach's Alpha was: paranoid α =.45; schizoid α =.49; dissocial α =.51; impulsive α =.58; borderline α =.58; histrionic α =.48; anankastic

$\alpha=.64$; anxious $\alpha=.74$; and dependent $\alpha=.50$. The results mirror Slade and Forrester's (2013) low internal consistency results for the histrionic, schizoid and paranoid traits. Although relatively low, Nunnally (1967) argued a cut off $\alpha>.5$ is acceptable, which most traits were within or nearing.

The HEXACO Personality Inventory Revised-100 (HEXACO-PI-R-100; Lee & Ashton, 2018; Appendix P)

The HEXACO-PI-R was used to investigate a second theory of personality traits (Lee & Ashton, 2018). The version used contains 100 questions, with 16 questions relating to each trait (honest-humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience). Each question is scored on a 5-point Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree), dependent upon reverse scoring. Scores range from 16-80 on each personality trait. As per the HEXACO-PI-R guidance, these scores were averaged (i.e., divided by 16, the number questions relating to each trait). Therefore, the HEXACO-PI-R scores suggest the higher the individual's score, the greater a particular trait they exhibit. There is an additional altruism scale containing four questions, however this was not used in this research, given it does not form part of the six HEXACO personality traits, and it is only included within the HEXACO-PI-R-100 questionnaire as an additional scale. For the purpose of full completion of the HEXACO-PI-R-100 psychometric, these data were collected, but not used for analysis. Henry et al. (2022) examined the test-retest reliability of the HEXACO-PI-R among 415 participants, and results ranged from $r=.6$ to $r=.88$ for the domains, facets and items (Henry et al., 2022). They concluded the HEXACO-PI-R demonstrated test-retest reliability similar to other contemporary

measures (Henry et al., 2022). Levy et al. (2016) examined the HEXACO-PI-R in several scenarios (e.g., HEXACO-PI-R researchers, online surveys, environmental and control) and found the personality scales ranged from $\alpha=.74$ to $\alpha=.84$, suggesting good internal consistency.

Regarding the current research, internal consistency for the overall measure was $\alpha=.87$ (i.e., *good*; Nunnally, 1967). For each personality trait, these achieved *good* internal consistency: honest-humility $\alpha=.85$; emotionality $\alpha=.80$; extraversion $\alpha=.88$; agreeableness $\alpha=.84$; conscientiousness $\alpha=.83$; and openness to experience $\alpha=.83$.

Treatment of Data

The raw data were initially exported from Qualtrics to Excel. The data were screened for any incomplete responses, which were later deleted listwise. Reverse scoring and overall scoring of the questionnaires was performed using Excel to create total scores for personality traits and each rule-breaking type. Indeed, the Excel spreadsheet reversed the relevant questions in the IPDE-SQ questionnaire (i.e., using 0 (false) and 1 (true) for individual question answers) in accordance with the IPDE manual, and then the answers to the questions related to each trait were totalled (Loranger et al., 1997). The Excel spreadsheet used coding to score the HEXACO-PI-R-100 questionnaire, including reverse scoring, and then created a total for each of the six personality traits, which were then averaged. The Excel spreadsheet also used coding to reverse and then total the rule-breaking types described previously. Once the data were scored and tidied, it was transferred to IBM Statistical Package for the Social Sciences (SPSS) Version 26 predictive software for analysis. After transfer between programmes, the data were checked thoroughly by comparing the SPSS data sheet to the original

Excel file. Moreover, the transfer process was repeated to review and confirm accuracy of the method.

Statistical Analysis

Data checks were conducted for the relevant statistical analysis. Descriptive statistics were used to characterise the study population and to identify outliers. SPSS box plots indicated seven outliers (i.e., those scoring particularly highly on rule-breaking scores), which were removed listwise. Data were inspected for normality, and there was a slight negative skew to the data according to both the Shapiro-Wilk test and inspection of normality plots, for all rule-breaking types. However, post-hoc power analysis suggested adequate power in the sample to continue to use parametric statistics. Moreover, Tabachnick and Fidell (2007) suggested a slight violation of normality is not a problem given the study's large sample size.

Correlational Analysis

Due to the complex nature of the study, and to investigate individual relationships (strength and direction) between the variables, correlational analyses were performed and interpreted prior to the main analysis. Pearson correlational analysis was conducted for each of the 15 personality traits and six types of rule-breaking. Dancey and Reidy (2017)'s correlation criteria was used to assess the strength of the correlational relationship (i.e., $r=1$ (perfect correlation), $r=.7-.9$ (strong correlation), $r=.4-.6$ (moderate correlation), $r=.1-.3$ (weak correlation), $r=0$ (no correlation)).

Regression Analysis

Regarding the hypotheses, Multiple Linear Regression was computed using the Enter Method. Linear Regression Models were tested separately with the ICD-10 and HEXACO traits used as predictors (given these are separate, stand alone, personality theories that make up an entire personality style) for each of the six types of rule-breaking (i.e., a total of 12 Multiple Linear Regression analyses). Assumption testing was carried out initially. The Durbin Watson test examined each multiple regression model to check for auto-correlation between residuals, which suggested there was little to no auto-correlation, meeting assumptions (Sheather, 2009). Multi-collinearity was investigated, and this indicated no issues with collinearity between predictor variables (Sheather, 2009). The standardised residuals histogram suggested the data contained appropriately distributed areas, as did the normal Q-Q plot of standardised residuals, which showed that points were close to the line and were not greater than two or minus two, suggesting no issues with homoscedasticity or kurtosis (Sheather, 2009).

Results

Descriptive Statistics

When asked how many times participants had broken the COVID-19 rules directly (this is referred to as “self-reported rule-breaking total” in Table 8; Question: “during the COVID-19 lockdown periods, approximately how many times in total would you say you broke the COVID-19 laws?”), individuals reported, on average, they broke the laws 4.9 times. In considering the specific types, the highest average rule-breaking occurred for social-distancing/social-activity, as shown in Table 8.

Table 8*Rule-Breaking Means and SD*

Rule-Breaking Type	<i>M</i>	<i>SD</i>
Self-Reported Rule-Breaking Total	4.9	10.2
Hygiene Rule-Breaking	5.9	1.6
Social-distancing/Social-activity Rule-Breaking	6.6	2.3
Isolation Rule-Breaking	5.9	2.2
Travel Rule-Breaking	5.4	1.8
Total Rule-Breaking	23.7	6.4

In terms of the personality traits, comparison with norms could not be drawn from Table 9 as the IPDE-SQ norms alone were not provided within the manual (Loranger et al., 1997). For the HEXACO-PI-R traits, the average scores in Table 9 are similar to the norms produced by Lee and Ashton (n.d.) from a college sample available on the HEXACO website.

Table 9*Personality Trait Means and SD*

Personality Psychometrics	Personality Traits	<i>M</i>	<i>SD</i>
IPDE-SQ (Examining the ICD-10 Traits)	Paranoid	2.2	1.4
	Schizoid	2.5	1.7
	Dissocial	0.6	1.0
	Impulsive	1.3	1.3
	Borderline	1.5	1.4
	Histrionic	1.9	1.4
	Anankastic	3.4	2.0
	Anxious	2.8	1.9
	Dependent	2.0	1.5
HEXACO-PI-R-100 (Examining the HEXACO Traits)	Honest-humility	3.5	0.6
	Emotionality	3.5	0.5
	Extraversion	3.2	0.6
	Agreeableness	3.0	0.5
	Conscientiousness	3.5	0.5
	Openness to Experience	3.3	0.6

Correlational Analyses

Pearson Correlational Analysis was used to initially examine the data.

Correlational analysis for all personality traits and all rule-breaking types is presented in Table 10. An intercorrelation table is provided in Appendix T.

Table 10

Two-Tailed Correlational Analysis between Personality Traits and COVID-19 Rule-Breaking

	Pearson Correlation Coefficient							
Variable	M	SD	1	2	3	4	5	6
1. Total Rule-Breaking	23.8	6.4	--					
2. Hygiene Rule-Breaking	5.9	1.6	.74***	--				
3. Social-distancing/Social-activity Rule-Breaking	6.6	2.3	.85***	.53***	--			
4. Isolation Rule-Breaking	5.8	2.2	.81***	.46***	.52***	--		
5. Travel Rule-Breaking	5.4	1.8	.84***	.50***	.64***	.60***	--	
6. Self-Reported Total Rule-Breaking	4.8	10.2	.43***	.20***	.42***	.32***	.44***	--
7. IPDE Paranoid	2.2	1.4	.15**	.06	.12**	.14**	.16***	.12*
8. IPDE Schizoid	2.5	1.7	.01	.00	-.05	.06	.04	.01
9. IPDE Dissocial	0.6	1.0	.14**	.05	.08	.15**	.18***	.14**
10. IPDE Impulsive	1.3	1.3	.23***	.17***	.19***	.14**	.26***	.21***
11. IPDE Borderline	1.5	1.4	.14**	.06	.14**	.08	.16***	.11*
12. IPDE Histrionic	1.9	1.4	.22***	.14**	.23***	.12*	.21***	.21***
13. IPDE Anankastic	3.4	2.0	-.01	-.02	-.01	.01	-.02	-.01
14. IPDE Anxious	2.8	1.9	.01	-.01	.02	.13	.00	-.03
15. IPDE Dependent	2.0	1.5	.09*	.02	.12*	.04	.12*	.00
16. HEXACO Honest-Humility	3.5	0.6	-.37***	-.26***	-.35***	-.27***	-.32***	-.19***
17. HEXACO Emotionality	3.5	0.5	-.01	-.04	.05	-.04	-.03	.00
18. HEXACO Extraversion	3.2	0.6	.05	.02	.05	.05	.04	.08
19. HEXACO Agreeableness	3.0	0.5	-.18***	-.16***	-.13**	-.13**	-.18***	-.02
20. HEXACO Conscientiousness	3.5	0.5	-.25***	-.14**	-.23***	-.17***	-.26***	-.19***
21. HEXACO Openness to Experience	3.3	0.6	-.16***	-.13**	-.18***	-.07	-.14**	-.02

*** $p < .001$; ** $p < .01$; * $p < .05$; $N = 469$, except N (Self-Reported Total) = 458

HEXACO-PI-R Traits (Confirmatory)

As Table 10 shows, negative significant correlations were seen for honest-humility, agreeableness, conscientiousness, and openness to experience, suggesting higher levels of these traits related to less rule-breaking. Emotionality and extraversion demonstrated non-significant correlations and showed no relationship with COVID-19 rule-breaking. As Table 10 suggests, correlational results were evident only for some types of rule-breaking, for example, agreeableness and openness to experience did not correlate with self-reported rule-breaking, but a negative correlational relationship was found between these traits and all other types of rule-breaking (total, hygiene, social-distancing/social-activity, isolation and travel). All traits exhibited a *weak* correlation with the COVID-19 rule-breaking types (Dancey & Reidy, 2017). However, when considering Cohen (2022) rather than Dancy and Reidy's (2017) interpretation, the correlations seen for honest-humility and COVID-19 rule-breaking are considered *moderate* (i.e., $>.30$).

IPDE-SQ Traits (Exploratory)

As Table 10 shows, positive significant correlations were evident for paranoid, dissocial, impulsive, borderline and histrionic traits, suggesting that higher levels of these traits correlated with higher COVID-19 rule-breaking scores. While a negative correlation was seen for the dependent trait, suggesting this related to less COVID-19 rule-breaking. Schizoid, anankastic and anxious traits all demonstrated non-significant correlations and showed no relationship with COVID-19 rule-breaking. Of the significant results, all traits exhibited a *weak* correlation with the COVID-19 rule-breaking types (Dancey & Reidy, 2017).

Multiple Linear Regression (Enter Method)

Multiple Linear Regression was used to test if personality traits explained the variance related to COVID-19 rule-breaking. This form of analysis tested whether the personality traits predicted the different types of rule-breaking and how much variance was explained by the personality traits.

HEXACO Personality Traits

Six separate multiple linear regression analyses were run using the Enter Method, so all personality traits were entered into the same model for each type of rule-breaking.

Table 11*HEXACO Six Multiple Linear Regressions (Enter Method) Results*

Independent Variable (Separate Enter Linear Regression Analyses/Models)	Predictor	<i>B</i>	β	<i>SE</i>	<i>T</i>	<i>p</i>	95% Confidence Interval (lower bound)	95% confidence Interval (upper bound)	Overall Regression Model
Total Rule-Breaking	Honest-Humility	-0.19	-.29	.03	-6.38	<.001***	-0.25	-0.13	$F(6, 462)=18.36, p<.001^{**}, R^2=.19, R=.44, \Delta R^2=.18$
	Emotionality	-0.01	-.01	.03	-0.22	.827	-0.07	0.06	
	Extraversion	0.07	.12	.03	2.64	.008**	0.02	0.13	
	Agreeableness	-0.06	-.08	.03	-1.76	.08	-0.13	0.01	
	Conscientiousness	-0.13	-.18	.03	-4.06	<.001***	-0.19	-0.07	
	Openness to Experience	-0.08	-.12	.03	-2.73	.007**	-0.13	-0.02	
Hygiene Rule-Breaking	Honest-Humility	-0.03	-.20	.01	-4.15	.000***	-0.05	-0.02	$F(6, 462)=8.21, p<.001^{**}, R^2=.10, R=.31, \Delta R^2=.09$
	Emotionality	-0.01	-.05	.01	-1.19	.234	-0.03	0.01	
	Extraversion	0.01	.06	.01	1.34	.182	-0.01	0.03	
	Agreeableness	-0.02	-.09	.01	-1.94	.052	-0.04	0.00	
	Conscientiousness	-0.01	-.08	.01	-1.70	.089	-0.03	0.00	
	Openness to Experience	-0.02	-.10	.01	-2.30	.022*	-0.03	-0.00	
Social-Distancing/Social-Activity Rule-Breaking	Honest-Humility	-0.07	-.29	.01	-6.21	<.001***	-0.09	-0.05	$F(6, 462)=16.52, p<.001^{**}, R^2=.18, R=.42, \Delta R^2=.17$
	Emotionality	0.02	.06	.01	1.42	.156	-0.01	0.04	
	Extraversion	0.03	.12	.01	2.74	.006**	0.01	0.05	
	Agreeableness	-0.01	-.03	.01	-0.58	.564	-0.03	0.02	
	Conscientiousness	-0.04	-.17	.01	-3.83	<.001***	-0.07	-0.02	
	Openness to Experience	-0.03	-.13	.01	-3.06	.002**	-0.05	-0.01	
Isolation Rule-Breaking	Honest-Humility	-0.05	-.22	.01	-4.49	<.001***	-0.07	-0.03	$F(6, 462)=7.91, p<.001^{**}, R^2=.09, R=.31, \Delta R^2=.08$
	Emotionality	-0.01	-.03	.01	-0.63	.528	-0.03	0.02	
	Extraversion	0.02	.08	.01	1.81	.072	-0.00	0.04	
	Agreeableness	-0.02	-.06	.01	-1.22	.222	-0.04	0.01	
	Conscientiousness	-0.03	-.12	.01	-2.51	.012*	-0.05	-0.01	

	Openness to Experience	-0.01	-.04	.01	-0.88	.38	-0.03	0.01	
Travel Rule-Breaking	Honest-Humility	-0.04	-.23	.01	-4.91	<.001***	-0.06	-0.03	$F(6, 462)=14.99, p<.001^{**}, R^2=.16, R=.40, \Delta R^2=.15$
	Emotionality	-0.01	-.03	.01	-0.66	.507	-0.02	0.01	
	Extraversion	0.02	.10	.01	2.25	.025*	0.00	0.03	
	Agreeableness	-0.02	-.10	.01	-2.05	.041*	-0.04	-0.00	
	Conscientiousness	-0.04	-.20	.01	-4.56	<.001**	-0.06	-0.02	
	Openness to Experience	-0.02	-.11	.01	-2.40	.017*	-0.04	-0.00	
Self-Reported Total Rule-Breaking	Honest-Humility	-0.18	-.18	.05	-3.49	<.001***	-0.28	-0.08	$F(6, 451)=6.05, p<.001^{**}, R^2=.08, R=.27, \Delta R^2=.06$
	Emotionality	0.03	.03	.06	0.58	.562	-0.08	0.14	
	Extraversion	0.11	.11	.05	2.21	.027*	0.01	0.20	
	Agreeableness	0.06	.05	.06	0.95	.344	-0.06	0.17	
	Conscientiousness	-0.20	-.17	.06	-3.58	<.000**	-0.31	-0.09	
	Openness to Experience	0.00	.00	.05	0.02	.986	-0.09	0.10	

*** $p<.001$; ** $p<.01$; * $p<.05$; $N=469$, except N (Self-Reported Total)=458

Total Rule-Breaking. As Table 11 shows, the model was significant, $F(6, 462)=18.36$, $p<.001$, with an $R^2=.19$. In line with H1, conscientiousness, openness and honest-humility negatively predicted total rule-breaking. Extraversion positively predicted total rule-breaking, consistent with H2. Of these, the results of the model suggested that 19% of the variance was explained by these personality traits. Unlike H1's predictions, agreeableness and emotionality did not significantly predict rule-breaking. Of the significant results, honest-humility contributed most to the model ($\beta=-.29$, $p<.001$).

Hygiene Rule-Breaking. The overall model was significant $F(6, 462)=8.21$, $p<.001$, with an $R^2=.10$, which suggested personality traits predicted 10% of the variance. Of the personality traits, honest-humility and openness to experience negatively predicted COVID-19 rule-breaking (partially supporting H1's predictions). However, against the predictions, agreeableness, conscientiousness, emotionality and extraversion (against H2's predictions) did not significantly predict rule-breaking (positively or negatively). Agreeableness was nearing significance ($\beta=-.09$, $p=.052$). Of the two traits, honest-humility contributed most to the model ($\beta=-.20$, $p<.001$), compared to openness to experience ($\beta=-.10$, $p<.05$).

Social-Distancing/Social-Activity Rule-Breaking. The overall model was significant $F(6, 462)=16.52$, $p<.001$. An $R^2=.18$ suggested the significant personality traits in the model predicted 18% of the variance. Of the traits, conscientiousness, openness to experience and honest-humility were significant predictors, which related negatively to COVID-19 rule-breaking (consistent with H1). However, agreeableness and emotionality were not significant predictors. Extraversion (as predicted in H2) was a significant predictor that positively associated with COVID-19 rule-breaking. Of the

significant predictors, again honest-humility was the strongest contributor ($\beta = -.29$, $p < .001$).

Isolation Rule-Breaking. In considering specific isolation rule-breaking, the model was found to be significant $F(6,462)=7.91$, $p < .001$. The $R^2 = .09$ suggested that 9% of the variance was explained by the significant personality traits in the model. As with other types of rule-breaking, concordant with H1, honest-humility significantly negatively predicted isolation rule-breaking. The only other personality trait that significantly predicted COVID-19 isolation rule-breaking was conscientiousness, as shown in Table 11, and in line with H1, given there was a negative association. However, H1 was only partially supported given the other traits (agreeableness and openness to experience) were non-significant, while H2 (regarding extraversion) was also not supported for this type of rule-breaking. Again, honest-humility was the strongest predictor ($\beta = -.22$, $p < .001$).

Travel Rule-Breaking. The model was significant $F(6, 462)=14.99$, $p < .001$. An $R^2 = .16$ suggested that 16% of the variance was explained by the significant traits in the model. In line with H1, honest-humility, conscientiousness, agreeableness and openness to experience all negatively predicted travel rule-breaking (i.e., higher levels of these traits predicted less COVID-19 travel rule-breaking, while lower levels of these traits predicted higher travel COVID-19 rule-breaking). While extraversion (H2) was positively associated with travel rule-breaking as predicted. Emotionality was not significantly associated, against the predictions of H1. Of the significant predictors, honest-humility had the strongest association with rule-breaking (negatively; $\beta = -.23$, $p < .001$).

Self-Reported Rule-Breaking Total. For the self-reported total rule-breaking, the model was significant $F(6, 451)=6.05, p<.001$. The $R^2=.08$ suggested the model explained 8% of the variance. Of the personality traits, conscientiousness and honest-humility both significantly negatively predicted rule-breaking in line with H1's predictions. While extraversion positively predicted rule-breaking, in line with H2. None of the other personality traits significantly contributed to the model, providing only partial support for H1. Of the significant predictors, honest-humility was the best predictor ($\beta=-.18, p<.001$), closely followed by conscientiousness ($\beta=-.17, p<.001$).

ICD-10 Personality Traits

Six multiple regression models were tested separately to examine whether the ICD-10 personality traits could predict the different types of COVID-19 rule-breaking. The results below partially supported H3 given that histrionic and impulsive (but not dissocial) traits were significant positive predictors of rule-breaking in most models. Meanwhile, for H4 and H5 the null hypothesis was accepted given that dissocial, schizoid, anxious, paranoid, borderline, dependent and anankastic traits, although contributing to the models, were not significant individual predictors of rule-breaking. However, overall, the models were significant, and the personality traits together were able to predict the rule-breaking types.

Table 12*ICD-10 Six Multiple Linear Regressions (Enter Method) Results*

Independent Variable (Separate Enter Linear Regression Analyses/Models)	Predictor	<i>B</i>	β	<i>SE</i>	<i>T</i>	<i>p</i>	95% Confidence Interval (lower bound)	95% confidence Interval (upper bound)	Overall Regression Model.
Total Rule-Breaking	Paranoid	0.36	.08	.25	1.45	.147	-0.13	0.84	$F(9, 459)=4.75, p<.001^{**}, R^2=.09, R=.29, \Delta R^2=.07$
	Schizoid	-0.11	-.03	.20	-0.56	.574	-0.50	0.28	
	Dissocial	0.25	.04	.36	0.71	.479	-0.45	0.95	
	Impulsive	0.78	.16	.28	2.73	.007**	0.22	1.33	
	Borderline	0.06	.01	.29	0.22	.825	-0.50	0.62	
	Histrionic	0.52	.12	.24	2.16	.031*	0.05	0.99	
	Anankastic	-0.23	-.07	.18	-1.26	.208	-0.58	0.13	
	Anxious	-0.26	-.08	.22	-1.19	.235	-0.69	0.17	
	Dependent	0.23	.05	.24	0.96	.340	-0.24	0.69	
Hygiene Rule-Breaking	Paranoid	0.01	.01	.06	0.20	.842	-0.11	0.14	$F(9, 459)=2.22, p=.020^*, R^2=.04, R=.20, \Delta R^2=.02$
	Schizoid	0.00	.00	.05	0.00	.998	-0.10	0.10	
	Dissocial	-0.07	-.04	.09	-0.79	.431	-0.25	0.11	
	Impulsive	0.21	.17	.07	2.92	.004**	0.07	0.36	
	Borderline	-0.03	-.01	.07	-0.22	.826	-0.16	0.13	
	Histrionic	0.11	.10	.06	1.82	.070	-0.01	0.23	
	Anankastic	-0.04	-.05	.05	-0.86	.388	-0.13	0.05	
	Anxious	-0.02	-.03	.06	-0.38	.703	-0.13	0.09	
	Dependent	-0.02	-.02	.06	-0.39	.697	-0.14	0.10	
Social-Distancing/Social-Activity Rule-Breaking	Paranoid	0.10	.06	.09	1.11	.268	-0.08	0.27	$F(9, 459)=4.44, p<.001^{**}, R^2=.08, R=.28, \Delta R^2=.06$
	Schizoid	-0.13	-.10	.07	-1.85	.065	-0.27	0.01	
	Dissocial	0.01	.01	.13	0.10	.922	-0.24	0.26	
	Impulsive	0.21	.12	.10	2.01	.045*	0.00	0.41	

	Borderline	0.04	.02	.10	0.38	.705	-0.16	0.24	
	Histrionic	0.24	.15	.09	2.74	.006**	0.07	0.41	
	Anankastic	-0.07	-.06	.07	-1.11	.268	-0.20	0.06	
	Anxious	-0.05	-.04	.08	-0.57	.567	-0.20	0.11	
	Dependent	0.12	.08	.09	1.37	.171	-0.05	0.29	
Isolation Rule-Breaking	Paranoid	0.15	.10	.09	1.73	.085	-0.02	0.31	$F(9,459)=2.10, p=.028^*, R^2=.04, R=.20, \Delta R^2=.02$
	Schizoid	0.03	.03	.07	0.47	.639	-0.10	0.17	
	Dissocial	0.17	.08	.12	1.40	.163	-0.07	0.41	
	Impulsive	0.11	.07	.10	1.12	.262	-0.08	0.30	
	Borderline	-0.01	-.00	.10	-0.05	.961	-0.20	0.19	
	Histrionic	0.06	.04	.08	0.77	.444	-0.10	0.23	
	Anankastic	-0.04	-.04	.06	-0.61	.544	-0.16	0.08	
	Anxious	-0.08	-.07	.08	-1.06	.291	-0.23	0.07	
	Dependent	0.03	.02	.08	0.32	.749	-0.14	0.19	
Travel Rule-Breaking	Paranoid	0.10	.08	.07	1.44	.151	-0.04	0.24	$F(9, 459)=6.05, p<.001^{**}, R^2=.11, R=.33, \Delta R^2=.09$
	Schizoid	-0.01	-.01	.06	-0.21	.831	-0.12	0.10	
	Dissocial	0.14	.08	.10	1.40	.162	-0.06	0.34	
	Impulsive	0.25	.18	.08	3.10	.002**	0.09	0.40	
	Borderline	0.05	.03	.08	0.56	.574	-0.11	0.20	
	Histrionic	0.11	.08	.07	1.56	.119	-0.03	0.24	
	Anankastic	-0.08	-.08	.05	-1.53	.127	-0.18	0.02	
	Anxious	-0.11	-.12	.06	-1.86	.064	-0.23	0.01	
	Dependent	0.11	.09	.07	1.61	.109	-0.02	0.24	
Self-Reported Rule-Break	Paranoid	0.37	.05	.40	0.92	.360	-0.42	1.15	$F(9, 448)=4.19, p<.001^{**}, R^2=.08, R=.28, \Delta R^2=.06$
	Schizoid	-0.05	-.01	.33	-0.16	.870	-0.69	0.59	
	Dissocial	0.44	.04	.58	0.75	.452	-0.70	1.57	
	Impulsive	1.13	.14	.46	2.43	.016*	0.21	2.04	
	Borderline	0.26	.03	.46	0.56	.574	-0.65	1.17	
	Histrionic	0.99	.14	.39	2.542	.011*	0.23	1.76	

Anankastic	-0.16	-.03	.29	-0.55	.586	-0.73	0.41
Anxious	-0.53	-.10	.35	-1.49	.138	-1.22	0.17
Dependent	-0.36	-.05	.39	-0.93	.355	-1.11	0.40

*** $p < .001$; ** $p < .01$; * $p < .05$.; $N=469$, except N (Self-Reported Total)=458

Total Rule-Breaking. The overall regression model was significant $F(9, 459)=4.75$. The $R^2=.09$ suggested the significant ICD-10 traits in the model predicted 9% of the variance. Of the traits, concordant with H3, impulsive and histrionic positively predicted rule-breaking, whereby impulsive showed a stronger association ($\beta=.16, p<.01$). None of the other personality traits contributed significantly (e.g., dissocial), therefore H3 was only partially supported, while H4 and H5 were not supported for this type of rule-breaking.

Hygiene Rule-Breaking. The overall model was significant $F(9, 459)=2.22$, and $R^2=.04$ suggested the significant personality traits in the model contributed to 4% of the variance. Of the personality traits, partially supporting H3, only impulsive predicted COVID-19 rule-breaking ($\beta=.17, p<.01$), although histrionic neared significance ($\beta=.11, p=.070$).

Social-Distancing/Social-Activity Rule-Breaking. The model was significant $F(9, 459)=4.44, p<.001$. The $R^2=.08$ suggested 8% of the variance was explained by the significant traits. Within the model, histrionic ($\beta=.15, p<.01$) and impulsive ($\beta=.12, p<.05$) were significant (providing partial support for H3). Of these, histrionic showed the higher increase in rule-breaking. Schizoid neared significance for negatively associating with social-distancing/social-activity rule-breaking ($\beta=-.06, p=.065$).

Isolation Rule-Breaking. The model was significant, $F(9, 459)=2.10, p<.05$. The $R^2=.04$ suggested 4% of the variance of isolation rule-breaking was explained by the personality traits tested in this model, albeit a minimal amount. Of the personality traits, none significantly predicted isolation rule-breaking singularly. The closest to significance was paranoid ($\beta=.15, p=.085$). Although personality traits contributed

some variance and could explain isolation rule-breaking, each individual personality trait did not significantly contribute.

Travel Rule-Breaking. The model was significant $F(9, 459)=6.05, p<.001$. The $R^2=.11$ suggested the personality traits contributed to 11% of the variance. Of the traits, only impulsive was statistically significant ($\beta=.18, p<.01$), and it associated with higher COVID-19 rule-breaking (partially supporting H3). Anxious neared significance, with a negative association ($\beta=-.12, p=.064$), suggesting that it nearly negatively predicted COVID-19 rule-breaking.

Self-Reported Rule-Breaking. The overall model was significant $F(9, 448)=4.19, p<.001$. The $R^2=.08$ suggested that 8% of the variance was explained by the personality traits. Of the personality traits, histrionic and impulsive significantly predicted higher COVID-19 rule-breaking, as shown in Table 12 (partially supporting H3). The degree of change in rule-breaking scores was the same for each unit of change for both histrionic and impulsive ($\beta=.14, p<.05$), suggesting that both traits positively predicted COVID-19 rule-breaking.

Overall, some of the ICD-10 personality traits predicted higher likelihood of COVID-19 rule-breaking, with specific themes across types of rule-breaking relating to impulsive and histrionic. The results suggest that although the other personality traits contribute some variance in the models, they do not significantly predict rule-breaking.

Discussion

The main objective of this research was to investigate the relationship between personality traits and COVID-19 rule-breaking behaviour. Specifically, two theories/models of personality, the HEXACO and the ICD-10 (as measured using the

HEXACO-PI-R and IPDE-SQ psychometrics), were explored in relation to whether these personality traits related to/could explain COVID-19 rule-breaking behaviour (Ashton & Lee, 2007; Lee & Ashton, 2018; Loranger et al., 1997; WHO, 1993). The research examined six types of rule-breaking: travel rule-breaking, isolation rule-breaking, hygiene rule-breaking, social-distancing/social-activity rule-breaking, total rule-breaking (all the former added together) and self-reported rule-breaking.

HEXACO Discussion

In considering the HEXACO, the results showed that these personality traits played a role in COVID-19 rule-breaking overall, and in the different types of rule-breaking. The relationship between total rule-breaking and the HEXACO traits was strongest. Findings suggested some personality traits were able to explain up to 19% of the variation in COVID-19 rule-breaking behaviour (i.e., honest-humility, conscientiousness, openness to experience and extraversion accounted for 19% of the difference in individuals' overall COVID-19 rule-adherence). This was demonstrated in the significant results of the regression analyses. However, only some traits significantly predicted the various types of COVID-19 rule-breaking investigated. Findings for each trait are discussed separately.

Agreeableness

Correlational analyses showed agreeableness negatively correlated with total rule-breaking, hygiene rule-breaking, social-distancing/social-activity rule-breaking, isolation rule-breaking, travel rule-breaking and self-reported rule-breaking. In considering the studies cited in the SLR (Chapter 2), these results are consistent with

research that has found an association between agreeableness and COVID-19 rule-compliance (e.g., Čavojová et al., 2022; Milad & Bogg, 2021; Smrdu et al., 2021; Turk et al., 2021; Zajenkowski et al., 2021). The current results suggest a causal relationship: individuals higher in agreeableness were significantly less likely to travel rule-break, while those lower in agreeableness were more likely to COVID-19 travel rule-break. In theory, agreeableness is characterised by cooperativeness and considerateness, which may explain why higher levels related to COVID-19 travel rule-compliance (Zajenkowski et al., 2020). However, agreeableness was unable to predict other types of rule-breaking (e.g., isolation, hygiene, total, social-distancing/social-activity, self-reported). This is somewhat surprising, given Chapter 2 highlighted agreeableness as the trait most commonly related to various types of COVID-19 rule-compliance. Concordant with the current results, Muccia et al. (2022; included in the SLR) and Schmeisser et al. (2021) found agreeableness was not directly linked to COVID-19 compliance. The latter found the relationship was explained by trust in the Swedish Public Health Agency (an agency that disseminates knowledge regarding good health) as a mediating factor, so agreeableness became a significant contributor (The Government of Sweden, 2023). Similarly, mediating factors (e.g., generalised social trust in others) might explain the (mostly) non-significant predictive ability of agreeableness in the current study (Alessandri et al., 2020). Alternatively, individuals high in agreeableness may have felt conflicted between wanting to be cooperative/considerate of COVID-19 rules, but also agreeable to friends/family (even if this required rule-breaking). The findings reflect the potential complexity of the relationship between this personality trait and COVID-19 rule-breaking.

Conscientiousness

A negative correlation was evident between conscientiousness and COVID-19 rule-breaking, and higher conscientiousness significantly predicted less COVID-19 rule-breaking. Conscientiousness was the second greatest predictor of total rule-breaking, social-distancing and social-activity, isolation, travel rule-breaking and self-reported rule-breaking, but not hygiene rule-breaking. Concordantly, past research has indicated that conscientiousness relates to higher impulse control which, theoretically means that, this trait aids compliance to norms and rules (Bogg & Roberts, 2013). This is consistent with research by Schmeisser et al. (2021) who found the only trait directly linked to compliance was conscientiousness, while those lower in conscientiousness tended to be more impulsive and more likely to rule-break. In the current study conscientiousness did not predict hygiene rule-compliance, similarly found by Milad and Bogg (2021) and Aschwanden et al. (2020) specifically for mask-wearing.

Openness to Experience

Openness to experience showed a negative correlational relationship with total rule-breaking, hygiene, social-distancing/social-activity, isolation and travel rule-breaking, suggesting that as openness increased, COVID-19 rule-breaking decreased (but not for self-reported rule-breaking). The regression analysis results suggested that those lower in openness to experience were more likely to break COVID-19 rules related to social-distancing/social-activity, hygiene rule-breaking and overall rule-breaking, but not less likely to break COVID-19 rules related to travel or isolation. The results are concordant with previous research, which suggested that those higher in openness were more likely to see COVID-19 as a threat and behaved accordingly

(Ranieri et al., 2021). Likewise, Wright et al. (2021) found those who did not comply as often were lower in traits of openness on the Big Five Inventory. It is likely that individuals lower in openness were less willing to seek out information regarding COVID-19 guidance and were slower at adapting to new situations (Götz et al., 2020). Although the result is in line with the predictions, several studies have found the opposite: those who are higher in openness exhibit greater curiosity and this often manifests in a less cautious attitude, implying that such individuals are more likely to put themselves at elevated risk of contracting COVID-19 (Martin, 2020; Schaller & Murray, 2008; Schaller & Park, 2011). Evidently, there is discrepancy between research and theory, however, this study clearly supports the argument that higher openness relates specifically to social-distancing/social-activity, hygiene and general rule-compliance.

Honest-Humility

Honest-humility demonstrated significant correlations and negatively predicted all types of rule-breaking. The results suggest that higher honest-humility predicted rule-compliance, while lower honest-humility predicted rule-breaking. The results are consistent with theory, which implies honest-humility relates to the fair treatment of others (Ashton & Lee, 2007). Similar to previous research conclusions, honest-humility was the greatest predictor of rule-compliance among all the HEXACO traits (Branovački et al., 2021; Costatini et al., 2022).

Emotionality

Emotionality was unrelated to all types of COVID-19 rule-breaking, both in correlational and regression analyses. Theoretically, emotionality relates to harm prevention and greater levels of anxiety, depression and vulnerability, and has been found to relate to heightened COVID-19 rule-compliance (Lee & Ashton, 2018; Oljača et al., 2020). The current results were surprising, given that research has indicated emotionality is more prevalent among younger female populations (Weisberg et al., 2011). Given the majority of the participants were female and 19 years old and non-significant findings were found, this provided rationale for the conclusion that emotionality does not appear to impact COVID-19 rule-breaking. The findings were similar to Blais et al. (2021), who also found emotionality did not exert consistent influence over COVID-19 rule-breaking, despite individuals having been found in favour of government lockdowns. Research suggests mediating factors may be influential in the emotionality and COVID-19 rule-breaking/compliance relationship. For example, Schmeisser et al. (2021) found that trust in public health agencies positively mediated the relationship between emotionality and COVID-19 rule-compliance. It seems the relationship is complex and not as straightforward as predicted.

Extraversion

Higher levels of extraversion did not correlate with any COVID-19 rule-breaking types. Nevertheless, when added into the regression analysis model, with the other HEXACO traits, extraversion predicted self-reported and total rule-breaking, albeit with a rather small degree of change compared to the other significant traits.

According to research and the theoretical rationale, it was appropriate to continue to use extraversion as a predictor, despite the non-significant correlation (Chan, 2016; Pandey & Elliott, 2010). Previous research is mixed; some studies found extraversion related to rule-breaking (in line with theoretical predictions e.g., Wright et al., 2021), while others found it related to rule-compliance (e.g., Milad & Bogg, 2021). Likewise, Schmeisser et al. (2021), found that when COVID-19 rules were enforced, extraversion might not have been as influential, compared to when individuals made autonomous decisions (perhaps lessening the impact of a potential extraversion and COVID-19 rule-breaking relationship). Hence, in the current study, extraversion was only related to two of the types of rule-breaking, including self-reported, which provided participants with the autonomous decision of providing a specific number of times they broke the COVID-19 rules.

ICD-10 Discussion

Regarding the ICD-10 traits, the hypotheses were more exploratory given the novelty of this line of investigation. Themes were evident whereby histrionic and impulsive traits had the greatest association with the different types of COVID-19 rule-breaking.

Impulsive

Correlations showed that as impulsive traits increased, so did all types of COVID-19 rule-breaking. Moreover, impulsive personality traits predicted all types of rule-breaking, except self-reported rule-breaking. The results correspond with previous research that found lower impulsiveness relates to COVID-19 rule-compliance (Frías-

Armenta et al., 2021; Nowak et al., 2002). Higher impulsivity likely creates challenges with behavioural inhibition and difficulties anticipating long-term consequences, making it difficult to rule-comply (Reynolds et al., 2006). Haag et al.'s (2023) research agrees that those with higher impulsiveness were more likely to hygiene rule-break and take sanitation risks compared with those with lower impulsiveness. Likewise, Frías-Armenta et al.'s (2021) research during the first Mexican lockdown further supports the association between high impulsivity and negative health behaviours.

Histrionic

Like impulsive traits, higher histrionic traits showed a positive correlational relationship with all types of COVID-19 rule-breaking. Histrionic traits were also able to predict most types of COVID-19 rule-breaking, except travel, isolation and hygiene rule-breaking. To the knowledge of the author, this is the first study to both investigate and find this relationship (i.e., histrionic traits positively predicted COVID-19 rule-breaking). The results are consistent with theory given that higher histrionic traits are characterised by melodrama/attention-seeking behaviour (which COVID-19 rule-breaking might have achieved; WHO, 2016). This is particularly evident in the prediction of social-distancing/social-activity rule-breaking, given this may attract attention, compared to the non-significant prediction of hygiene and isolation rule-breaking, i.e., behaviours more commonly undertaken in private (and less likely to attract attention). Moreover, higher histrionic traits relate to a need for emotional and physical proximity to others, therefore the pandemic restrictions may have led such individuals to seek closeness to others, which could explain the positive prediction of COVID-19 social-distancing/social-activity rule-breaking (WHO, 2016).

Paranoid

The analysis found paranoid traits weakly correlated with all types of COVID-19 rule-breaking, except hygiene, but did not predict COVID-19 rule-breaking. There has been relatively little research examining paranoid traits and COVID-19 rule-breaking, with most research having focused on paranoia as an outcome variable from the pandemic, rather than a predictor variable (Starčević & Janča, 2022). Theoretically, the relationship is not straightforward, given such traits are characterised by mistrust and hold equal arguments for being suspicious of the rules or being extra-cautious of COVID-19 (WHO, 2016). From these findings, it seems paranoid traits do not predict COVID-19 rule-breaking, although when included with the other personality traits they likely contributed slightly to the significant models.

Schizoid

Schizoid traits did not correlate/predict COVID-19 rule-breaking. This finding is theoretically challenging given that schizoid is characterised by less social interest and a tendency towards solidarity (WHO, 2016). Therefore, such individuals would be expected as more likely to abide by the COVID-19 rules (as they do not necessarily place value on seeing/interacting with others). Alternatively, it may be that at a baseline level, those higher in schizoid traits may remain socially withdrawn, and were therefore perhaps undeterred by the COVID-19 rules. Overall, it seems that schizoid traits are unrelated to COVID-19 rule-breaking/rule-compliance. It must be acknowledged, the relatively low internal consistency found for the IPDE-SQ's schizoid subscale could have impacted the results.

Dissocial

Regarding dissocial traits, there were significant results from correlation analyses, i.e., as these traits increased, so did scores on total, isolation, travel and self-reported rule-breaking types, although not for hygiene or social-distancing rule-breaking. Despite this, dissocial personality traits did not significantly predict any type of COVID-19 rule-breaking. The results are surprising given that dissocial personality traits are characterised by irresponsibility, recklessness and deceitfulness, and exposing oneself and others to risk, even when it can be avoided (Tidy & Knott, 2022).

Moreover, previous COVID-19 rule-breaking research has found that such traits are directly associated with lower compliance (Miguel et al., 2021; Nowak et al., 2020; Zettler et al., 2021). Miguel et al. (2021) goes as far as to say that antisocial traits explained why individuals broke COVID-19 rules, even when increasing numbers of cases and deaths were evident. Of all the ICD-10 personality traits, dissocial presented with the lowest mean among participants, and could have been under-represented within the study's population given males generally tend to present with more dissocial traits, while this study had a majority female sample (Paris, 2004). Given this and the previous research base, it is prudent in this case to consider the study parameters as a limitation, rather than dismissing this trait as a predictor due to the current findings.

Borderline

Borderline traits showed a weak correlational relationship with all rule-breaking types, except hygiene rule-breaking, however, they did not significantly predict COVID-19 rule-breaking. This result appears novel, and no known studies have investigated borderline (at trait level) with COVID-19 rule-breaking. From a theoretical

perspective, to cope with imposed social isolation during the pandemic and to regulate potential feelings of loneliness (characteristic of borderline traits), such individuals may have been more likely to COVID-19 rule-break (WHO, 2016). However, within this study, borderline traits were not predictive of COVID-19 rule-breaking. Given borderline traits can be variable and feelings change quickly, such as swinging from extreme closeness to dislike of others, this could explain the lack of relationship found, as rule-breaking behaviour is situational and dependent upon both mood and environmental circumstances (Paris, 2005). Therefore, such individuals may present differently in terms of COVID-19 rule-breaking dependent upon their current emotions/emotional wellbeing within the pandemic.

Anankastic

Higher anankastic personality traits did not show correlation/prediction with COVID-19 rule-breaking. This is somewhat surprising given that theory suggests that anankastic characteristics include perfectionism, excessive conscientiousness (which showed a relationship in this study), preoccupation with caution and rigidity (WHO, 2016). Against theoretical stances, it seems there is no relationship, although this is a novel result given that the anankastic trait has not been investigated previously. Given this, it is difficult to provide explanations for the current findings; perhaps other mitigating factors (e.g., moderators, mediators) are relevant.

Anxious

A further surprising finding was the lack of a relationship (correlation or predication) between anxious traits and COVID-19 rule-breaking. Theoretically, it was

expected that there would have been a negative relationship with COVID-19 rule-breaking given characteristic feelings of tension, apprehension and avoidance of situations due to habitual exaggeration of the potential dangers or risks (WHO, 2016). The current findings could be explained from a baseline perspective, whereby such individuals do not take risks in general, and therefore the pandemic did not elicit heightened rule-compliance. However, a negative correlation and predictive ability with COVID-19 rule-breaking would still have been likely. The findings suggest that anxious traits do not guide COVID-19 rule-breaking behaviour.

Dependent

Finally, higher dependent personality traits weakly correlated with higher total, social-distancing/social-activity and travel rule-breaking, but not hygiene, isolation or self-reported rule-breaking. Despite this, higher dependent styles did not predict higher rule-breaking. The lack of predictive ability is somewhat surprising given that, theoretically, such individuals may seek out support from others to regulate their own needs (WHO, 2016). However, the correlational results support the idea that as dependent traits increase, so does social-distancing/social-activity and travel rule-breaking, in line with these theoretical underpinnings (i.e., travelling/not social-distancing to seek contact with others). The lack of predictive ability could relate to the limitations regarding internal consistency of the IPDE-SQ dependent subscale, and although correlations were evident, it is perhaps prudent to conclude that dependent traits are unrelated to COVID-19 rule-breaking.

Summary of ICD-10 Findings

Overall, the ICD-10 personality traits significantly predicted each rule-breaking model, whereby impulsivity and histrionic traits played substantial roles. Only a small amount of variance was accounted for within the ICD-10 personality trait and COVID-19 rule-breaking relationship (ranging 4-11% across rule-breaking types), which may suggest other, more significant variables impact this relationship. This is echoed by Zajenkowski et al. (2020), who concluded that personality traits play a relatively minor role in influencing COVID-19 rule-breaking behaviour. Such results may reflect research advances that have focused more on mediating factors.

Low-Level Crime Themes

From a theoretical perspective, nearly all traits that were found to significantly predict COVID-19 rule-breaking behaviour have also been considered within low-level crime literature. For example, low conscientiousness was found to predict COVID-19 rule-breaking, and it has also been related to risky driving styles, misdemeanours, physical aggression, self-reported vandalism and low-level community crime (e.g., Gleason et al., 2004; Miller & Lynam, 2006; Wang et al., 2018). There is consensus among the current results and low-level crime literature that lower conscientiousness relates to such individuals putting themselves, and others, at risk. Similarities were found between low honest-humility, low COVID-19 rule-breaking and less likelihood to commit low-level crime. Indeed, high levels of honest-humility are rarely found within prison populations, while those low in honest-humility are more likely to engage in criminal/antisocial behaviour, particularly low-stakes antisocial behaviour, similar to the current findings (Međedović, 2017; Ścigała et al., 2022). Despite extraversion not

relating to as many types of COVID-19 rule-breaking as expected, the significant results were consistent with the low-level crime literature. Indeed, in the current study, higher extraversion predicted higher COVID-19 rule-breaking, similar to studies that have found that higher extraversion relates to a risky driving style and low-level community crime (Miller & Lynam, 2006; Romero et al., 2001; Wang et al. 2018). Extraversion was also included in one of the first biological theories of criminal behaviour, which proposed that individuals with higher levels of extraversion have lower levels of arousal and therefore require more environmental stimulation (e.g., low-level crime/COVID-19 rule-breaking) to fuel their excitement (Eysenck & Eysenck, 1970). The results found that higher impulsiveness was one of the best predictors of COVID-19 rule-breaking. This is concordant with the low-level crime literature (Reynolds et al., 2006; Tharshini et al., 2021). It seems that impulsiveness is a risk factor for both low-level crime and COVID-19 rule-breaking. Finally, the results found that higher histrionic traits predicted higher COVID-19 rule-breaking. This is concordant with low-level crime literature, which suggests histrionic personality traits have similar features to narcissistic traits, which relate to increased criminal behaviour (Dawood, 2020; Lau, 2013). In one of the few crime studies that has examined histrionic traits directly (as opposed to narcissistic traits), Fakhrzadegan et al. (2017) found higher levels related to increased likelihood to commit low-level crimes such as theft, but not severe crimes such as murder and rape. These results are similar to the current research regarding COVID-19 rule-breaking.

The study results also highlight some inconsistencies with the low-level crime research. First, it was expected that higher dissocial traits would predict COVID-19 rule-breaking. A relationship between higher levels of crime and dissocial traits (also

known as antisocial traits) is one of the most consistent within crime research (e.g., fly-tipping, speeding; Lau, 2013). Although a correlation was found, dissocial traits did not predict COVID-19 rule-breaking. Similar discrepancies were found for low agreeableness given that it did not predict as many types of COVID-19 rule-breaking as expected. High neuroticism (which holds theoretical similarities to low agreeableness) has been consistently related to low-level crime such as driving offences, risky driving styles and misdemeanours (Alavi et al. 2017; Faílde-Garrido et al. 2021; Möttus et al. 2012). Clearly, however, COVID-19 rule-breaking differs in this regard.

These theoretical comparisons provide useful insight into the similarities and differences regarding the personality traits of low-level criminals and COVID-19 rule-breakers. Despite similarities, there are some crucial differences, in particular that there was no relationship found between dissocial traits and COVID-19 rule-breaking. Therefore, the characteristics of COVID-19 rule-breakers do differ, somewhat, to low-level criminals, which could, for example, relate to the unprecedented nature of the pandemic, however explanations for the differences requires further research. There could be mediating/moderating factors in the personality trait and COVID-19 rule-breaking relationship that need to be considered. There could also be inherent differences between complying with government laws in a global pandemic compared to complying with laws in general, although this was not explored within this study. Relating to the similarities found among traits, it may be beneficial to consider similar approaches in addressing/tackling/deterring pandemic-related rule-breaking (particularly in the case of another pandemic) when compared to those used for low-level crime.

Overall Findings

The findings demonstrate that the personality traits of impulsiveness, histrionic, honest-humility, conscientiousness, extraversion, agreeableness and openness to experience can, to some extent, predict COVID-19 behaviour. Honest-humility was one of the best predictors, closely followed by conscientiousness, impulsivity, histrionic, openness to experience, and to a lesser extent, extraversion (which predicted travel and self-reported rule-breaking) and agreeableness (which only predicted travel rule-breaking). Themes were evident whereby higher honest-humility, conscientiousness, openness to experience and agreeableness predicted rule-compliance, while lower levels predicted rule-breaking. Moreover, higher impulsiveness, histrionic and extraverted traits predicted rule-breaking, and lower levels predicted rule-compliance. The HEXACO traits predicted more variance (19%) in rule-breaking than the ICD-10 traits (11% for the highest rule-breaking type: travel), but played a relatively small role. This is reflected in other research, for example, Zajenkowski et al. (2020) argued personality traits demonstrate a minor role in their relationship with COVID-19 rule-breaking, while other mediating/moderating factors play more significant roles. Consistency of these results within wider research was discussed, while some findings were novel. Themes were apparent among low-level crime literature, whereby similar traits related to both COVID-19 rule-breaking and low-level crime, for example, low conscientiousness, higher impulsivity and lower honest-humility (Faílde-Garrido et al., 2021; Lau, 2013; Miller & Lynam, 2006; Wang et al., 2018).

Strengths and Limitations

A particular strength of this research relates to its large sample size which greatly exceeded the proposed requirement. Moreover, excellent internal consistency was found for the COVID-19 Behaviour Questionnaire (Appendix N). Furthermore, the study used the long form of the HEXACO-PI-R-100 to examine personality traits, rather than relying on shorter versions used in previous studies (Lee & Ashton, 2018). Finally, the study represents a valuable contribution to the literature base by using a measure, hitherto unused, based on a medical model personality theory, to examine whether the traits within the model were related to COVID-19 rule-breaking.

There were several limitations. In particular, the IPDE-SQ showed weak internal consistency on the paranoid, schizoid and histrionic subscales (Nunnally, 1967). To the knowledge of the author, this is the first research testing the IPDE-SQ's internal consistency in a community/student sample, and despite the weak reliability score for these traits, this finding presents a valuable contribution to the literature (Loranger et al., 1997).

A further limitation is the number of participants who did not fully complete the questionnaire. Generally, these participants signed up for the study, but answered relatively few questions. True reasons for non-completion are unknown and missing responses could not be analysed given the lack of questions answered.

In considering generalisability, most participants identified as female. This could bias the results given research indicates women in general were less likely to be caught COVID-19 rule-breaking (NPCC, 2022a). Therefore, the results may only reflect the portion of the population who were less likely to COVID-19 rule-break. Despite 20% of the sample identifying as male, generalising the results to the wider male population

(i.e., those with a higher likelihood of COVID-19 rule-breaking) risks communicating two linked assumptions, i.e., that men present with similar personality traits to women, and that these traits/results relate to a population more likely to be caught COVID-19 rule-breaking. Moreover, research suggests that, in general, women are less likely to be charged with low-level crime than men (Abrahamsen, 2014). Given the predominant female sample within the current research, generalisability of the results is somewhat limited to those less likely to commit low-level crime, including COVID-19 rule-breaking. To summarise, the findings are, to some extent, limited by a majority female sample who are less likely to be charged with both COVID-19 crimes and low-level crimes. Despite these environmental generalisability issues, as highlighted in Chapter 2, most research examining the personality traits of COVID-19 rule-breakers has also relied on a majority female sample, so the results can be viewed as generalisable and comparable in research contexts.

Moreover, the research comprised a WEIRD (White, Educated, Industrialised, Rich, Democratic) sample. For both reasons, the results may not be applicable to the wider population. Nonetheless, this is consistent with 80% of all published studies which also relied on participants that fit WEIRD criteria (Azar, 2010). Moreover, the findings are likely specific to those in Western cultures given the use of a Westernised theory of personality. Although it is argued the ICD-10 cross-culturally more valid than the DSM-5, generalising these findings to populations with differing COVID-19 and personality beliefs/values could be considered culturally insensitive (Gureje et al., 2020).

Another limitation relates to the self-report measures used and the tendency for participant social desirability (Crutzen & Göritz, 2010). Individuals may not have

answered the questions honestly due to the knowledge that if they admitted to breaking the COVID-19 rules, they are, in some instances, admitting to breaking the law.

Wider Implications

Important conclusions can be drawn from this research in terms of understanding why individuals broke COVID-19 rules. Psychological research plays a valuable role in understanding the complexities of human behaviour, and contributes to finding ways to encourage, enable and support people to engage with positive changes (Porritt, 2023, as cited in Turns, 2023). Indeed, if policies are introduced without understanding what elicits behavioural change/compliance, crucial elements could be missed (Arden, 2023, as cited in Turns, 2023). This is particularly relevant given that the COVID-19 laws and guidance were introduced with speed, and without the government and policymakers necessarily understanding what would encourage specific COVID-19 rule-compliance. Therefore, this research is particularly valuable in planning strategies for potential future pandemics, which may require similar methods to reduce transmission. Arden (2023, as cited in Turns 2023) argued it is important to embed behavioural science and psychology into decision-making at early stages to help design effective policies. Clearly, behaviour change and psychology play an important role in tackling societal challenges, from pandemic guidance to low-level crime, and in developing solutions that are impactful and feasible (Turns, 2023).

Overall, this study contributes to understanding the characteristics of COVID-19 rule-breakers. The finding that personality traits of conscientiousness, openness to experience, honest-humility, extraversion, impulsiveness, histrionic, and agreeableness, influence behaviour within a pandemic context enhances the knowledge base. The

findings further suggest it would be beneficial for future public health crisis policies to consider research on the topic of personality traits of rule-breakers. For example, preliminary research by Kleitman et al. (2020) advised that government messages would be more effective for some individuals if they appeal to self-interest rather than social obligations. Moreover, there will be variation between individuals as to what motivates them to comply with rules; variation, which is likely, at least partially, related to personality traits. As such, psychological targeting (i.e., framing messages to individual personality traits or a particularly common trait within a population) is considered an important/modern tool of communication in promoting behavioural compliance (Ceylan & Hayran, 2021).

Although not directly investigated, but compared to theory, the results of the personality traits related to COVID-19 rule-breaking are similar to those found in low-level crime research, for example, low conscientiousness and impulsiveness showed strong links with both types of behaviour. COVID-19 rule-breaking is comparable to crimes that attract similar sanctions, such as fly-tipping and driving offences which can result in FPNs (Alavi et al., 2017; Wang et al., 2018; Webb et al., 2006). Therefore, corresponding prevention methods could be applied. For example, fly-tipping research has suggested successful personality-motivated reduction/preventative methods include increasing difficulty, heightening risk, reducing reward, lowering provocation and expelling excuses for offenders (Webb et al., 2006). Although requiring further research, such methods could be adapted and applied within future pandemics.

Although there is a robust argument that personality traits should be considered when developing government guidance in terms of how it is communicated and enforced, it is evident that there are other variables that impacted COVID-19 rule-

compliance behaviour, which would benefit further exploration. The results suggest that personality traits alone cannot predict fully whether a person would COVID-19 rule-break. Factors such as trust in the government, public health agencies and science are also considered to impact COVID-19 rule-compliance (Schmeisser et al., 2021). For example, trust in the Swedish Government's Public Health Agency recommendations was found to account for more variance in COVID-19 rule-breaking behaviour (40.9%) than personality traits (Schmeisser et al., 2021). Therefore, it is worth considering both personality traits and other factors (such as increasing trust in science) in formulating government policy, prevention methods and guidance. Accounting for as many factors as realistically possible that impact COVID-19 behaviour would ultimately support the reduction of the associated rule-breaking/criminal behaviour, pressure on public health services and overall health risks. In the wider context, this research is an initial step to understanding the characteristics associated with pandemic rule-breaking behaviour.

Future Research Directions

Given the results suggested that personality traits accounted for up to 19% of the differences observed in an individual's COVID-19 behaviour, several areas for future research are recommended. A key area is to further investigate the mediator/moderator variables that might impact on the relationship between personality traits and rule-breaking. Research focusing on this area has suggested that factors such as social values and moral foundations provide plausible interacting factors (Chan, 2021; Schmeisser et al., 2021). It is recommended that future research continues this investigative direction to provide a fuller explanation of the variance. Similarly, it would be beneficial to examine sample characteristics in relation to personality traits and COVID-19 rule-

breaking combined (for example, as covariates, mediators, additional predictors within regression models). This was not in the remit of the current study given the focus on the direct relationship between personality traits and COVID-19 rule-breaking, but would prove a useful and interesting future research area.

Regarding COVID-19 rule-breaking and low-level crime, future research could investigate these directly with individuals known to have offended. This could take two forms: first, to assess the personality traits of known COVID-19 law-breakers (i.e., those who were caught), and, second, to compare known COVID-19 law-breakers' and known low-level criminals' personality traits. The latter could support in understanding whether those who commit low-level crime were more likely to, or were involved in, breaking COVID-19 laws. This would provide comparative insights into the personality traits of COVID-19 rule-breakers and low-level criminals, and further evaluation could add to the *what works* literature regarding low-level criminal desistance (in the case of pandemic-related offenders).

Future research would benefit from investigating *what works* to prevent rule-breaking specifically among individuals who display higher histrionic, impulsivity, extraversion traits, and lower conscientiousness, openness to experience, honest-humility, and agreeableness. To help limit future pandemic rule-breaking, it is important to understand how framing government messages might address these personality traits. Such strategies could provide long-term benefit within public health crises. Psychological targeting is becoming increasingly common, and has been shown, in research, to be a successful persuasion technique (Hirsh et al., 2012). While the UK Government focused on group persuasion to “stay at home, protect the NHS, save lives” (Department of Health and Social Care, 2021; Figure 1), an approach which considers

that individuals vary in terms of personality traits, and has understanding that what works for one individual in terms of effective communication of the COVID-19 rules to encourage behavioural change might not work for others, would certainly be beneficial.

Conclusion

The present research contributes to a growing body of evidence that personality traits played a small but significant role in COVID-19 rule-breaking behaviour. This study builds on previous research by using a measure based on a medical model of personality and presents novel findings, including the role of histrionic traits relating to COVID-19 rule-breaking. This research is highly relevant to our times, and the results are valuable within personality, forensic, health and behavioural contexts.

CHAPTER 4

CRITIQUE OF THE SHORT DARK TRIAD (SD3)

Introduction

The Dark Triad, the “new kid on the personality psychology block” (Jonason et al., 2014, p.117), is a personality theory. Coined by Paulhus and Williams (2002), it concerns three *dark* personality traits – narcissism, Machiavellianism and psychopathy – that share malicious features and a “callous-manipulative interpersonal style” (Brinkley et al., 2001, p.1025). Narcissism is defined by grandiosity, self-esteem and self-interest; Machiavellianism by exploitation, absence of morality and egotism, and psychopathy by callousness, remorselessness and antisocial/impulsive behaviour (Paulhus & Williams, 2002).

The Dark Triad fits into a socio-biological model, with genetic components relating to psychopathy and narcissism, and to a lesser extent, Machiavellianism, while environmental/developmental factors contribute to the development of all three (Ali, 2020; Láng et al., 2017). The traits are thought to be influenced by societal and evolutionary reinforcement and tend to be associated with males because of consistency with *hegemonic masculinity* (Gluck et al., 2020). This refers to society’s promotion and maintenance of dominant social roles over women, whereby these traits tend to benefit men to keep societal positions of power (Gluck et al., 2020). From an evolutionary perspective, these traits have been found to benefit men, and research has suggested they are related to increased sexual activity and accelerated reproduction among men (Gluck et al., 2020). However, given advances in gender-related equality, the gender gap regarding these traits (in particular, narcissism) reduced considerably between 1992 and 2006, in line with the Generation Me/Millennial era (Twenge et al., 2008).

The three traits are conceptually distinct, but the Dark Triad encourages researchers to study them together, given their common dark and malevolent features

and “callous core that encourages interpersonal manipulation” (Jones & Paulhus, 2013, p. 3). The theoretical roots of the Dark Triad have been debated, and McHoskey et al. (1998) argued that when studied alone, narcissism, Machiavellianism and psychopathy overlap, and the factors display significant intercorrelation. Paulhus and McHoskey debated this at an APA conference in 2002, inspiring a growing body of research (Paulhus & Williams, 2002). Jones and Paulhus (2013) recognised that the theoretical distinctions between the traits had become intertwined, so they proposed the theoretically-loyal Short Dark Triad (SD3) psychometric.

Previously, each of the Dark Triad traits was assessed using its own psychometric: the Self-Report Psychopathy Scale (SRP-III; Williams et al., 2003),¹ the standard measure of Machiavellianism (MACH-IV; Christie & Geis, 1970),² and the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) or Narcissistic Personality Inventory-40 (NPI-40; Raskin & Terry, 1988).³ Many researchers felt deterred by the time-consuming nature of these measures combined, so the Dirty Dozen (DD) was created to examine the Dark Triad traits in tandem (Jonason & Webster, 2010). This short measure contains four questions for each personality trait, however several studies have raised concerns about its reliability/validity (Jones & Paulhus, 2013). Vize et al. (2019) argued high reliabilities were achieved due to repetitive wording, and cross-correlations were often stronger than the convergent correlations. To

¹ The Self-Report Psychopathy Scale (SRP-III); a 64-item self-report measure with four subscales: interpersonal manipulation, callous affect, erratic lifestyle, and antisocial behaviour (Williams et al., 2003).

² The standard measure of Machiavellianism (MACH-IV); a 20-item self-report measure which produces a total Machiavellianism score (Christie & Geis, 1970).

³ The Narcissistic Personality Inventory (NPI-40); a 40-item self-report measure with items derived from the DSM-III criteria for narcissistic personality disorder, with subscales for leadership/authority, grandiose exhibitionism and entitlement/exploitativeness; the measure is not intended for diagnostic purposes (it measures *normal* and *subclinical* narcissism; Raskin & Terry, 1988). The NPI-40 is a refined version of the original 220-item NPI measure (Raskin & Hall, 1979).

ensure accuracy of measurement, particularly with personality traits, which are considered persistent across the life span, it is necessary to measure the Dark Triad with a well-constructed scale consisting of sound psychometric properties. As with all psychometric measures, reliability, validity and norms are essential qualities to consider.

Body of Work

To account for the DD's shortcomings, Jones and Paulhus (2013) devised the SD3 to fit into a wider research base. High scores in each Dark Triad trait denote an increased likelihood of engaging in criminality, creating social distress, and causing workplace problems (Azizli et al., 2016; O'Boyle et al., 2012). Adolescents who scored higher in Dark Triad traits presented with an increased likelihood of interpersonal violence (Ali, 2020). Moreover, Lyons and Jonason (2015) found that self-confessed thieves scored higher on these traits. Other research has linked the Dark Triad traits to internet trolling/cyberstalking, cybercrime and extremism (Harrison et al., 2016; Lopes & Yu, 2017; Pavlović & Wertag, 2021). Although the SD3 is widely used within research, uses in practice have not been recorded.

More recently, the SD3 has been employed to examine COVID-19 rule-breaking. Gogola et al. (2021) found that, among 604 participants, there was a positive correlation between SD3 psychopathy and COVID-19 rule-breaking, while SD3 narcissism positively correlated with rule-compliance. Additionally, Zajenkowski et al. (2020) found individuals with high Dark Triad traits were less likely to COVID-19 rule-comply. Konc et al. (2022) found recklessness (SD3 psychopathy) positively correlated with COVID-19 rule-breaking, deviousness (SD3 Machiavellianism) and an

unwillingness to be vaccinated. The recent interest in pandemic-related Dark Triad studies can be seen to demonstrate researchers' eagerness to understand the traits across wider settings.

Since Jones and Paulhus (2013) proposed the SD3, hundreds of academic articles adopting the methodology have been published (Dragostinov & Möttus, 2022). In terms of psychometric properties, most studies have focused on assessing SD3 language translations. This review examined SD3 psychometric properties, including reliability, validity and norms.

Short Dark Triad Development

The SD3 was created using an item pool designed to examine the classic Dark Triad constructs (Jones & Paulhus, 2013). Jones and Paulhus (2013) provided background context regarding the theoretical underpinnings of the traits, for example, they described impulsivity as the difference between Machiavellianism and psychopathy, whereby those with higher psychopathic traits exhibit more impulsive behaviours, while those with higher Machiavellianism traits tend to be more strategic. Furthermore, the three key elements of Machiavellianism are manipulateness, strategic calculating orientation and callous affect, while narcissism is a conflict between grandiose identity and insecurity (Wu et al., 2019). Jones and Paulhus (2013) agreed that only the grandiose variant would be represented in the Dark Triad, given the lack of a theoretical link between narcissistic vulnerability/insecurity and *darkness*. Therefore, the SD3 does not consider vulnerable narcissism.

First, Jones and Paulhus (2013) saturated items, ensuring the conceptual facets were maintained by creating a large pool of 41 items. They reduced the items, avoiding

mixing of the conceptual facets of each trait (Jones & Paulhus, 2013). Factor analyses found 14 items did not adequately saturate the factors, or saturated multiple factors, and eventually 13 items related to narcissism and Machiavellianism and 15 to psychopathy (Jones & Paulhus, 2013). Factor analysis and cross-validation resulted in 27 items, nine for each personality trait (Jones & Paulhus, 2013). A three-factor model was optimal when completing Exploratory Structural Equation Modelling (ESEM) to uncover the smallest number of dimensions needed to explain the variables covariation, Root Mean Square Error of Approximation [RMSEA]=.04,⁴ Comparative Fit Index [CFI]=.93, Tucker Lewis index [TLI]=.91 (Jones & Paulhus, 2013).⁵ Jones and Paulhus (2013) also conducted a Confirmatory Factor Analysis (CFA) model using 279 US respondents (*M age*=30.7, *SD*=10.9), finding the model was an overall good fit and items loaded appropriately (i.e., >.3), albeit slightly weaker than the original (RMSEA=.07, CFI=.82, TLI=.80). The factor loadings (i.e., the correlation between the item and the factor) indicated a moderate correlation of >.3 between the items and personality traits (Tavakol & Wetzel, 2020). However, research has stipulated a CFI and TLI of .90 or higher is acceptable as an indicator of good fit, which is not the case for the aforementioned results (Hu & Bentler, 1999; Kim et al., 2016). Given the relatively small factor loadings and CFI (for the CFA only), it is questionable whether the model is actually a good fit, and whether the psychometric is based on a sound theoretical model. Nevertheless, the ESEM provided a better fit for this initial evaluation, indicating the

⁴ Root Mean Square Error of Approximation (RMSEA), known as an absolute fit index, measures the size of errors produced by a model, so that it can be compared to another model (Xia & Yang, 2018).

⁵ The Comparative Fit Index (CFI) and Tucker Lewis Index (TLI), known as incremental fit indices, are differing methods to examine the fit of a hypothesised model with a baseline model (Xia & Yang, 2018)

final items in the psychometric were suitable for each personality trait (Jones & Paulhus, 2013).

Tool Characteristics

Taking on average 147 seconds to complete, the SD3 contains 27 statements, each with nine questions per personality trait (Jones & Paulhus, 2013). While no manual is available, Jones and Paulhus's (2013) study provided a detailed overview of the tool. The questions are scored on a five-point Likert Scale, which ranges from disagree to agree, including a neutral option (Jones & Paulhus, 2013). For scoring, the answers for each trait are added together and the mean is calculated.

For a psychometric test to be considered robust, it ought to be constructed as an interval scale (Kline, 1986). Neither Jones and Paulhus (2013) nor other published research has formally determined the SD3's measurement level. Likert scales are subject to much debate regarding whether they are ordinal or interval level, with many researchers assuming Likert scales to be interval (Wu & Leung, 2017). Strictly speaking, Likert scales yield ordinal data, given the responses have directionality but the intervals cannot be assumed equal (Wu & Leung, 2017). Research regarding the SD3 has classified the data as being interval level in order to use parametric tests (Wu & Leung, 2017). However, Likert scales present at a lower level of measurement than what is ideally required for statistical analysis. This suggests that caution should be taken in considering the results of SD3 studies and the interpretation of parametric data used in the context of an ordinal style scale.

The SD3 is a self-report measure, completed by the respondent (Demetriou et al., 2015). Individuals may therefore falsify their responses to portray positive

characteristics (Demetriou et al., 2015). While some personality psychometrics (e.g., Millon Clinical Multiaxial Inventory (MCMI-IV; Millon et al., 2015)), include questions and statistical methods to assess desirability, the SD3 does not, and Jones and Paulhus (2013) have advised discretion among researchers/clinicians.

Reliability

Reliability is “the trustworthiness/consistency of a measure” (APA, 2023c, para. 1). Alternate form reliability is the degree to which two different versions of the same test correlate with one another (APA, 2023a). This was not assessed as there is only one SD3 version. Moreover, there is no direct literature regarding inter-rater reliability (the consistency of the test conducted by different people), which is understandable given the SD3 is a self-reporting measure (Price, 2015). The inability to examine these should not be considered a weakness but due to the SD3’s design. Research has focused on internal consistency and test-retest reliability.

Internal Consistency

Internal consistency reflects the SD3’s ability for individual items to measure the same domain/construct (Price, 2015). Cronbach’s Alpha examines how closely items are related as a group by providing an internal consistency estimate using correlations (Cronbach, 1951). Cronbach’s Alpha above $\alpha > .7$ is recommended, specifically, $\alpha = .90$ to $\alpha = .99$ is excellent/strong, $\alpha = .80$ to $\alpha = .89$ is good, $\alpha = .70$ to $\alpha = .79$ is fair, and $\alpha = .00$ to $\alpha = .69$ is considered poor (Cronbach, 1951). Given the popularity of using this technique, Table 13 lists a selection of studies for overview.

Table 13*Cronbach's Alpha Across a Selection of SD3 Studies*

Author	Participant total, Age (<i>M</i> , <i>SD</i>)	Machiavellianism Cronbach's Alpha, α	Psychopathy Cronbach's Alpha, α	Narcissism Cronbach's Alpha, α
Atari and Chegeni (2016)	Iranian sample $N=301$ ($M=25.6$, $SD=6.9$)	Male=.50 Female=.69	Male=.69 Female=.60	Male=.65 Female=.61
Birkás et al. (2016)	Undergraduate and postgraduate sample (unclear if conducted in specific country, authors affiliate with a Hungarian university) $N=200$ ($M=26.4$, $SD=5.8$)	.75	.70	.76
Burtăverde et al. (2022)	Romanian sample $N=4,134$ ($M=29.0$, $SD=11.4$)	Male=.80 Female=.78	Male=.74 Female=.69	Male=.66 Female=.68
Chegeni and Atari (2017)	Iranian sample $N=222$ ($M=24.6$, $SD=4.2$)	.69	.64	.55
Egan et al. (2014)	Mixed country sample $N=840$ ($M=30.1$, $SD=12.7$)	.74	.76	.74
Ermis and Sahin (2018)	Turkish university student sample $N=327$ (M =not provided, SD =not provided)	.78	.71	.73
Gamache et al. (2018)	French Canadian sample $N=405$ ($M=31.0$, $SD=12.0$)	.80	.75	.64

Hasanati and Istiqomah (2019)	Indonesian employee sample $N=380$ (M =not provided, SD =not provided)	.78	.82	.73
Jones and Paulhus (2017)	Mixed ethnicity sample, 68% European heritage (unclear if conducted in specific country) $N=292$ ($M=32.9$, $SD=11.8$)	.74	.81	.71
Jones and Paulhus (2013) original SD3 (Study 1)	US sample $N=489$ ($M=30.7$, $SD=11.1$)	.71	.77	.74
Kawamoto et al. (2020)	Japanese sample $N=1,947$ ($SD=12.7$, M =not provided, $Median=46$)	.70	.69	.79
Malesza et al. (2017)	German sample $N=598$ ($M=.27.3$, $SD=7.5$)	.73	.72	.78
Pechorro et al. (2019)	Portuguese adolescents sample $N=412$ ($M=.13.2$, $SD=1.4$)	.85	.83	.89
Salessi and Omar (2018)	Argentinian sample $N=316$ ($M=34.6$, $SD=10.6$)	.92	.89	.91
Sindermann et al. (2018)	German university student sample $N=468$ ($M=23.2$, $SD=8.4$)	.78	.74	.65
Szabó et al. (2022)	Hungarian full-time employee sample $N=662$ ($M=37.4$, $SD=11.4$)	.76	.74	.74

Table 13 demonstrates that internal consistency generally falls within the fair to good range (Cronbach, 1951). Some results indicate poor internal consistency, particularly for narcissism, suggesting items are not in complete agreement and may indicate the need for item-deletion (Cronbach, 1951).

Gamache et al. (2018) suggested the narcissism factor had low internal consistency ($\alpha=.64$) because one item had a higher endorsement level due to French-linguistics, whereby the wording underplayed entitlement/social dominance. Somma et al. (2020b), not included in Table 12 given the Cronbach's Alpha was presented as a range, found internal consistency was significantly lower among Italian adolescents ($\alpha=.67-.68$), compared to Italian university students ($\alpha=.77-.84$). This suggests the Italian SD3 translation may not be appropriate for adolescents; given research suggests personality traits develop up to 25 years, using an adult version raises ethical concerns (Van Dijk et al., 2020). Both Atari and Chegeni (2016) and Chegeni and Atari (2017) found poor/questionable internal consistency across all traits among an Iranian population. The former found only acceptable internal consistency (i.e., $\alpha > .7$) after deletion of six items (Atari & Chegeni, 2016; Cronbach, 1951). Given the removal of so many items in the development of the Iranian version, it is queried whether the construct/content proposed by Jones and Paulhus (2013) is valid cross-culturally, and whether the remaining 21-items provide accurate measurement of the traits/construct.

McDonald's Omega is considered a better way to estimate internal consistency as it requires error loadings from Confirmatory Factor Analysis (CFA; Hayes & Coutts, 2020). The cut-off for Omega is consistent with Cronbach's Alpha ($\omega > .7$). Persson et al. (2017), among $N=2,095$ ($M=33.3$, $SD=11.6$), found the SD3 Omega total was $\omega=.90$ suggesting only 10% random error variance. Bonfá-Araujo et al. (2021) found SD3

Omega total was ($\omega=.86$), albeit slightly lower than Persson et al.'s (2017), but emphasised this was unusually high, indicating a large general factor accounting for item variance. Klimczak and Turska (2020) found questionable SD3 Omega internal consistency among $N=45$ adolescents ($\omega=.66$ narcissism, $\omega=.71$ psychopathy, $\omega=.67$ Machiavellianism) querying the SD3's reliability among adolescents. Researchers appear eager to use the SD3 with a younger population, but available reliability results suggest this may be unwise.

Another method used to assess internal consistency is inter-item correlation (Cohen, 2022). The ideal inter-item correlation range is $r=.2-.4$, while higher correlations suggest too much inter-relatedness (Piedmont, 2014). Szabó et al. (2022), using the Hungarian SD3 translation with $N=663$ employees ($M=37.4$, $SD=11.4$), found acceptable correlations between all traits, Machiavellianism and narcissism $r=.15$, $p<.001$, Machiavellianism and psychopathy $r=.38$, $p<.001$, and psychopathy and narcissism $r=.40$, $p<.001$. In a re-examination study, Jones and Paulhus (2017) also found a good level of inter-item correlation between Machiavellianism and narcissism $r=.29$, $p<.001$, and narcissism and psychopathy $r=.33$, $p<.001$. However, concerns were raised regarding Machiavellianism and psychopathy $r=.51$, $p<.001$, suggesting significant inter-item correlation (Jones & Paulhus, 2017), like Zhang et al.'s (2019) finding, $r=.58$, $p<.01$. The inter-correlations found in these studies potentially provide evidence for a bi-factor model (see content validity).

Test-Retest Reliability

Test-retest reliability examines correlations between test scores over time (Matheson, 2019). A test with acceptable test-retest reliability shows little change in

scores over time. This is essential for the SD3 given that personality traits are considered persistent/pervasive (Millon et al., 2015). There is no standard interval for determining test-retest reliability, although many standardised tests range from 2-12 weeks (Fawns-Ritchie & Deary, 2020). The most common way to measure test-retest reliability is using Pearson's r correlational analysis; a minimum correlation of $r=.70$ is advised (Glen, 2020). Malesza et al. (2017) examined test-retest reliability of the German translation of the SD3 ($N=221$) over four weeks (Table 14).

Table 14

Malesza et al. (2017) Test-Retest Results

SD3 Trait	Person r Correlation Result
Machiavellianism	$r=.91, p<.001, 95\% \text{ CI} [.80, .82]$ i.e., 179 of 221 participants demonstrated stable personality traits.
Psychopathy	$r=.83, p<.001, 95\% \text{ CI} [.81, .85]$ i.e., 183 of 221 participants demonstrated stable personality traits.
Narcissism	$r=.74, p<.001, 95\% \text{ CI} [.73, .75]$ i.e., 164 of 221 participants demonstrated stable personality traits.

Table 14's results indicate that Malesza et al. (2017) found high SD3 correlations (i.e., $r>.7$), indicating acceptable test-retest reliability. Ermis and Sahin (2018), in testing a Turkish translation of the SD3 ($N=327$ students) two weeks apart, found better test-retest results for Machiavellianism ($r=.92, p<.001$), narcissism ($r=.89, p<.001$), and psychopathy ($r=.91, p<.001$). However, Dragostinov and Möttus (2022; $N=209$), found questionable test-retest results for psychopathy ($r=.69, p<.001$) and Machiavellianism ($r=.61, p<.001$), mirrored by Čopková and Šafář (2021) over three weeks.

Results regarding test-retest reliability are mixed, and further research is needed over longer time periods. It is concerning that test-retest reliability has been found below acceptable levels in published studies because it suggests the SD3 is not a stable measure over time (while personality traits generally are), and poses the question as to whether other external factors are incorrectly captured within the measure (e.g., mood).

Validity

Validity examines whether a test measures the characteristic as intended (HR-Guide, 2022). Five validity types were considered: face, criterion (predictive/concurrent), incremental, content, and construct (convergent/divergent).

Face Validity

Face validity is the extent to which a test is effective in its aims (Price, 2015). Although no studies have addressed this directly, the SD3 seems appropriate for Dark Triad measurement, using questions appearing face-relevant to each trait. The careful sorting of each trait in the initial stages of development indicates face validity (Jones & Paulhus, 2013). More rigorous types of validity are conducted only if initial face validity is confirmed, therefore it must be assumed researchers agree the test is face valid.

Criterion Validity

Criterion validity is the extent to which a test measures the outcome it was designed for (West & Beckman, 2018). There are two subtypes of criterion validity: predictive and concurrent.

Predictive Validity

Predictive validity is the degree to which a test score predicts future behaviour at a later time point (Clemens et al., 2018). No research has focused specifically on predictive validity of the SD3. Some authors have claimed the SD3 demonstrates predictive validity, however, evaluations were not assessed over time, and assertions may be reflective of difficulty in differentiating statistical uses of prediction (i.e., multiple regression) and predictive validity. For example, Dinić and Wertag (2018) claimed to demonstrate predictive validity by examining the SD3 and aggression using the Serbian Reactive-Proactive Questionnaire (Dinić & Raine, 2017; $N=632$, $M=30.3$, $SD=12.5$), finding SD3 psychopathy was the best predictor of reactive/hierarchical aggression (men, $R^2=.23$, $p<.001$; women, $R^2=.15$, $p<.05$), consistent with theoretical underpinnings related to remorse/guilt/empathy. Although multiple regression provides evidence of *prediction*, this was not assessed over time, so likely demonstrates convergent validity.

Concurrent Validity

Concurrent validity is the extent to which a psychometric compares to a related measure at the same time point (West & Beckman, 2018). Most studies have compared the SD3 to its predecessor, the DD (Jonason & Webster, 2010). For concurrent validity the correlation should be as high as possible (around $r>.9$), however correlations of $r>.75$ are acceptable (Lin & Yao, 2014). The DD, a brief 12-item questionnaire, examines the Dark Triad, and was created, like the SD3, to negate the need for long psychometrics (Jonason & Webster, 2010). However, the DD has been subject to significant criticism due to poor validity, despite good overall reliability (Kajonius et

al., 2016). Nevertheless, researchers consider it an important measure by which to assess the SD3's concurrent validity.

In the original study, Jones and Paulhus (2013) found correlations between SD3 and DD scales ranging from $r=.46, p<.01$ to $r=.56, p<.01$. Jones and Paulhus (2013) suggested this demonstrated concurrent validity, although the correlations were low given the SD3 is the DD's *improvement*. Similarly, Maples et al. (2014) found the DD and SD3 subscales ranged from $r=.54, p<.001$ for narcissism to $r=.65, p<.001$ for psychopathy. Moreover, Egan et al. (2014) examined happiness and wellbeing ($N=804$), finding correlations between the SD and DD scales: Machiavellianism ($r=.38, p<.01$), narcissism ($r=.60, p<.01$) and psychopathy ($r=.96, p<.01$). Egan et al. (2014) concluded the lower Machiavellianism correlation reflected DD limitations. Later, Geng et al. (2015) compared the DD and SD3, finding modest correlations for narcissism ($r=.45, p<.01$) and psychopathy ($r=.47, p<.01$). Arguably, these are low correlation levels. However, Geng et al. (2015) reported this is normal among personality measures, yet suggested this implies the SD3 and DD have dissimilar constructs. These results present a concerning picture in considering Lin and Yao's (2014) criteria. The fundamental reason for SD3 development (DD improvement), could be seen to undermine the efficacy of using the DD as a sufficient concurrent measure.

Incremental Validity

Given the difficulties using the DD to assess concurrent validity, researchers have examined incremental validity (i.e., whether a new psychometric increases predictive ability beyond an existing measure; Sackett & Lievens, 2008). Incremental validity assesses whether a predictor can explain an outcome, above all other predictors,

usually using hierarchical regression to measure the prediction of one criterion after another (Sackett & Lievens, 2008). Gamache et al. (2018), in developing a French SD3 ($N=405$, $M=31.0$, $SD=12.0$), compared SD3 and DD measures to predict psychopathy on the Expanded-Levenson Self-Report Psychopathy Scale (Levenson et al., 1995). Using regression analysis, Gamache et al. (2018) reported the SD3 Machiavellianism demonstrated better incremental validity than DD Machiavellianism and showed better trait coverage through its associations with callousness ($z=4.10$, $p<.001$), egocentricity ($z=2.87$, $p<.001$), and unempathetic features ($z=3.78$, $p<.001$), with similar results found for psychopathy. The authors reported this related to convergent incremental validity, rather than criterion, arguing the DD is a related construct, rather than a previously validated measure.

Content Validity

Content validity is the extent to which a measure represents all facets of a construct and whether the instrument and items reflect theoretical/empirical research (Dixon & Johnston, 2019). Factor analysis can identify whether the SD3 corresponds to the Dark Triad construct (Dixon & Johnston, 2019). SD3 content validity determines whether Jones and Paulhus's (2013) three-factor model fits across samples using CFA, Exploratory Factor Analysis (EFA) or ESEM. In terms of model criteria for these, a significant model fit is required (X^2), and for CFA, ideally a CFI>.95 for *excellent* fit, or CFI>.90 for *good* fit, and similar TLI criteria (Hu & Bentler, 1999; Kim et al., 2016). Moreover, a RMSEA as close to zero as possible (or <.06) suggests the model (i.e., of Dark Triad traits) is an *acceptable* fit (Hu & Bentler, 1999; Kim et al., 2016; for RMSEA, CFI and TLI definitions see footnotes 4 and 5, p. 155).

A number of studies have replicated Jones and Paulhus's (2013) three-factor model. Malesza et al. (2017), using CFA in the German SD3 translation ($N=598$, $M=27.3$, $SD=7.5$), found Maximum Likelihood indicated a CFA three-factor model was a good fit, $\chi^2(102)=206.24$, $p>.05$, RMSEA=.04, CFI=.98, TLI=.99 (CI not provided), compared to a tested one-factor model. Moreover, Pineda et al. (2020), developing a Spanish version ($N=545$, $M=34.6$, $SD=11.1$), found a CFA three-factor model fitted well, and items loaded convincingly onto their hypothesised factor, $\chi^2(321)=574.83$, $p<.001$, CFI=.93, RMSEA=.04, 90% CI[.04, .05] (TLI not provided), although this model was compared to the DD model rather than other types of models (e.g., bi-factor models), so comparison is relatively limited. Nevertheless, it appears the Spanish/German/English SD3's evidence content validity.

However, Pechorro et al. (2019) found CFA only supported a three-factor model after two items were removed, similar to Atari and Chegeni (2016) with seven items removed. Atari and Chegeni (2016) related this to cultural norms, for example "being acquainted with important people" (question 14; p. 116), is not *dark* but pertinent for economic survival in Iran. Similar item-removal patterns have been seen across studies (Čopková & Šafář, 2021; Salezzi & Omar, 2018), questioning content validity, and whether studies fulfil Jones and Paulhus's (2013) theoretical stance given content removal.

Several studies suggest content validity of a three-factor model is poor. Rogoza and Cieciuch (2017) proposed a bi-factor model including narcissistic grandiosity and "Dark Dyad" (i.e., psychopathy/Machiavellianism subsumed; p. 760), theorising that Machiavellianism was an aspect of psychopathy. Persson et al. (2017) found an EFA bi-factor SD3 was more acceptable among a large sample ($N=17,749$, $M=34.1$, $SD=12.2$),

with psychopathy and Machiavellianism subsumed, and narcissism as a separate factor, $\chi^2(273)=1,794.55$, $p<.001$, RMSEA=.06 (90% CI[.06, .06]). Similar results were found for a bi-factor CFA with two specific factors, ($\chi^2[297]=16,651.80$, $p<.001$, CFI=.97, TLI=.97, RMSEA=.08, CI[.08, .08]), which fitted better than other tested models (according to the CFI, TLI and RMSEA criteria; Hu & Bentler, 1999; Kim et al., 2016; Persson et al., 2017). Gamache et al. (2018; $N=405$, $M=31.1$, $SD=12.0$) found a bi-factor ESEM had the best fit, given the highest CFI and TLI and lowest RMSEA ($\chi^2=426.67$, $p<.05$, CFI=.96, TLI=.94, RMSEA=.05, CI[.04, .05]) compared to the bi-factor CFA model ($\chi^2[46]=217.70$, $p<.001$ CFI=.92, TLI=.90, RMSEA=.06, CI[.05, .06]), and orthogonal three-factor ESEM ($\chi^2[23]=119.23$; $p<.001$, CFI=.93, TLI=.91, RMSEA=.05, CI[.05, .06]). The Machiavellianism/psychopathy items loaded onto a global Dark Triad factor, raising concerns about the psychopathy coverage and inter-item correlation (Gamache et al., 2018). Similar bi-factor models were found by Vaughan et al. (2019) and Szabó et al. (2021). Klimczak and Turska (2020), demonstrated a strong correlation between psychopathy and Machiavellianism ($r=.94$, $p<.001$) among Polish youths ($N=221$; $M=14.4$, $SD=1.1$), suggesting inherent differentiation problems, hence a *Dark Dyad* was appropriate. There appears overlap between SD3 traits, unfortunately a common issue for multifaceted traits.

A different style bi-factor model has been confirmed in non-Western cultures. In the Chinese SD3 translation ($N=508$, $M=21.5$, $SD=1.1$), Zhang et al.'s (2019) bi-factor ESEM (with one general factor and the three personality traits as separate factors) fitted better ($\chi^2[249]=450.73$, $p<.001$, CFI=.93, TLI=.90, RMSEA=.04, CI[.03, .05]) than two other tested factor models (correlated three-factor CFA and orthogonal three-factor ESEM models) which demonstrated lower CFIs, TLIs and higher RMSEAs, across two

different samples. Given the specific bi-factor model design (i.e., whereby SD3 items were indicative of both one general factor and the specific three personality traits), this is more similar to the original version, as opposed to models whereby psychopathy and Machiavellianism have been subsumed as one factor. However, in Zhang et al.'s (2019) study, some narcissism factor loadings were low, but this likely related to the collectivist sample, with similar results to Park et al. (2021) in Korea. Moreover, Bonfá-Araujo et al. (2021), when testing a Brazilian sample ($N=1,965$, $M=25.5$, $SD=9.1$), using CFA, found the three-factor model was poor ($\chi^2(321)=3,589.98$, $p<.001$, $RMSEA=.07$, $CFI=.86$, $TLI=.85$), but the bi-factor model (with one general factor and the personality traits) yielded an improvement ($\chi^2(294)=2,714.41$, $p<.001$, $RMSEA=.07$, $CFI=.90$, $TLI=.88$) according to the aforementioned criteria (Hu & Bentler, 1999; Kim et al., 2016). Like Zhang et al. (2019), Bonfá-Araujo et al. (2021) concluded a general underlying factor was likely present, and which could evidence a continuum of traits, rather than separate trait entities. Moreover, Machiavellianism and psychopathy correlations were the highest ($r=.60$ $p<.001$), indicating the existence of a large general factor (Bonfá-Araujo et al., 2021). They therefore suggested the traits might be better conceptualised on a spectrum of *narcissism-Machiavellianism-psychopathy*, and future research ought to consider a unidimensional model.

Content validity evidence from Western cultures converges towards a bi-factor model (i.e., Dark Dyad) with Machiavellianism and psychopathy subsumed, and a separate narcissism factor. Theoretically, Machiavellianism and psychopathy could be the *dark core*, while narcissism contains *brighter*, rather than conceptually *dark* characteristics, querying whether flawed theoretical concepts underpin the SD3 (Szabó et al., 2021). Whereas, non-Western evidence suggests a continuum of the three traits,

given an underlying *dark trait* (also a bi-factor model) found among studies (e.g., Bonfá-Araujo et al., 2021). Taken together, evidence converges towards a bi-factor model, although disagreement exists about the specific conceptualisation and structure of the bi-factors.

Construct Validity

Construct validity is a psychometric's ability to measure its intended construct and whether the test correlates with theory (Pelz, 2022). Types of construct validity include convergent and divergent.

Convergent and Divergent Validity

Convergent validity is the ability of a measure to correspond to other measures, demonstrated by positive correlations between measures of related constructs (Krabbe, 2017). Carlson and Hederman's (2010) criteria suggest acceptable convergent validity is achieved if the correlation coefficient is $r > .50$, ideally $r > .70$. Contrastingly, divergent validity is how much a test deviates from another measure whose underlying construct is different, i.e., no/negative correlation suggests good divergent validity (Krabbe, 2017).

Convergent and Divergent Validity with Long Dark Triad Psychometrics.

Jones and Paulhus (2013) originally tested convergent validity against standard measures of each of the Dark Triad traits: MACH-IV (Christie & Geis, 1970), SRP-III (Williams et al., 2003), and NPI-40 (Raskin & Terry, 1988; see footnotes 1, 2, 3, page 152 for details). Among $N=230$ adults, Jones and Paulhus (2013) found each subscale

correlated well with these tools, e.g., positive correlations between SD3 Machiavellianism and MACH-IV ($r=.68, p<.01$), SRP-III and SD3 psychopathy ($r=.78, p<.01$), and NPI-40 and SD3 narcissism ($r=.70, p<.01$). They claimed the SD3 subscales are appropriately distinct and comparable to related tools, with acceptable convergent correlations (i.e., $r>.50$; Carlson & Hederman, 2010; Jones & Paulhus, 2013). Malesza et al. (2017) compared the SD3 subscales with the same psychometrics ($N=384, M=23.0, SD=1.8$). The SD3 showed correlations ranging from $r=.28, p<.01$ (SRP-III antisocial behaviour facet with SD3 narcissism) to $r=.71, p<.01$ (SRP-III manipulation facet with SD3 psychopathy), providing evidence of the convergent validity between the variables (Malesza et al., 2017). Moreover, Maples et al. (2014) found SD3 narcissism negatively correlated with NPI-40 vulnerable narcissism ($r=-.51, p<.05$), an expected divergent validity finding, given the SD3 does not account for vulnerable narcissism (Raskin & Terry, 1988). Overall, these studies show convergent/divergent validity for the SD3 scales with longer psychometrics, albeit some with lower correlations than Carlson and Hederman's (2010) criteria ($r>.50$), such as Malesza et al.'s (2017) result for the SRP-III antisocial behaviour facet and SD3 narcissism.

Convergent and Divergent Validity with the Big Five. Studies have focused on comparing the SD3 with personality trait measures such as the Big Five (Goldberg, 1993). O'Boyle et al.'s (2014) meta-analysis found SD3 narcissism in general correlated positively with extraversion and negatively with agreeableness, concurring with theoretical underpinnings that, from a Big Five perspective, individuals high in narcissism are considered "disagreeable extraverts" (Paulhus, 2001, p. 228). Moreover,

SD3 Machiavellianism and psychopathy correlated negatively with Big Five agreeableness and conscientiousness (divergent validity), as theoretically expected (O'Boyle et al., 2014). Čopková and Šafár (2021) examined convergent/divergent validity of the Slovak SD3 using the NEO-Five Factor Inventory (NEO-FFI; $N=333$, $M=26.5$, $SD=11.4$; Costa & McCrae, 1992). In considering their results, using Spearman's Rho, SD3 psychopathy was "slightly" (p. 659) negatively correlated with openness ($r=-.19$, $p<.001$) and conscientiousness ($r=-.31$, $p<.001$), and had a "strong" (p. 659) significant negative relationship with agreeableness ($r=-.62$, $p<.001$; Čopková & Šafár, 2021). Psychopathy's negative correlation with agreeableness confirms theory suggesting a typical characteristic of someone who scores highly on psychopathy is coldness in interpersonal relationships (Čopková & Šafár, 2021). Considering further results, Čopková and Šafár (2021) found no relationship between narcissism and conscientiousness ($r=.03$, $p>.05$), which was to be expected given that they are theoretically dissimilar, demonstrating divergent validity (Carlson & Hederman, 2010).

Convergent and Divergent Validity with HEXACO. Given the Big Five's theoretical limitations (e.g., factor analysis over-reliance, trait broadness), some researchers have opted to use the HEXACO (Big Five with "honest humility"; Ashton & Lee, 2007). In a Chinese sample, Zhang et al. (2019) found correlations between the SD3 and HEXACO: Machiavellianism significantly correlated negatively with all HEXACO honest-humility facets, with values ranging from $r=-.30$, $p<.01$ for modesty to $r=-.48$, $p<.01$ for sincerity, demonstrating divergent validity. Moreover, Pailing et al. (2014) found convincing convergent/divergent results ($N=159$; $M=29.3$, $SD=11.1$): positive significant Spearman Rho correlations between SD3 narcissism and HEXAO

extraversion ($r=.49$, $p<.001$), while other SD3 traits did not significantly correlate (divergent). Although Pailing et al. (2014) claimed evidence of convergent validity for SD3 narcissism and HEXACO extraversion, according to Carlson and Hederman's (2010) criteria ($r>.50$) the positive correlation is not quite within the acceptable range to demonstrate this.

Convergent and Divergent Validity with Other Measures. Some researchers have opted to examine the convergent/divergent validity using other measures. For example, Pechorro et al. (2019) examined convergent/divergent validity among $N=412$ adolescent offenders ($M=13.2$, $SD=1.4$) using an array of psychometrics considered theoretically linked to the SD3 (see table 15).

Table 15

Pechorro et al. (2019) SD3 Convergent/Divergent Correlations

Male/Female	Dirty Dozen (DD)	Self-Report Delinquency Scale (SRD)	Rosenberg Self-Esteem Scale (RSES)	Brief Self-Control Scale (BSCS)
Machiavellianism	.50***/.51***	.42***/.26***	.02/.04	-.18*/-.16*
Narcissism	.61***/.57***	.46***/.18*	-.01/.03	-.06/-.08
Psychopathy	.53***/.46***	.43***/.22**	.05/-.10	-.16*/-.15*

*** $p<.001$; ** $p<.01$; * $p<.05$. References: DD, Jonason and Webster (2010); SRD, Elliott et al. (1985); RSES, Rosenberg (1965); BSCS, Tangney et al. (2004).

Table 15 suggests “good” (p. 281) convergent validity between the DD and SRD Scale (significant “moderate-to-high” (p. 280) positive correlations), while RSES and BSCS (i.e., null/low negative correlations) demonstrate divergent validity (Pechorro et al., 2019). Pechorro et al. (2019) concluded the latter results corroborate with theoretical underpinnings: self-esteem is likely low for all SD3 traits and typically characterised by

low self-control. The results overall suggest good convergent/divergent validity with theoretically-linked measures (Pechorro et al., 2019).

Norms

Norms, established through control groups, are essential for test interpretation at individual/group level (Ruble, 2017). Although Jones and Paulhus (2013) presented means regarding the sample's scores on each Dark Triad trait, they did not provide normative data. Norms are only available to view when an individual has personally taken the SD3 online, either at <https://www.psytoolkit.org/survey-library/short-dark-triad.html> or <https://openpsychometrics.org/tests/SD3/>. The former, PsyToolKit (2021), claims the SD3 normative data on their webpage (provided below in Table 16) was sourced from Professor Paulhus' website, however the webpage link provided does not work. In accessing Professor Paulhus' website (Paulhus, n.d) via Google, only the Short Dark Tetrad (SD4; Paulhus, 2021) is available, with no information regarding a SD3 normative sample. Therefore, it is unclear where the information provided by PsyToolKit (2021) in Table 16 was sourced.

Table 16

SD3 Norms (PsyToolKit, 2021)

Trait	Mean	Standard Deviation	Score Above This Is Outside of Normal Range
Machiavellianism	3.1	0.76	> 3.86
Narcissism	2.8	0.88	> 3.68
Psychopath	2.4	1.0	> 3.40

Note. SD not in APA one decimal place style as table is directly taken from PsyToolKit (2021; also reflected in the text below).

Regarding the norms available on the OpenPsychometrics (2021) website, OpenPsychometrics reported being aware the SD3 did not have a normative sample, and claimed this was because most research was conducted using convenience samples rather than control groups. Therefore, OpenPsychometrics (2021) reported they developed SD3 norms by producing a statistical estimate of a normative sample across several studies. They used Google Scholar to search for studies to include, and claimed they chose these based on “quality” (para. 8), those that reported the mean and standard deviation, and had a “large sample size” (para. 8), while “studies with similar samples to those already collected were skipped” (para. 8). Table 17 lists the studies used (OpenPsychometrics, 2021).

Table 17*Normative Sample References (OpenPsychometrics, 2021)*

Authors	Sample	<i>n</i>	<i>M</i>	<i>N</i>	<i>p</i>
Adler et al. (2017)	CUNY undergraduates and social media recruitment	499	3.05 (0.7)	2.77 (0.59)	2.15 (0.62)
Baughman et al. (2012)	Adults recruited through snowball sampling starting with posters and emails at a Canadian university	657	3.28 (0.59)	2.97 (0.56)	2.2 (0.64)
Butler (2015)	Small business owners contacted from a registry of business owners in US south	159	2.34 (0.58)	2.97 (0.31)	1.86 (0.5)
Egan et al. (2014)	Persons via Facebook and a variety of online Internet-based research sites	861	2.8 (0.5)	2.7 (0.6)	2.0 (0.6)
Hmieleski and Lerner (2016)	Business undergraduates and MBA students in the USA	742	2.36 (0.867)	3.29 (0.73)	2.12 (0.77)
Jonason et al. (2014)	Undergraduates from a south-western American university	1389	2.99 (0.78)	3.38 (0.73)	2.16 (0.8)
Jones and Paulhus (2013)	mTurk users from USA and Canada	998	3.2 (0.57)	2.83 (0.52)	2.16 (0.62)
Kay et al. (2020)	Undergraduates at a north-western US university	463	2.9 (0.56)	2.91 (0.53)	2.16 (0.56)
Papageorgiou et al. (2019)	Adults from advertisements on social networks (e.g., Facebook) as well as through word of mouth	608	3.05 (0.68)	2.92 (0.57)	2.14 (0.58)
Persson et al. (2019)	Residents of the US on mTurk	1487	3.05 (0.62)	2.76 (0.61)	1.95 (0.50)

Note. *M* and *SD* not in APA one decimal place style as table is directly taken from OpenPsychometrics (2021; also reflected in the text below).

Based on the studies mentioned above, OpenPsychometrics (2021) claimed that the “weighted average of the samples” (para. 9) scores produced the following norms: Machiavellianism $M=2.96$, $SD=0.65$; Narcissism $M=2.97$, $SD=0.61$; Psychopathy $M=2.09$, $SD=.63$. However, caution must be taken when interpreting the data in Table 17, given that Butler (2015) is an unpublished thesis; Adler et al. (2017) and Kay et al.’s

(2020) references could not be sourced; spelling mistakes were present for author names; Baughman et al.'s (2012) study was published before Jones and Paulhus (2013) published their original SD3 study. Moreover, OpenPsychometrics (2021) comment on their webpage that “the estimated distribution for US adults [presented in a graph on the webpage] is probably not very good because so far research has only been done with convenience samples and the assumptions of the model are not fit particularly well” (para. 3). Given these concerns, and as Jones and Paulhus (2013) did not provide norms in their original study, and percentiles were not provided for the above-mentioned data, limitations certainly arise regarding the efficacy of the PsyToolKit (2021) and OpenPsychometric (2021) norms claims.

Culture/Gender Norms

In considering norms, it is a limitation that available data (Table 16/17) are not separated by gender. Jones and Paulhus (2013) acknowledged that men scored significantly higher on all SD3 traits in alignment with evolutionary/social theory, however supporting research has been relatively mixed, partially due to unequal sex ratios within samples (Burtăverde et al., 2022). Nevertheless, Pineda et al. (2020) found males scored higher on all traits ($t[452]=4.31, p<.001$) as expected, mirroring Malesza et al.'s (2017) study ($t[479]=14.17, p<.01$) and Zhang et al.'s (2019) Chinese SD3. Pechorro et al. (2019) found male adolescents scored higher on all traits: Machiavellianism (males $M=17.9$, females $M=16.0$); narcissism (males $M=18.6$, females $M=17.3$); psychopathy (males $M=14.0$, females $M=11.5$). In considering gender/cultural differences, Burtăverde et al. (2022), using factor analysis among a Romanian population ($N=4,134, M=29.0, SD=11.4$), found that some Machiavellianism factors in the CFA model did not load for both men and women, and for the ESEM

model, and some poor loadings were evident in the women sample. However, in their final model tested, Burtăverde et al. (2022) concluded that there was “strict invariance across gender” (p. 11; i.e., the model met certain statistical criteria that provided evidence that the same construct was being measured and interpreted the same way for both genders). Burtăverde et al. (2022) found the SD3 was problematic to use in developing countries where individuals scored higher on the Dark Triad traits due to competitive living/work environments. It is concerning that gender/age/culture norms are unaccounted for, an area future research can contribute to. Such research can heighten the understanding of personality structures across protected characteristics, and provide baseline information to enhance accurate result comparisons within certain populations. This will ultimately improve the accuracy of research using the SD3 by ensuring that test results are applicable to population norms.

Conclusions

The rationale of the SD3 put forward by Jones and Paulhus (2013) was clear: to address the limitations of the DD by providing distinct definitions of each trait, ensuring theoretical underpinnings were incorporated into the three-factor model. Within the Dark Triad field, the SD3 has been used extensively within research, as demonstrated by citation numbers.

For reliability, the SD3 holds acceptable internal consistency among studies. However, a lower than expected Cronbach’s Alpha was found for the trait of narcissism, and issues of low internal consistency among adolescents were reported. Research considering inter-rater and parallel-forms reliabilities is unavailable, however this is not necessarily a weakness, but relates to test design.

Although SD3 reliability appears positive, a differing picture emerges for validity. Concurrent validity has been assessed by comparing the SD3 and DD, with relatively low correlations found between the two measures (Jonason & Webster, 2010; Jones & Paulhus, 2013). A better picture was presented with incremental validity, however, further research is needed in this area. Limitations arose due to a lack of knowledge regarding predictive validity. Longitudinal data, measuring the Dark Triad against subsequent diagnoses/criminal behaviour, are required to provide evidence of predictive validity and confirmation of theoretical underpinnings. Researchers claim good convergent/divergent correlations (construct validity) between the SD3 and longer Dark Triad psychometrics and personality tests, however many correlations were below the recommended cut-off, demonstrating potential over-optimism among researchers, perhaps due to a personal investment in their SD3 translation (Glen, 2020). Given the Big Five limitations, further convergent/divergent research between the SD3 and personality psychometrics is needed using a medical model (e.g., ICD-11, DSM-5; American Psychiatric Association, 2013; WHO, 2019). Issues were noted regarding the SD3's content validity, whereby a bi-factor model better fits the data, and high inter-item correlations between Machiavellianism and psychopathy suggest these ought to be subsumed and are likely measuring over-lapping constructs, while narcissism is a distinct brighter trait. Some have proposed the Dark Triad as a spectrum (Bonfá-Araujo et al., 2021).

Issues arose in the lack of published norms (Kline, 1986). Cultural norms are important to establish, given the significant body of research regarding SD3 translations. It appears that the SD3 may have fallen victim to a Westernised view of

personality, and without standardised cultural norms it is difficult to assess the applicability of Dark Triad traits in non-Western countries.

Although research regarding norms and predictive validity would be beneficial, it is recommended that rather than continuing to assess the SD3's psychometric properties and creating language translations, future research should focus on the development of a new Dark Triad psychometric, addressing the aforementioned psychometric shortcomings. Moreover, research is required on the newly developed SD4 (Dark Tetrad, including sadism; Paulhus et al., 2021); as yet it is unclear as to whether the SD4 accounts for the SD3's limitations.

In summary, the SD3's merits are potentially outweighed by the validity limitations presented in this chapter. For use within research and clinical/forensic contexts, and examining the personality traits of COVID-19 rule-breakers, the SD3 likely does not provide an accurate, theoretical reflection of the Dark Triad traits, even as a brief screening measure. It is recommended that significant caution is taken by researchers and practitioners should the SD3 be used, while clinical judgement and further psychometric testing is certainly required in the interpretation and differentiation of each trait, in line with medical models of personality. Moreover, narcissism would benefit from examination singularly, given the view that it is a *brighter* distinct trait compared to Machiavellianism and psychopathy. Subject to psychometric critique themselves, alternative tools likely provide a more thorough and accurate examination of each trait than the SD3, for example, the original tools used to assess the three traits: the SRP-III (Williams et al., 2003), the MACH-IV (Christie & Geis, 1970) and the NPI (Raskin & Hall, 1979) or NPI-40 (Raskin & Terry, 1988).

CHAPTER 5

DISCUSSION

Aims

The overarching aim of the thesis was to increase understanding of the personality traits associated with COVID-19 rule-breaking. To achieve this, the specific aims were: 1) to investigate available literature on the topic of the relationship between personality traits and COVID-19 rule-breaking thus far; 2) to further investigate the personality traits of COVID-19 rule-breakers in the UK; and 3) to examine the psychometric properties of a tool used to examine the personality traits of COVID-19 rule-breakers. To accomplish these objectives, three pieces of work were carried out, with the predominant findings outlined below. Chapter 5 concludes with discussion regarding the thesis' strengths and limitations, the practice implications, and a number of recommendations for further research.

Summary of Findings

Chapter 2: Systematic Literature Review

In Chapter 2, the SLR examined and synthesised available literature assessing the direct relationship between personality traits and COVID-19 rule-breaking in Western countries. Following application of the inclusion/exclusion criteria and quality assessment, 11 studies were included in the final review (Biondi et al., 2021; Bogg & Milad, 2020; Čavojová et al., 2022; Kleitman et al., 2021; Milad & Bogg, 2021; Muccia et al., 2022; Smrdu et al., 2021; Turk et al., 2021; Wallace et al., 2021; Wright et al., 2021; Zajenkowski et al., 2020). The findings were synthesised, interpreted and presented, in table format and narrative summary. Results demonstrated that all studies had a majority female sample and were most commonly conducted in the US.

Collectively, the studies agree that higher levels of agreeableness related to COVID-19 rule-compliance (as suggested by 9/10 studies examining this trait). From a theoretical perspective, this is likely due to the trait's inherent characteristics of putting other people's needs before their own (Lee & Ashton, 2018). The personality traits of honest-humility, negative affect, detachment, antagonism, disinhibition and psychoticism were only examined within two studies, the former trait examined by Muccia (2022), and the latter five by Biondi et al. (2021). This made comparison across studies difficult, although in line with the theoretical basis, it seems that higher honest-humility related to COVID-19 rule-compliance, while higher negative affect, detachment and psychoticism related to COVID-19 rule-breaking (Biondi et al., 2021; Muccia et al., 2022). The review found that, more often than not, the studies related higher conscientiousness and openness to COVID-19 rule-compliance, although non-significant relationships were found among some of the included studies, as such, concrete conclusions cannot be drawn. A tenuous relationship is evident for extraversion, neuroticism, emotional stability, and intellect with conflicting results found among studies, creating difficulties in establishing whether there is a relationship as well as the relationship's direction. The review highlights discrepancies among the studies, for example, extraversion was found, in some studies, to be related to COVID-19 rule-breaking (Bogg & Milad, 2021; Čavojová et al., 2022; Wright et al., 2021), while others found it related to rule-compliance (Turk et al., 2021; Smrdu et al., 2021). Moreover, it was found that the traits of antagonism and disinhibition were less likely related to COVID-19 rule-breaking (Biondi et al., 2021).

Despite conflicting results regarding some personality traits, all included studies agree that personality traits impact on COVID-19 behaviour, even if the relationship is

not as straightforward as hypothesised. The SLR plays a valuable role in understanding current research findings. In considering the implications, the review highlights a need for personality traits to be considered in how guidance related to the COVID-19 pandemic laws were communicated, and will be particularly relevant in the context of another pandemic. For example, health messages tailored to personality traits are currently a popular line of research (Blais et al., 2021; Freimuth & Quinn, 2004; Hirsh et al., 2012). This can potentially be a way of reducing rule-breaking behaviour within future pandemics.

Chapter 3: Empirical Research Study

Chapter 3 was an empirical study that examined the personality traits of COVID-19 rule-breakers in the UK. The study was informed by a recommendation made in Chapter 2 that highlighted the need for further research examining the personality traits of COVID-19 rule-breakers using validated psychometric measures, which are based on medical model theories of personality. The study used psychometrics based on two different personality models, i.e., the HEXACO and ICD-10 (the HEXACO-PI-R-100 and the IPDE-SQ) to understand if these traits related to COVID-19 rule-compliance/rule-breaking (Lee & Ashton, 2018; Loranger et al., 1997). Six types of COVID-19 rule-breaking were examined (hygiene, travel, social-distancing/social-activity, isolation, total rule-breaking (all scores added together) and a self-reported rule-breaking score). The quantitative research employed a cross-sectional design and data from 469 participants were examined. Regression analyses found that all personality traits and rule-breaking models were significant, and the traits overall could, when entered into the model together, predict a significant amount of variation in

explaining COVID-19 rule-breaking behaviour. Of the HEXACO traits, honest-humility was most consistently significant across the rule-breaking types, while conscientiousness, agreeableness, openness to experience and extraversion showed some relationship for specific rule-breaking types. However, emotionality was found to be unrelated to COVID-19 rule-breaking. For the IPDE-SQ, histrionic and impulsive traits were the best predictors of rule-breaking, while the traits of paranoid, schizoid, dissocial, borderline, anankastic, anxious and dependent did not significantly predict COVID-19 rule-breaking. Notably, some discrepancies from the SLR results are evident, for example agreeableness was not a significant negative predictor of all types of rule-breaking (only travel rule-breaking), which is unexpected, although partially consistent with two studies discussed in Chapter 2 (Muccia et al., 2021; Wright et al., 2021).

The key findings of the study were that personality traits were significantly related (as a whole) to COVID-19 rule-breaking/rule-compliance, and some traits were significantly able to predict differences in rule-breaking behaviour. The traits related to COVID-19 rule-breaking were: lower honest-humility, lower conscientiousness, lower openness to experience, lower agreeableness, higher impulsiveness, higher histrionic, and higher extraversion traits. A novel finding in the study related to the psychometric properties of the IPDE-SQ in a community/student sample, which did not demonstrate good internal consistency for all the personality traits (Loranger et al., 1997).

Although personality traits played a convincing role in whether an individual broke COVID-19 rules, other factors likely mediated/moderated the relationship with COVID-19 rule-breaking. Current research has started to examine

mediating/moderating/covariate factors, such as trust in the government (Schmeisser et al., 2021).

Similarities are evident between the personality traits of COVID-19 rule-breakers and those associated with low-level criminals, such as extraversion, impulsivity and lower conscientiousness (Eysenck & Eysenck, 1970; Gleason et al., 2004). It is of note that dissocial traits did not relate to COVID-19 rule-breaking, as traditionally, antisocial (the same as dissocial) traits are commonly found among those who commit low-level criminal behaviour (Lau, 2013; Miguel et al., 2021; WHO, 2016). Given the complexity of issues around whether or not someone complied with COVID-19 laws, some differences in traits compared to those who commit other low-level crimes are expected.

It is recommended that personality traits should be used to inform target compliance levels among the population (e.g., through government messaging). This is particularly important in considering a future pandemic, and given that the UK had one of the highest death rates in Europe, any contribution to increase compliance will be beneficial (WHO, 2023b).

Chapter 4: Critique of a Psychometric Measure

This chapter examined the Short Dark Triad (SD3), which measures the personality traits Machiavellianism, psychopathy and narcissism in tandem (Jones & Paulhus, 2013). The measure was selected for review due to its wide use in assessing the *dark* personality traits of COVID-19 rule-breakers. The popularity of using the SD3 for this line of research related to the COVID-19 pandemic is understandable, given the links between the three traits and low-level crime in general, and because it provides a

quick way to examine three conceptually unique, yet commonly dark, traits (Konc et al., 2021; Nowak et al., 2020).

Collectively, research has reported good internal consistency and relatively good test re-test reliability (Gamache et al., 2018; Malesza et al., 2017; Salessi & Omar, 2018). However, significant limitations are noted in considering validity, with issues regarding content validity and the initial Dark Triad model proposed by Jones and Paulhus (2013). Both research across Western and non-Western cultures supported different models to the originally proposed three-factor model (e.g., Rogoza & Cieciuch, 2017; Zhang et al., 2019). Moreover, research has been inconsistent, with studies providing support for differing models, including a bi-factor model (comprising psychopathy and Machiavellianism as a single factor), a model with one general factor, and a model with one large factor whereby the traits are likely on a spectrum (e.g., Bonfá-Araujo et al., 2021; Pechorro et al., 2019). Research has suggested that narcissism likely presents differently to psychopathy and Machiavellianism, and tends to hold *brighter* characteristics (Szabó et al., 2021).

Limitations of the SD3 are the lack of appropriate norms, and concerns about the norms presented on two websites (OpenPsychometrics, 2021; PsyToolKit, 2021). The review concludes that although the SD3 has some merits, these are outweighed by issues of validity and theoretical limitations. Concerns are raised about the efficacy of using this tool for COVID-19 research, and caution ought to be taken in interpreting such findings.

Strengths and Limitations of the Thesis

A strength of the thesis lies in its contribution to the field of personality traits and COVID-19 rule-breaking by casting light on the key research findings and examining the traits of COVID-19 rule-breakers. Moreover, novel findings within the thesis are noted, including that higher levels of histrionic traits relate to COVID-19 rule-breaking. The conclusions of the thesis are tentative, and it is important to consider the strengths and limitations of each chapter.

In considering the specific strengths of the SLR, first this relates to the originality of the research. To the knowledge of the author, this is the first piece of research to have collated and narratively synthesised studies examining personality traits and COVID-19 rule-breaking behaviour. A second strength relates to the appreciation that countries across the world implemented differing levels of rules/guidance, hence it was prudent to only compare studies in Western countries that employed similar sanctions.

Taking forward the recommendations from the SLR, a strength of the empirical study is its originality in the exploration of personality traits as measured by validated psychometrics, one of which was based on medical model theory. Secondly, the study examined specific types of rule-breaking using a relatively large sample size, ensuring the study has adequate power.

Regarding limitations of the empirical study, one relates to the self-reported nature of the data, in that participants may have provided socially desirable answers. Nevertheless, the anonymity and reassurance offered, that there would be no implications to admitting to having broken the law, likely allays this potential issue. A second limitation relates to the majority female sample. Indeed, women tend to present

higher in some traits naturally (e.g., agreeableness), which potentially limits generalisability of the results to the male population (Weisberg et al., 2011). A final limitation relates to the relatively low internal consistency of the paranoid, schizoid and histrionic IPDE-SQ subscales, as reflected in Slade and Forrester's (2013) prison study (Loranger et al., 1997). Nevertheless, this result is novel, given the study is the first (to the knowledge of the author) to examine the internal consistency of the IPDE-SQ alone in a community/student sample, rather than the entire IPDE process, adding a significant finding to the literature base. Given the internal consistency results, conclusions regarding the paranoid, schizoid and histrionic traits are tentative. Moreover, as the whole IPDE tool is generally used to assess criteria for personality disorder, it may be that the SQ alone is not sensitive enough to assess traits as opposed to a disorder, although no research has indicated this.

Limitations regarding the thesis as a whole are worth noting. First, personality traits are considered to be developing until the age of 25 years (Van Dijk et al., 2020). Indeed, both the SLR and empirical research project included participants under this age, whereby the persistence of these traits is questionable (Van Dijk et al., 2020). For the SLR, it would have been impractical/impossible to stratify studies to only include those over 25 years. Moreover, the mean age for the empirical research sample was over 25 years, suggesting the study likely embraced a wide age range to ensure personality traits were accurately captured. A second overall limitation relates to the thesis' applicability to current psychological trends. With the introduction of the ICD-11, there has been a move away from naming and diagnosing certain personality traits/disorders, resulting in formulation-led approaches (WHO, 2019). Although the thesis is not concordant with these practice views of personality, it highlights the benefits of using

both medicalised (e.g., ICD-10; WHO, 1993) and non-medicalised (e.g., Big Five; Goldberg, 1990; HEXACO; Ashton & Lee, 2007) personality trait terms within research, in particular for trait conceptualisation and comparison to previous research within the empirical study and SLR.

Practical Implications

Based on the findings of this thesis, it is important to consider implications for practice. Notably, this thesis is an early step in understanding the relationship between personality traits and COVID-19 rule-breaking, while the issue of COVID-19 is complex, with no single predictive factor. Therefore, it is recognised that more specific implications for practice can be made once further research is conducted. However, some implications are provided based on the findings of this thesis:

- There are implications for professionals (in practice and research), who currently use the SD3 (Jones & Paulhus, 2013). All professionals using this tool ought to be cautious about the validity and poor replication of the three-factor model. Moreover, it is essential to acknowledge that research suggests the Machiavellianism and psychopathy items may well be measuring similar/overlapping constructs. It is recommended to consider using a more robust measure, or the three original tools individually measuring these traits, for example, the SRP-III (Williams et al., 2003), the MACH-IV (Christie & Geis, 1970), and the Narcissistic Personality Inventory-40 (NPI-40; Raskin & Terry, 1988).
- Government and civil service/policy officials would benefit from training/guidance regarding how personality traits impact COVID-19 rule-

compliance/rule-breaking. This would increase consideration and knowledge of traits beneficial to account for in regard to pandemic-related communication, laws and guidance.

- Although some similarities between personality traits relating to COVID-19 rule-breaking and low-level crime were identified, it is worth considering these as separate types of crimes. Not all traits, such as dissocial, were related to COVID-19 rule-breaking, as they have been to low-level crime. Factors surrounding whether or not someone broke COVID-19 rules may not be present in other types of low-level crime (e.g., individuals breaking rules for altruistic reasons); as such, it is perhaps inappropriate to consider COVID-19 rule-breaking as being in the same category of criminal behaviour.
- The thesis results suggest that public health messages targeted to match a recipient's individual personality style may be an important method/tool to encourage compliance (Blais et al., 2021). One essential component of the response to the COVID-19 pandemic, and relevant to potential future pandemics, were public messages from a variety of sources such as the media and government (Blais et al., 2021). Given the confirmed role of personality traits in guiding COVID-19 behaviour, there are valid reasons to expect personality traits will also affect an individual's receptiveness to health messages (Blais et al., 2021). While a relatively new topic, research has examined the types of appeals/messages that could be used to encourage greater compliance within a pandemic context (Blais et al., 2021; De Vries et al., 2017; Freimuth & Quinn, 2004; Hirsh et al., 2012,). Indeed, research suggests that messages tailored to specific personality traits can amplify the effect of such

communications, with different appeals better suited to individual personality traits (Blais et al., 2021). This is particularly important given that, in the UK (and other Western countries), common themes among media/government communications focused on the disease trajectory, death and infection rates and group persuasion to “stay at home, protect the NHS, save lives” (Department of Health and Social Care, 2021; Figure 1). Such information was broadcast to the entire population and did not engage in “narrowcasting” (i.e., more tailored messaging; Blais et al., 2021, p. 8). Blais et al. (2021) considered that while this may have worked historically, as science and public health have become more politicised, group persuasion techniques may no longer produce the anticipated outcome. Indeed, Blais et al. (2021) found when those higher in emotionality traits were “confronted” (p. 11) with media/government communication about the severity of infections, this resulted in higher COVID-19 rule-compliance, while for those higher in Machiavellianism, such public health messages tended to increase rule-breaking. With this information and the findings of this thesis in mind, it seems clear that it would be beneficial for public health officials and policymakers to have an awareness of the personality trait and COVID-19 relationship, and to consider message tailoring in relation to pandemic compliance.

Future Research Directions

This thesis suggests that personality traits impact COVID-19 rule-breaking/rule-compliance. This raises the question (as raised by Blais et al. (2021) once before), that as compliance is rooted in relatively stable personality traits, how much change can be

expected from individuals, particularly in the case of another pandemic? *What works* research is required to understand this further, with a particular focus on what may increase compliance of individuals with high histrionic, high impulsivity, high extraversion, low conscientiousness, low honest-humility, low openness to experience and low agreeableness traits. This is particularly relevant when considering a preventative rather than interventionist approach. Clearly, *what works* research needs to be conducted to understand whether behavioural change/adaptation is possible for those with certain personality styles.

Although the thesis confirms personality traits influenced COVID-19 behaviour, it would be beneficial for research to continue to focus on identifying moderating/mediating factors, as personality traits did not explain the entire variation in the relationship. This would create a wider picture of the causes of COVID-19 rule-breaking, and in doing so, further the understanding of factors that need to be targeted to reduce/prevent such behaviour. Given several mediators/moderators have already been identified within research (such as trust in government, locus of control, age, gender), it would be beneficial for an SLR to be conducted on this topic. In addition, the field may benefit from qualitative research to explore the potentially complex rationales/reasons individuals had for rule-breaking during the pandemic to highlight factors which may need considering for future pandemics.

It is recommended future research focuses on understanding how personality traits can be incorporated into public health messages/guidance/policies in order to reduce pandemic-related offending. Understanding and trialling this could result in increased compliance in the case of a future pandemic, ultimately reducing pressure on health care systems, with the potential of also reducing the number of fatalities. Future

research should focus on how traits (such as higher histrionic) might be targeted to increase compliance. Research has recently started to focus on how certain demographics could be targeted to increase compliance. For example, Utych and Fowler (2020) found that providing information on COVID-19 threats to older individuals had little to no impact on compliance. A similar research approach could be taken regarding personality traits.

Finally, it is recommended that future research focuses on evaluating the SD4 (Paulhus et al., 2021). Several studies are available that have considered the SD4's psychometric properties, and a review of the current research base would be beneficial. Although relatively few studies have used the SD4 to examine the traits of COVID-19 rule-breakers (compared to the SD3), hence the choice for this thesis to examine the SD3, it would be beneficial to understand whether the SD4 has improved psychometric qualities.

Conclusion

The COVID-19 pandemic impacted the entire world population and had devastating consequences, including the death of at least 6.9 million people, as well as short/long-term consequences for the economy and health systems (WHO, 2023b). Individuals not abiding by the COVID-19 laws/rules/guidance set out by individual countries/states likely increased these consequences by putting their own and others' lives at risk. The present thesis highlights that individual differences in personality traits influenced COVID-19 behaviour. The thesis contributes to understanding the personality traits that relate to COVID-19 rule-compliance/rule-breaking, through exploration of existing research and novel research. The results indicate that

understanding of personality traits should be incorporated into rule-compliance strategies. This is essential given the 3-7% annual probability of a pandemic occurrence, which has the potential to result in similar (or even greater) health, social and economic consequences as the COVID-19 pandemic (Connolly, as cited in Regan, 2021).

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APPENDICES

Appendix A

Search Terms and Database Hits, Syntax and Subject Heading Searches

Database	Search completed	Date	Hits
Web of Science: Core Collection	1. coronav* OR "covid 19" OR covid?19 OR covid* OR "sars cov*" OR sars?cov?2 OR "severe acute respiratory syndrome" 2. personalit* OR "personality trait*" OR "personality characteristic*" 3. "rule break*" OR "break rule*" OR "government guid*" OR "coronavirus law*" OR "coronavirus rule*" OR "covid law*" OR "covid rule*" OR law* OR rule* OR offen* OR "lockdown rule*" OR "transmission mitigation behav* guidelines" OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3	04/02/2023	157 hits (abstract only)
Proquest: Social Sciences Premium Collection. Includes eight databases within the premium collection: Criminological Collection Educational Collection International Bibliography of the Social Sciences Library and Information Science Collection Linguistics Collection Politics Collection Social Science Database Sociological Collection	1. coronav* OR "covid 19" OR covid?19 OR covid* OR "sars cov*" OR sars?cov?2 OR "severe acute respiratory syndrome" 2. personalit* OR "personality trait*" OR "personality characteristic*" 3. "rule break*" OR "break rule*" OR "government guid*" OR "coronavirus law*" OR "coronavirus rule*" OR "covid law*" OR "covid rule*" OR law* OR rule* OR offen* OR "lockdown rule*" OR "transmission mitigation behav* guidelines" OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3	04/02/2023	50 hits (abstract only)

Ovid: APA PsychInfo	1. coronav* OR covid 19 OR covid?19 OR covid* OR sars cov* OR sars?cov?2 OR severe acute respiratory syndrome 2. personalit* OR personality trait* OR personality characteristic* 3. rule break* OR break rule* OR government guid* OR coronavirus law* OR coronavirus rule* OR covid law* OR covid rule* OR law* OR rule* OR offen* OR lockdown rule* OR transmission mitigation behav* guidelines OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3	04/02/2023	103 hits on (abstract only)
Ovid: Embase	1. coronav* OR "covid 19" OR covid?19 OR covid* OR "sars cov*" OR sars?cov?2 OR "severe acute respiratory syndrome" 2. personalit* OR "personality trait*" OR "personality characteristic" 3. "rule break*" OR "break rule*" OR "government guid*" OR "coronavirus law*" OR "coronavirus rule*" OR "covid law*" OR "covid rule*" OR law* OR rule* OR offen* OR "lockdown rule*" OR "transmission mitigation behav* guidelines" OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3	04/02/2023	119 hits (abstract only)
Scopus	1. coronav* OR "covid 19" OR covid?19 OR covid* OR "sars cov*" OR sars?cov?2 OR "severe acute respiratory syndrome" 2. personalit* OR "personality trait*" OR "personality characteristic" 3. "rule break*" OR "break rule*" OR "government guid*" OR "coronavirus law*" OR "coronavirus rule*" OR "covid law*" OR "covid rule*" OR law* OR rule* OR offen* OR "lockdown rule*" OR "transmission mitigation behav* guidelines" OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3	04/02/2023	168 hits (abstract only)
EBSCO Host: CINAHL Plus	1. coronav* OR "covid 19" OR covid?19 OR covid* OR "sars cov*" OR sars?cov?2 OR "severe acute respiratory syndrome" 2. personalit* OR "personality trait*" OR "personality characteristic"	04/02/2023	19 hits (abstract and find all search terms)

3. "rule break*" OR "break rule*" OR "government guid*" OR "coronavirus law*" OR "coronavirus rule*" OR "covid law*" OR "covid rule*" OR law* OR rule* OR offen* OR "lockdown rule*" OR "transmission mitigation behav* guidelines" OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3				
EBSCO Host: Medline	1. coronav* OR "covid 19" OR covid?19 OR covid* OR "sars cov*" OR sars?cov?2 OR "severe acute respiratory syndrome" 2. personalit* OR "personality trait*" OR "personality characteristic*"	04/02/2023	116 hits	(abstract and find all search terms)
	3. "rule break*" OR "break rule*" OR "government guid*" OR "coronavirus law*" OR "coronavirus rule*" OR "covid law*" OR "covid rule*" OR law* OR rule* OR offen* OR "lockdown rule*" OR "transmission mitigation behav* guidelines" OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3			
PubMed	1. coronav* OR "covid 19" OR covid?19 OR covid* OR "sars cov*" OR sars?cov?2 OR "severe acute respiratory syndrome" 2. personalit* OR "personality trait*" OR "personality characteristic*"	04/02/2023	128 hits	(abstract/ title)
	3. "rule break*" OR "break rule*" OR "government guid*" OR "coronavirus law*" OR "coronavirus rule*" OR "covid law*" OR "covid rule*" OR law* OR rule* OR offen* OR "lockdown rule*" OR "transmission mitigation behav* guidelines" OR fine* OR adher* OR comply OR complian* OR complies 4. 1 AND 2 AND 3			

Database	Subject heading search:	Date:	Hits
Ovid: APA PsychInfo	1. Exp coronavirus 1. Exp personality 2. Exp compliance	04/02/2023	55
Ovid: EMBASE	1. Exp coronavirus 2. Exp personality 3. Exp compliance	04/02/2023	1
Ovid: Medline ®	1. Exp coronavirus 2. Exp personality 3. Exp guideline adherence (0 results with compliance)	04/02/2023	13

Appendix B

SPIDER Exclusion/Inclusion Criteria Application (After Initial Sifting)

Author and Date	Title	Reason for Exclusion	How the Study was Sourced
Abdelrahman (2020)	Personality traits, risk perception, and protective behaviours of Arab residents of Qatar during the COVID-19 pandemic.	Did not fit inclusion criteria for “Sample”. The participants were a non-Western sample.	Reference list of final articles.
Ahmadi et al. (2022)	Social determinants of adherence to COVID-19 preventative guidelines in Iran: A qualitative study.	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=15$ health professionals in Iran, a non-Western country. It would also not fit Inclusion criteria for “Design” given the qualitative approach.	Search-term database searches.
Ahn & Campbell, (2022)	Who loves lockdowns? Public service, motivation, bureaucratic personality and support for COVID-19 containment policy.	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=568$ South Korean citizens. The study would have also not met criteria for “Evaluation” given the use of moderation analysis (i.e., indirect relationship).	Search-term database searches.
Aschwanden et al. (2020)	Psychological and behavioural responses to Coronavirus disease 2019: The role of personality.	Did not meet criteria for “Evaluation” given the focus of the study on age as a moderator between personality trait and COVID-19 response.	Reference list of final articles.
Asslemann et al. (2020)	The role of personality in the thoughts, feelings, and behaviours of students in Germany during the first weeks of the COVID-19 pandemic.	Did not fit inclusion criteria for “Sample”. The participant ages ranged from 15 to 34 years, so the sample included those under 18 years.	Search-term database searches.
Bacon et al. (2021)	Emotional and behavioural responses to COVID-19: Explanations from three key models of personality.	Did not fit inclusion criteria for “Design” as no personality psychometric was used, and the paper was a research review.	Search-term database searches.

Blagov (2020)	Adaptive and dark personality in the COVID-19 pandemic: Predicting health-behavior endorsement and the appeal of public-health messages.	Did not fit inclusion criteria “Phenomenon of Interest”. The study examined predictive endorsement of rules, adaptive coping responses and intent (as opposed to rule-breaking/rule-compliance).	Reference list of final articles.
Blanchard et al. (2023)	COVID-19 prevention behaviour is differentially motivated by primary psychopathy, grandiose narcissism and vulnerable Dark Triad traits.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study focused on the Dark Triad traits only.	Search-term database searches.
Branovački et al. (2020)	A person-centered approach in studying coronavirus pandemic response: The role of HEXACO-PI-R and PANAS dimensions.	Did not fit inclusion criteria for “Sample”. The study used $N=471$ Serbian citizens i.e., non-Western country as not in the EU, or in line with economic definition used.	Search-term database searches.
Carvalho & Machado (2020a)	Differences in adherence to COVID-19 pandemic containment measures: psychopathy traits, empathy, and sex (A Letter to the Editors).	Did not fit inclusion criteria for “Sample”. The study used $N=893$ participants from a Brazilian population, a non-Western country.	Search-term database searches.
Carvalho et al. (2020b)	Personality differences and COVID-19: Are extroversion and conscientiousness personality traits associated with engagement with containment measures?	Did not fit inclusion criteria for “Sample”. The study used $N=715$ Brazilian adults, a non-Western country.	Search-term database searches.
Carvalho et al. (2021)	Preliminary findings on the associations between personality traits and engagement behaviour to the COVID-19 containment measures.	Did not fit inclusion criteria for “Sample”. The study used $N=814$ Brazilian adults, a non-Western country.	Search-term database searches.
Čavojová, Adamus, & Mikušková (2022)	You before me: How vertical collectivism and feelings of threat predicted more socially desirable behaviour during COVID-19 pandemic.	Did not meet criteria for “Phenomenon of Interest”. Study examined personality traits that related to collectivism and individualistic styles, rather than how personality traits relate to COVID-19 rule-breaking.	Search-term database searches.
Chan et al. (2020)	Can psychological traits explain mobility behaviour during the COVID-19 Pandemic?	Did not fit inclusion criteria for “Sample”. The authors used mixed Western and non-Western data from 31 countries using Google Mobility Data.	Search-term database searches.

Choi et al. (2022)	Personality and compliance with COVID-19 protective measures among older Americans: Moderating effects of age, gender, and race/ethnicity.	Did not meet criteria for “Evaluation” given the focus on age, gender and race/ethnicity as moderators between the personality and COVID-19 rule-compliance relationship (i.e., not direct relationship).	Search-term database searches.
Chong et al. (2020)	The role of illness perceptions, coping and self-efficacy on adherence to precautionary measures for COVID-19.	Did not fit inclusion criteria for “Sample”. The participants were from Hong Kong i.e., a non-Western country.	Search-term database searches.
Clark et al. (2020)	Predictors of COVID-19 voluntary compliance behaviours: An international investigation.	Did not fit inclusion criteria for “Sample”. The study used a large international sample (N=8317) from 70 countries, including non-Western.	Search-term database searches.
Coroiu et al. (2020)	Barriers and facilitators of adherence to social-distancing recommendations during COVID-19 among a large international sample of adults.	Did not fit inclusion criteria for “Design”. The study did not use a personality trait psychometric.	Search-term database searches.
DeGrace et al. (2021)	Sex differences in maladaptive emotional and behavioural responses to COVID-19: What is the role of personality?	Did not fit inclusion criteria for “Design”. Although claiming to examine the role of personality, the study did not use a specific personality trait psychometric, and instead opted to use the Substance Use Risk Profile Scale to investigate four personality traits.	Search-term database searches.
Dinić & Bodroza (2021)	COVID-19 protective behaviors are forms of prosocial and unselfish behaviours.	Did not fit inclusion criteria for “Sample”. The study used N=581 participants from Serbia, a non-Western country according to the economic definition.	Search-term database searches.
Doerfler et al. (2021)	The Dark Triad of psychopathy and message framing predict risky decision-making during the COVID-19 pandemic.	Did not fit inclusion criteria for “Design”. The authors focused on the Dark Triad, a specific strain of personality traits.	Search-term database searches.
Eichenberg et al. (2021)	The relationship between the implementation of statutory preventative measures, perceived susceptibility of COVID-19 and personality traits in the initial stages of corona-related lockdown: A	Did not fit inclusion criteria for “Design”. Although the study claimed to examine personality traits, the research did not use a specific personality trait questionnaire, instead opting to examine psychosocial wellbeing e.g., Positive and Negative Affect Schedule, Stress Coping	Search-term database searches.

	German and Austrian population online survey.	Style Questionnaire, Uncertainty Intolerance Scale and State Trait Anxiety Inventory (i.e., no explicit personality trait measure).	
Eid et al. (2022)	Personality traits, perceived stress and perception of COVID-19 among Arab population: A cross-sectional survey.	Did not fit inclusion criteria for “Sample”. The study used <i>N</i> =948 participants from different Arabic nationalities (Arabic native language) i.e., non-Western.	Search-term database searches.
Eslamzadeh et al. (2022)	The role of personality traits in following quarantine orders during the COVID-19 pandemic.	Did not fit inclusion criteria for “Sample”. The study used <i>N</i> =142 Iranian outpatients i.e., non-Western country as not in the EU, or in line with economic definition used.	Search-term database searches.
Espinosa & Clemente (2021)	Beyond the pale: Dark traits and close relations influence attitudes towards COVID-19 and rejection of quarantine rules.	Did not fit inclusion criteria for “Design”. The study focused on <i>dark</i> traits using the Short Dark Triad and Brief Sensation Seeking Scale, i.e., a specific type/strain of personality traits.	Search-term database searches.
Feng et al. (2022)	Cultural antecedents of virus transmission: Individualism is associated with lower compliance with social-distancing rules during the COVID-19 pandemic.	Did not meet criteria for “Phenomenon of Interest”, as irrelevant to research question as does not directly look at personality traits.	Search-term database searches.
Fink et al. (2021)	COVID-19 fear affects current safety behaviour mediated by neuroticism – Results of a large cross-sectional study in Germany.	Did not fit inclusion criteria for “Evaluation”. Although correlation and regression analyses were initially used, the study included ‘neuroticism’/personality traits as the mediators between fear of COVID-19 and antisocial behaviour i.e., did not examine the direct relationship.	Search-term database searches.
Flesia et al. (2020)	Predicting perceived stress related to the COVID-19 outbreak through stable psychological traits and machine learning models.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study examined perceived stress during the pandemic.	Reference list of final articles.
Garbe et al. (2020)	Influence of perceived threat of COVID-19 and HEXACO personality traits on toilet paper stockpiling.	Did not fit inclusion criteria for “Sample”. Included participants from non-Western countries.	Reference list of final articles.

Giancola (2022)	Who complies with prevention guidelines during the fourth wave of COVID-19 in Italy? An empirical study.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study examined only the Dark Triad personality traits (using the Dirty Dozen). Would also not meet criteria for “Evaluation” given the focus on the Dark Triad moderating the positive association between fear of COVID-19 and COVID-19 rule-compliance.	Search-term database searches.
Gogola et al. (2021)	The Dark Triad of personality’s relationship with compliance towards COVID-19 pandemic recommendations along with anxiety and depressive symptoms in Polish citizens.	Did not fit inclusion criteria for “Design”. The study focussed on one specific type/strain of personality traits, the Dark Triad.	Search-term database searches.
Gojković et al. (2021)	The first wave of the COVID-19 pandemic: HEXACO profiles affect coping mechanisms and adaptability of response.	Did not meet criteria for “Phenomenon of Interest”, given the study examined coping, rather than rule-breaking behaviour.	Reference list of final articles.
Grežo & Adamus (2022)	Light and dark core of personality and the adherence to COVID-19 containment measures: The roles of motivation and trust in government.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study examined only the Dark Triad personality traits. Also did not meet criteria for “Evaluation” given focus on mediation.	Search-term database searches.
Han (2021)	Exploring the association between compliance with measures to prevent the spread of COVID-19 and big five traits with Bayesian generalised linear model.	Did not fit inclusion criteria for “Sample”. The study used data from $N=173,425$ (part of the COVIDiSTRESS Global survey dataset) from 170 countries; final analyses only included $N=61,889$ participants from 19 countries, but these included non-Western.	Search-term database searches.
Hartmann & Müller (2022)	Acceptance and adherence to COVID-19 preventive measures are shaped predominantly by conspiracy beliefs, mistrust in science and fear - A comparison of more than 20 psychological variables.	Did not meet criteria for “Evaluation” given personality traits were mediators to build a model of which variables (e.g., COVID-19 conspiracy) were influenced by personality traits in relation to adherence of the COVID-19 rules.	Search-term database searches.

Joaquim et al. (2022)	Emotional stability and anxiety symptoms differentiates people leaving the home usually during the COVID-19 pandemic.	Did not fit inclusion criteria for “Sample”. The study used $N=2709$ Brazilian participants i.e. non-Western country as not in the EU, or in line with economic definition used.	Search-term database searches.
Józefacka et al. (2022)	Masquerade of Polish society – psychological determinants of COVID-19 precautionary behaviours.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study focussed on the Dark Triad traits only.	Search-term database searches.
Kaspar & Nordmeyer (2022)	Personality and motivation to comply with COVID-19 protective measures in Germany.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study examined personality and motivation rather than actual compliance/rule-breaking behaviour. The authors acknowledge this is a limitation (i.e., motivation to follow COVID-19 measures rather than actual behaviour performed).	Search-term database searches.
Khosravi (2020)	Neuroticism as a marker of vulnerability to COVID-19 infection.	Did not fit inclusion criteria for “Design”. The study did not use a specific personality trait measure.	Reference list of final articles.
Khosravi et al. (2022)	Prevalence and associated factors of personal protective measures among the South-eastern Iranian population during the COVID Pandemic	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=351$ Iranian citizens.	Search-term database searches.
Kohút et al. (2021)	Big Five predictors of pandemic-related behaviour and emotions in the first and second COVID-19 pandemic wave in Slovakia.	Did not meet criteria for “Phenomenon of Interest”. The study focussed on differences between personality traits and their impact between the first and second waves of the pandemic i.e., difference over time, rather than aiming to examine the personality traits of COVID-19 rule-breaking. E.g., the authors found the effects of personality traits were diminished lower in the second wave than the first wave.	Reference list of final articles.

Konc et al. (2022)	Dark Tetrad and COVID-19 protective measures: Mediating effects of risk-taking tendencies.	Did not fit inclusion criteria for “Sample”. The study used $N=348$ Serbian citizens i.e., non-Western country as not in the EU, or in line with economic definition used. Would also not have met criteria for “Phenomenon of Interest” given the study only used the Dark Tetrad.	Search-term database searches.
Kroencke et al. (2020)	Neuroticism and emotional risk during the COVID-19 pandemic.	Did not fit inclusion criteria for “Phenomenon of Interest”. The paper only examined neuroticism, not a range of personality traits.	Reference list of final articles.
Krupić et al. (2021)	Big Five traits, approach-avoidance motivation, concerns and adherence with COVID-19 prevention guidelines during the peak of pandemic in Croatia.	Did not fit inclusion criteria for “Evaluation”. Although regression analyses were initially used, mediational analysis meant the study did not examine the direct relationship between personality traits and COVID-19 rule-breaking.	Search-term database searches.
Kušnírová & Kačmár (2022)	Individual differences in compliance with COVID-19 containment measures in V4 countries.	Did not meet criteria for “Evaluation” given the focus on trust and concerns as mediators in the personality trait – compliance relationship.	Search-term database searches.
Lachowicz-Tabaczek & Kozłowska (2021)	Being others-oriented during the pandemic: Individual differences in the sense of responsibility for collective health as a robust predictor of compliance with the COVID-19 containing measures.	Did not fit inclusion criteria for “Design”. The study used the Narcissistic Personality Inventory and Hypersensitive Narcissism Scale i.e., one specific personality trait.	Search-term database searches.
Lazarević et al. (2021)	What drives us to be (ir)responsible for our health during the COVID-19 pandemic? The role of personality, thinking styles, and conspiracy mentality	Did not fit inclusion criteria for “Sample”. The study used $N=417$ participants from Serbia, a non-Western country according to the definition used in this literature review. The study would also not have fit “Evaluation” as it did not examine the direct relationship, opting to use mediation analysis.	Search-term database searches.
Lebni et al. (2022)	Determinants of observing health protocols related to preventing COVID-19 in adult women: A qualitative study in Iran.	Did not fit inclusion criteria for “Sample”. The participants were based in Iran (non-Western country),	Search-term database searches.

Li (2023)	Follow or not follow?: The relationship between psychological entitlement and compliance with preventive measures to the COVID-19.	Did not fit inclusion criteria for “Sample”. The study used $N=155$ Chinese participants i.e., non-Western country as not in the EU, or in line with economic definition used.	Search-term database searches.
Lo Presti et al. (2021)	Psychological precursors of individual differences in COVID-19 lockdown adherence: Moderated-moderation by personality and moral cognition measures.	Did not fit inclusion criteria for “Evaluation”. Although simple regression analyses were initially used, the study did not examine the direct relationship between personality and COVID-19 rule-breaking behaviour, but focused on mediation/moderation.	Search-term database searches.
Lo Presti et al. (2022)	Risk perception and behaviour during the COVID-19 pandemic: Predicting variables of compliance with lockdown measures.	Did not fit inclusion criteria for “Design”. Authors claimed to examine personality, but actually examined temperament (Temperament and Character Inventory). Did not use a direct personality trait measure.	Search-term database searches.
Ludeke et al. (2021)	Personality in a pandemic: Social norms moderate associations between personality and social-distancing behaviours.	Did not meet inclusion criteria for “Sample”. The sample included non-Western countries e.g., Brazil. The study would also have not met criteria for “Evaluation” given the indirect relationship examined and use of moderation.	Reference list of final articles.
Maaravi et al. (2020)	Fighting coronavirus one personality at a time: Need for structure, trait victimhood and adherence to COVID-19 health guidelines.	Did not fit inclusion criteria for “Sample”. The study used $N=354$ Israeli citizens, a non-Western country.	Search-term database searches.
Martin (2020)	HEXACO traits, Big Five traits, and COVID-19.	Did not fit inclusion criteria for “Other”. The study was a pre-print and not peer reviewed.	Reference list of final articles.
Matthews et al. (2021)	Attitudes towards social-distancing in response to COVID-19.	Did not fit inclusion criteria for “Evaluation”. Although hierarchical linear regression was initially used, the main aim of the study was to explore the role of health beliefs as mediators between personality and attitude to the	Search-term database searches.

		pandemic i.e., the study did not examine the direct relationship.	
Miguel et al. (2020)	Compliance with containment measures to the COVID-19 pandemic over time: Do antisocial traits matter?	Did not fit inclusion criteria for “Sample”. The study used <i>N</i> =1578 Brazilian citizens, a non-Western country.	Search-term database searches.
Modersitzki et al. (2020)	Who is impacted? Personality predicts individual differences in psychological consequences of the COVID-19 pandemic in Germany.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study examined perceived restrictiveness and negative appraisal of the pandemic (opposed to rule-breaking/rule-compliance behaviour).	Reference list of final articles.
Moore et al. (2022)	Agreeableness and conscientiousness promote successful adaptation to the COVID-19 pandemic through effective internalization of public health guidelines.	Did not meet criteria for “Evaluation” given the focus on community values and autonomous motivation for social-distancing as mediators between agreeableness and conscientiousness and COVID-19 social-distancing.	Search-term database searches.
Muehlenbein et al. (2022)	Waco COVID Survey: A community-based SARS-CoV-2 serological surveillance study in Central Texas.	Did not fit inclusion criteria for “Design” as no personality psychometric was used (despite claims to examine personality in the abstract).	Search-term database searches.
Naeimijoo et al. (2022)	The role of bright and dark personality traits in self and other protective pandemic related preventive behaviours.	Did not fit inclusion criteria for “Sample”. The study used <i>N</i> =541 participants from Iran (i.e., non-Western country).	Search-term database searches.
Nikčević et al. (2021)	Modelling the contribution of the Big Five personality traits, health anxiety, and COVID-19 psychological distress to generalised anxiety and depressive symptoms during the COVID-19 pandemic.	Did not fit inclusion criteria for “Evaluation”. The study used mediation/moderation analysis.	Reference list of final articles.
Nivette et al. (2021)	Non-compliance with COVID-19-related public health measures among young adults in Switzerland: Insights from a longitudinal cohort study.	Did not meet criteria for “Phenomenon of Interest”, as did not specifically examine personality traits, therefore irrelevant to the research question. The study also would not have met criteria for “Sample” due to inclusion of adolescents <18 years.	Search-term database searches.

Nofal et al. (2020)	Who complies with COVID-19 transmission mitigation behavioural guidelines?	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=8548$ participants from Japan, a non-Western country.	Search-term database searches.
Nowak et al. (2020)	Adaptive and maladaptive behavior during the COVID-19 pandemic: The roles of Dark Triad traits, collective narcissism, and health beliefs.	Did not meet criteria for “Phenomenon of Interest”. The study focused on the Dark Triad traits and narcissism i.e., not a broad spectrum of personality traits, only one strain.	Reference list of final articles.
Oljača et al. (2020)	Unrealistic optimism and HEXACO traits as predictors of risk perception and compliance with COVID-19 preventative measures during the first wave of the pandemic.	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=423$ participants from Serbia, a non-Western country (according to the definition used).	Search-term database searches.
Otterbring & Festila (2022)	Pandemic prevention and personality psychology: Gender differences in preventive health behaviours during COVID-19 and the roles of agreeableness and conscientiousness.	Did not meet criteria for “Evaluation” given personality traits were mediators within the gender – compliance relationship. Also unclear if study would meet criteria for “Sample” given the authors provided no detail about which country participant data was collected from.	Search-term database searches.
Paiva et al. (2021)	Boldness personality traits are associated with reproduced risk perceptions and adoption of protective behaviours during the first COVID-19 outbreak.	Did not fit inclusion criteria for “Design”. The study used the Triarchic Psychopathy Measure to examine ‘boldness’ i.e., only examined one specific type of personality trait.	Search-term database searches.
Patitsa et al. (2022)	The influence of personality on compliance with COVID-19 public health protection measures: The role of prosocial behaviour.	Did not meet criteria for “Evaluation” given analysis included pro-sociality as a mediator between the Big Five and Health Protection Measures relationship.	Search-term database searches.
Pavlović et al. (2022)	Predicting attitudinal and behavioural responses to COVID-19 pandemic using machine learning.	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=51,404$ participants from 69 countries from all continents except Antarctica (i.e., not Western countries)	Search-term database searches.

Peters et al. (2022)	Regional personality differences predict variation in early COVID-19 infections and mobility patterns indicative of social-distancing.	Did not meet criteria for “Sample” due to inclusion of participants aged 15 years (not >18).	Search-term database searches.
Pianowski et al. (2022)	Cross-cultural investigation from nine countries on the associations of antisocial traits and the WHO's containment measures for the COVID-19 pandemic.	Did not fit inclusion criteria for “Sample”. The study used $N=4538$ adults from nine Western/Non-Western countries.	Search-term database searches.
Pilch et al. (2021)	The predictors of adaptive and maladaptive coping behaviour during the COVID-19 pandemic: The Protection Motivation Theory and the Big Five personality traits.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study examined coping behaviour as opposed to rule-breaking in relation to the Protection Motivation Theory and Big Five personality traits.	Search-term database searches.
Pollak et al. (2020)	Predictors of non-adherence to public health instructions during the COVID-19 pandemic (Letters to the editor).	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=849$ participants from Israel, a non-Western country.	Search-term database searches.
Prentice et al. (2020)	Personality, trait EI and coping with COVID-19 measures.	Did not fit inclusion criteria for “Sample”. Sample consisted of participants from non-Western countries.	Reference list of final articles
Rodriguez-Besteiro et al. (2021)	Gender differences in the COVID-19 pandemic risk perception, psychology, and behaviours of Spanish university students.	Did not fit inclusion criteria for “Sample”. The sample included participants under 18 years.	Reference list of final articles.
Rojek et al. (2022)	Self-Assessed Personality Traits and Adherence to the COVID-19 Lockdown.	Did not fit inclusion criteria for “Design”. The study did not use a standardised measure of personality and only asked the participants to rate themselves on their own beliefs of sociability, calmness, openness and optimism. Thereby the study does also not meet criteria for “Phenomenon of Interest” given the focus only on certain personality traits, not an entire spectrum.	Search-term database searches.

Rudert & Janke (2021)	Following the crowd in times of crisis: Descriptive norms predict physical distancing, stockpiling, and prosocial behaviour during the COVID-19 pandemic.	Did not fit inclusion criteria for “Sample”. The study included participants from 16 years.	Search-term database searches.
Rudloff et al. (2022)	Beliefs about the nature of knowledge shape responses to the pandemic: Epistemic beliefs, the Dark Factor of Personality, and COVID-19-related conspiracy ideation and behaviour.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study examined only Dark Factor of Personality (D16). The study would also not have met criteria for “Evaluation” given focus on mediators between dark personality factors and COVID-19 protective behaviour (e.g., faith in intuition for facts, need for evidence, truth is political).	Search-term database searches.
Schmeisser et al. (2021)	Who follows the rules during a crisis?— Personality traits and trust as predictors of compliance with containment recommendations during the COVID-19 pandemic.	Did not meet criteria for “Evaluation” given the focus on a moderator role of trust in authorities to explain the Big Five personality trait and COVID-19 compliance relationship (i.e., not direct relationship, although some direct relationship analyses were carried out).	Search-term database searches.
Schmiedeberg & Thönnissen (2021)	Positive and negative perceptions of the COVID-19 pandemic: Does personality play a role?	Did not fit inclusion criteria for “Sample”. The sample included participants under 18 years.	Reference list of final articles.
Schunk & Wagner (2021)	What determines the willingness to sanction violations of newly introduced social norms: Personality traits or economic preferences? Evidence from the COVID-19 crisis.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study did not focus on the individual’s rule-breaking behaviour, instead focusing on the individual’s likelihood to economically sanction another individual for rule-breaking. Therefore the study was considered unrelated to the research question.	Search-term database searches.
Shook et al. (2020)	Who’s Listening? Predictors of Concern about COVID-19 and Preventative Health Behaviors.	Did not fit inclusion criteria for “Other”. The study was a pre-print and not peer reviewed.	Reference list of final articles

Siritzky et al. (2021)	The role of personality in shaping pandemic responses: Systematic sociological factors drive country differences.	Did not fit inclusion criteria for “Sample”. Data was collected from $N=971$ participants from a mix of Western and non-Western countries.	Search-term database searches.
SoleimanvandiAzar et al. (2021)	Explaining the reasons for not maintaining the health guidelines to prevent COVID-19 in high-risk jobs: A qualitative study in Iran.	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=31$ participants in Iran, a non-Western country. The study also did not fit Inclusion criteria for “Design” given the qualitative approach, and no use of a personality psychometric measure i.e., quantitative approach.	Search-term database searches.
Somma et al. (2020a)	Dysfunctional personality features, non-scientifically supported causal beliefs, and emotional problems during the first month of the COVID-19 pandemic in Italy.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study focused on emotional reactions during the pandemic.	Reference list of final articles.
Sprengholz et al. (2023)	From delta to omicron: The role of individual factors and social context in self-reported compliance with pandemic regulations and recommendations	Did not meet criteria for “Sample” due to inclusion of participants aged 17. Study did not detail age of participants, but supplementary information suggested inclusion of those born in 2004 (and testing took place in 2021) making them 17 years old.	Search-term database searches.
Stadler et al. (2020)	Individual psychological responses to the SARS-CoV-2 pandemic: Different clusters and their relation to risk-reducing behaviour.	Did not fit inclusion criteria for “Other”. The study was a pre-print and not peer reviewed.	Reference list of final articles.
Stanković et al. (2022)	The role of personality, conspiracy mentality, REBT irrational beliefs, and adult attachment in COVID-19 related health behaviours.	Did not fit inclusion criteria for “Sample”. The study used $N=471$ Serbian citizens i.e., non-Western country as not in the EU, or in line with the definition used. The study also did not meet criteria for “Evaluation” given examined mediators (irrational beliefs, attachment dimensions and conspiracy mentality) between the COVID-19 rule-breaking and personality relationship.	Search-term database searches.

Steca et al. (2022)	Impulsivity assessed ten years earlier and sociodemographic factors predict adherence to COVID-19 related behavioural restrictions in old individuals with hypertension.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study only examined Type A personality characteristics (leadership, competitiveness, hostility, job involvement and impulsivity) using 12 items from the Cognitive Behavioural Assessment Form Hospital battery. The study did not include Type B characteristics i.e., ‘whole’ model of personality.	Search-term database searches.
Tagini et al. (2021)	Attachment, personality and locus of control: Psychological determinants of risk perception and preventive behaviours for COVID-19.	Did not fit inclusion criteria for “Evaluation”. Although the study initially used hierarchical multiple linear regression analysis, the statistical analysis focused on the mediation model i.e., the focus of the study was not to directly examine the relationship between personality and COVID-19 rule-breaking.	Search-term database searches.
Triberti et al. (2021)	Social-distancing is the right thing to do: Dark Triad behavioural correlates in the COVID-19 quarantine.	Did not fit inclusion criteria for “Design”. The study focused on the Dark Triad, one specific strain of personality traits.	Search-term database searches.
Twardawski et al. (2021)	Three pillars of physical distancing: Anxiety, pro-sociality and rule-compliance during the COVID-19 pandemic.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study was not directly related to personality traits and COVID-19 rule-breaking behaviour.	Search-term database searches.
Vaal et al. (2022)	Narcissism, national narcissism, COVID-19 conspiracy belief, and social media use as predictors of compliance with COVID-19 public health guidelines.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study only examined narcissistic personality traits using the Collective Narcissism Scale and Narcissistic Personality Inventory-16.	Search-term database searches.
Valenti & Faraci et al. (2021)	Identifying predictive factors in compliance with the COVID-19 containment measures: A mediation analysis.	Did not fit inclusion criteria for “Evaluation”. The study focused on a mediation analysis in identifying predictive factors related to compliance including personality and did not examine direct relationship, using ‘fear’ as the consistent mediator.	Search-term database searches.

Vally (2021)	Compliance with health-protective behaviours in relation to COVID-19: The roles of health-related misinformation, perceived vulnerability, and personality traits.	Did not meet criteria for “Phenomenon of Interest”, considered irrelevant to research question as the study was a review of literature, rather than a study testing participants.	Search-term database searches.
Volk et al. (2021)	The influence of demographics and personality on COVID-19 coping in young adults.	Did not meet criteria for “Evaluation” as the study examined mediators between personality and coping relationship.	Reference list of final articles.
Williams et al. (2021)	Patient adherence with infection control measures on a novel ‘COVID-19 triage’ in psychiatric in-patient ward.	Did not fit inclusion criteria for “Design”. The study examined personality traits and COVID-19 rule-compliance, however this was through individuals who had a personality disorder diagnosis, and therefore an explicit personality trait measure was not used within the study.	Search-term database searches.
Willroth et al. (2021)	The Health Behaviour Model of personality in the context of a public health crisis.	Did not fit inclusion criteria for “Evaluation”. The study used moderation by socio-demographic factors, and therefore did not focus on the direct relationship between personality traits and COVID-19 rule-breaking.	Search-term database searches.
Wismans et al. (2021)	The role of impulsivity and delay discounting in student compliance with COVID-19 protective measures.	Did not fit inclusion criteria for “Design”. The study focused on impulsivity, i.e., one type of personality trait rather than a ‘whole’ model of personality.	Search-term database searches.
Wright et al. (2022a)	Predictors of self-reported adherence to COVID-19 guidelines. A longitudinal observational study of 51,600 UK adults.	Did not meet inclusion criteria for “Design”. Although the study examined predictors of self-reported adherence, this did not include personality traits.	Search term database searches.
Wright et al. (2022b)	Trajectories of Compliance With COVID-19 Related Guidelines: Longitudinal Analyses of 50,000 UK Adults.	Did not meet criteria for “Phenomenon of Interest”. The study aimed to examine whether characteristics (e.g., personality traits) related to trajectories of COVID-19 compliance (over time) and whether these related to declining compliance over time, rather than a relationship between COVID-19 rule-breaking and	Subject heading searches.

		personality style i.e., the SLR did not examine what motivates declining compliance over time.	
Yamada et al. (2021)	COVIDiSTRESS Global Survey dataset on psychological and behavioural consequences of the COVID-19 outbreak.	Did not fit inclusion criteria for “Sample”. Data was collected from $N=173,426$ participants across the world, including non-Western countries.	Search-term database searches.
Zager et al. (2021)	Resilience matters: Explaining the association between personality and psychological functioning during the COVID-19 pandemic.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study focused on examining ‘resilience’.	Reference list of final articles.
Zanini et al. (2021)	Practicing social isolation during a pandemic in Brazil: A description of psychosocial characteristics and traits of personality during COVID-19 lockdown.	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=1914$ participants aged between 14 and 81 years from Brazil, both a non-Western sample, and included participants under 18 years.	Search-term database searches.
Zirenko & Kornilova (2021)	Individual differences in decisions on physical distancing during the COVID-19 pandemic.	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=308$ Russian participants, a non-Western country.	Search-term database searches.
Zirenko et al. (2021)	Personality regulations of decisions on physical distancing: Cross-cultural comparison (Russia, Azerbaijan, China).	Did not fit inclusion criteria for “Sample”. The sample consisted of $N=1077$ participants from non-Western countries.	Search-term database searches.
Zitek & Schlund (2020)	Psychological entitlement predicts noncompliance with the health guidelines of the COVID-19 pandemic.	Did not fit inclusion criteria for “Phenomenon of Interest”. The study was considered unrelated as it examined psychological entitlement as opposed to personality traits directly.	Search-term database searches.

Appendix C**SPIDER Inclusion/Exclusion Form**

Article Title:					
Author(s):					
Date:					
Sample	Over 18 years old?	Yes	No	?	
	Western country only?	Yes	No	?	
Phenomenon of Interest	Related to COVID-19, personality traits and rule-breaking?	Yes	No	?	
	Examine more than one strain/type of personality trait?	Yes	No	?	
Design	Does the study use an explicit standardised psychometric personality measure?	Yes	No	?	
Evaluation	Does the study examine the direct relationship between personality and COVID-19 rule-breaking/rule-compliance i.e., not moderator, mediator (manually search for “mediator” and “moderator” in the paper)?	Yes	No	?	
Research Type	N/A	N/A	N/A	?	
Other	Is the paper available in the English language?	Yes	No	?	
	Is the paper peer reviewed?	Yes	No	?	

Appendix D

Detailed Data Extraction Table

Author/ Date	Design: Collection	Participant Sample Size Gender % Age (<i>M</i> , <i>SD</i> , Range)	Personality Psychometrics. Internal Consistency Score	Statistical Analysis	Results/Outcome/findings	Limitations
Location	Recruitment Design		Measurement of COVID-19 Rule- Breaking/ Compliance. Internal Consistency Score			
Quality Score	Study Design					
Biondi et al. (2021)	Data collected between 1 st -7 th April 2020 using an online survey.	Italian undergraduate students. <i>N</i> =1427 26.14% male 73.86% female <i>M</i> =23.26yrs, <i>SD</i> =2.27 Range=18-27	DSM-5 Brief Form/PID-5-BF (abbreviated version of the PID-5) α =.85 (good internal consistency), ranging α =.56 to α =.74.	Cluster Analysis to a) reveal natural groupings b) identify subgroups presenting with similar characteristics.	Results for the DASS (Depression, Anxiety and Stress Symptoms) not discussed due to "Phenomenon of Interest". Two step cluster analysis: Cluster 1 (<i>n</i> =551, 38.6% of sample): psychoticism <i>M</i> =0.93, detachment <i>M</i> =0.72, negative affect <i>M</i> =1.29, disinhibition <i>M</i> =0.83, antagonism <i>M</i> =0.69. Cluster 2 (<i>n</i> =290, 27.3% of sample): psychoticism <i>M</i> =1.57, detachment <i>M</i> =1.37, negative affect <i>M</i> =1.79, disinhibition <i>M</i> =1.25, antagonism <i>M</i> =0.94. Cluster 3 (<i>n</i> =286, 34.1% of sample): psychoticism <i>M</i> =0.43, detachment <i>M</i> =0.28, negative affect <i>M</i> =0.78, disinhibition <i>M</i> =0.36, antagonism <i>M</i> =0.94. Outcome: Cluster 1: tendency to develop dysfunctional levels of psychoticism, negative affect and antagonism. Cluster 2: those who scored most dysfunction (highest) in negative affect, psychoticism, detachment. Cluster 3: no dysfunction on the PID-5-BF (i.e., lower levels of psychoticism, detachment, negative affect, disinhibition and antagonism). ANOVA: Cluster 2 subjects showed a significant difference between other two clusters on compliance with guidelines <i>F</i> =13.51, <i>p</i> <.001; Cluster 2 <i>M</i> =40.46 significantly lower than Cluster 1 <i>M</i> =41.68 and Cluster 3 <i>M</i> =42.52.	Not generalisable to students in other countries and the general population. Implemented during the first wave of COVID-19 infections so unable to assess functioning before lockdown and compliance in more advanced phases of the outbreak. Majority female sample.
Italy	Snowball/ Convenience sample.					
Quality = 70%	Cross-sectional design (although study does not explicitly name this).		10 questions related to COVID-19 compliance α =.82 (good internal consistency).	After ANOVA and MANOVAs run to identify differences between the three clusters in terms of emotional wellbeing and compliance with recommended COVID-19 guidance.		

A three by 10 MANOVA demonstrated a significant clustering effect between 10 compliant behaviours ($V=0.031$, $F(2, 1424)=2.219$, $p=0.001$, $\eta^2=0.015$).

Univariate ANOVAs found Cluster 2 (higher levels of negative affect, psychoticism and dysfunction) scored significantly lower than the other two clusters on avoiding hand-shaking $F=6.586$, $p=.001$, $M=4.36$, $SD=0.89$, avoiding drinking from bottles and glasses used by others $F=9.415$, $p<.001$, $M=4.34$, $SD=0.92$ and staying at home $F=7.531$, $p=.001$, $M=4.36$, $SD=0.88$. In addition, Cluster 2 exhibited significantly lower scores than Cluster 3 (lower levels of psychoticism, detachment, negative affect, antagonism and disinhibition) on: keeping at least one metre distance $F=8.024$, $p<.001$, $M=3.83$, $SD=1.11$, avoiding crowded places $F=5.183$, $p=.006$, $M=4.54$, $SD=0.79$, frequent handwashing outside $F=3.951$, $p=.091$, $M=4.28$, $SD=0.97$ and sneezing or coughing into a handkerchief or in the elbow $F=5.188$, $p=.006$, $M=4.12$, $SD=0.98$. Finally, Cluster 3 exhibited significantly increased levels avoidance of touching the face compared to the other two clusters $F=9.350$, $p<.001$, $M=3.27$, $SD=1.18$.

Author interpretation: Cluster 2 had the highest relational impairment (higher psychoticism, detachment and negative affect) and were less likely to adhere to rules and recommendations e.g., shake hands, drink from other's bottles, stay at home, compared to other clusters. The authors reported psychoticism was the best predictor in the Cluster 2 model (but can be correlated with other PID-5-BF domains). Lower levels of psychoticism, detachment, negative affect, antagonism and disinhibition were associated with avoidance of touching the face.

Recommended to post guidance on the internet (given its popularity/use during the pandemic).

Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Bogg & Milad, (2020)	Data collected between 24 th -26 th March 2020 using Prolific.	US public population signed up to Prolific. $N=500$	Big Five Inventory (44 items). N/A .	Blom transformation (rank order) due to skew on scales.	Adherence ranged from 94.4% (avoiding drinking, eating inside) to 13.6% (avoiding touching the face).	Representativeness limited by age, sex, race.
USA	Stratified sample based on Prolific consensus data for age, sex and race.	48.6% male 51.4% female $M=45.49$ $SD=15.78$ Range= N/A .	Guideline adherence questionnaire. N/A .	Correlational analysis then Path Modelling via Amos V26 using Bootstrapping.	Conscientiousness directly associated with greater guideline adherence (in line with trait-consistent temperamental process models of behaviour); this approached a medium-sized effect ($r=.28$, $p<.01$). Tests of total effects showed significant total association with adherence for conscientiousness $\beta=.191$, 95% CI [.092, .290]. Lower neuroticism was associated with greater perceived control, self-efficacy and lower perceived risk of exposure ($r_s=.11$ to $.16$, $p_s<.01$ to $.05$), but not significant in overall total effects.	Limited assessment of participant psychosocial correlates. Guideline adherence questionnaire limited by self-report.

	Cross-sectional study design (first come, first served basis).			Model fit assessed using the Comparative Fit Index. RMSEA used to assess closeness of fit in relation to degrees of freedom. Tests of total effects used to clarify associations.	Openness related to following guidelines (consistent with instrumental disposition belief motivation perspective); $\beta=.098$, $p<.05$; 95% CI[.011, .188]. Tests of indirect associations with guideline adherence showed small significant positive association for openness $\beta=.053$, 95% CI[.098, .064]. Higher agreeable individuals were more likely to follow guidelines. There were small sized associations with greater perceived norms, control, attitudes, self-efficacy and perceived health consequences ($rs=.12$ to .21, $ps <.01$). Tests of indirect association with guideline adherence showed small significant positive associations for agreeableness $\beta=.063$, 95% CI[.012, .123]. Tests of total effects showed no association with overall adherence for agreeableness $\beta=.074$, 95% CI[-.029, .174], however authors concluded agreeable individuals were more likely to adhere due to endorsement of norms and attitudes. Greater extraversion only associated with greater perceived norms ($r=.10$, $p<.05$), but not significant in overall test of total effects for non-adherence. No statistically significant associations for neuroticism and extraversion in the PATH Model ($ps>.05$). Conclusion: open individuals more likely to follow guidelines (due to more positive attitudes). Agreeable individuals more likely to follow guidelines, despite total association not statistically significant. Conscientiousness directly associated with guideline adherence. Extraversion and neuroticism total associations not significant with guideline adherence.	
Note. <i>df</i> 's not provided for correlations.						
Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Čavojová et al. (2022)	Data collected between 2 nd -6th November 2020.	Slovakian population <i>N</i> =1024 7.46% female 52.34% male <i>M</i> =44.17 <i>SD</i> =15.33 Range=18-81.	Big Five Inventory-30 Short Form (BFI-2-S) $\alpha=.64$ to $\alpha=.77$ internal consistency across personality traits.	Correlational analysis between personality traits and avoidance of preventative measures.	Results for other factors e.g., feelings of threat by COVID-19, COVID pseudoscientific beliefs not discussed (Phenomenon of Interest). Extraversion was positively correlated with avoiding preventative measures $r=.10$, $p<.01$. Overall hierarchical regression results found extraversion was a significant predictor of avoiding health regulations: $\beta=.10$, 95% CI[.03, .16], $p<.001$. One of the most important personality factors predicting avoidance of preventative measures (although weak effect). As per the supplementary information, in considering specific rule-breaking, extraversion significantly predicted avoiding curfew $\beta=.09$, CI[.02, .16], $p<.01$, less strict mask-wearing $\beta=.08$, CI[.01 .15], $p<.001$ and avoiding social-distancing recommendations $\beta=.11$, CI[.05, .18],	Cronbach's alphas acceptable but low. Study did not discuss limitations.
Slovakia	Stratified sample design using Qualtrics from a participant recruitment		Avoiding Prevention	Hierarchical linear regression		
Quality = 67.5%						

agency using quotas to ensure the sample was representative of gender and age. Cross-sectional design (although authors do not explicitly state this).	Measures against COVID-19 questionnaire (curfew, hygiene, mask-wearing, social-distancing, total). $\alpha=.39$ to $\alpha=.73$ internal consistency across the five domains.	(enter method) to examine whether personality traits explained the variance of avoiding preventative measures. Personality traits entered in Step 3 (other factors e.g., demographics were examined).	$p<.001$, but not a significant predictor of avoiding hygiene $\beta=-.03$, CI[-.01, .04], $p>.05$. Overall agreeableness was negatively correlated with avoidance of preventative measures $r=-.17$, $p<.001$. Hierarchical regression results found: $\beta=-.11$, 95% CI[-.17, -.05], $p<.001$. The authors concluded that agreeableness was one of the most important personality factors predicting avoidance of preventative measures (although weak effect). As per the supplementary information, agreeableness was significantly negatively associated with avoiding facemasks $\beta=-.09$, CI[-.16, .02], $p<.001$ (i.e., higher agreeableness predicted less facemask avoidance), but not significantly associated with avoiding curfew $\beta=-.06$, CI[.13, .02], $p>.05$, avoiding social-distancing $\beta=-.05$, CI[-.13, .01], $p>.05$ or avoiding hygiene $\beta=-.08$, CI[-.15, -.01], $p>.05$. Overall conscientiousness was not significantly correlated with avoiding preventative measures $r=-.06$, $p>.05$. Hierarchical regression results found: $\beta=-.06$, 95% CI[-.13, .01], $p>.05$. The authors conclude it was surprising conscientiousness did not predict adherence to preventative measures. In considering the supplementary information for specific rule-breaking, there was a significant negative association between conscientiousness and avoiding facemasks $\beta=-.08$, CI[-.15, .00], $p<.001$ (higher conscientiousness predicted less avoidance of facemasks), but no significant relationship with avoiding social-distancing $\beta=-.05$, CI[-.13, .02], $p>.05$, avoiding curfew $\beta=-.00$, CI[-.08, .07], $p>.05$ or avoiding hygiene $\beta=-.01$, CI[-.08, .07], $p>.05$. Overall neuroticism (negative emotionality as termed in the study). Overall neuroticism was not correlated with avoiding preventative measures $r=-.04$, $p>.05$. Hierarchical regression results for avoiding health regulations found: $\beta=-.01$, 95% CI[-.08, .06], $p>.05$, so it was not a significant predictor. In considering specific types of rule-breaking in the supplementary data, negative emotionality significantly predicted avoiding curfew $\beta=.08$, CI[-.00, .16], $p<.01$, not significantly associated with avoiding hygiene $\beta=.00$, CI[-.07, .08], $p>.05$, avoiding facial masks $\beta=-.03$, CI[-.11, .05], $p>.05$ and avoiding social-distancing $\beta=-.02$, CI[-.08, .05], $p>.05$. The study mentions neuroticism was positively correlated with social-distancing rules, however correlational analyses are not available in the supplementary information. Overall openness was not significantly correlated with avoiding preventative measures $r=-.05$, $p>.05$. Hierarchical regression results found openness was not a significant predictor of avoiding health regulations: $\beta=-.05$, 95% CI[-.11, .01],

$p > 0.5$. In examining the supplementary information for exact rule-breaking, there are no significant associations between openness and avoiding curfew $\beta = -.05$, $CI[-.12, .02]$, $p > .05$, avoiding hygiene $\beta = -.05$, $CI[-.12, .01]$, $p > .05$, avoiding facial masks $\beta = -.03$, $CI[-.10, .04]$, $p > .05$ and avoiding social-distancing $\beta = -.02$, $CI[-.08, .05]$, $p > .05$. In the text results, it is reported openness to experience correlated positively with abiding by the hygiene recommendations, however this is not available in the supplementary information as advised, nor is openness significant in the correlation table provided.

Hierarchical linear regression found that higher extraversion and lower agreeableness predicted questionable health behaviour, and accounted for 2.4% of the variance. Regression models (with the Big Five personality traits as predictors) significant for: avoiding curfew $\Delta R^2 = .016$, $p < .001$ (higher extraversion and higher negative emotionality significant predictors); avoiding facial masks $\Delta R^2 = .020$, $p < .001$ (higher extraversion, lower agreeableness and lower conscientiousness significant predictors); avoiding social-distancing $\Delta R^2 = .022$, $p < .001$ (higher extraversion significant predictor). Regression model (with Big Five personality traits as predictors) non-significant for: avoiding hygiene measures $\Delta R^2 = .009$, $p > .05$ (lower agreeableness was still a significant predictor).

Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Kleitman et al. (2021)	Data collected between 1 st April-20 th May 2020 using online survey software (Qualtrics).	US, UK, Canadian and Australian sample. University recruitment and Prolific. $N = 1575$.	Mini International Personality Item Pool (20 items) $\alpha = .65$ to $\alpha = 0.82$ internal consistency. Individual personality trait α presented in the results/outcome/findings (as per authors presentation of results).	Latent Profile Analysis and cluster analysis.	90% of participants were part of the compliant group, 10% part of the non-compliant group.	Early in the pandemic so compliance rates may change e.g., European studies suggest individuals stayed at home less during second wave (late 2020 to 2021).
Australia UK US Canada	Snowball sampling design through Prolific ($N = 415$) and university participant recruitment system ($N = 870$).	Australia: $N = 609$ 23.81% male 76.19% female $M = 35.21$ $SD = 14.51$ Range = N/A.	COVID-19 behaviour questionnaire (beliefs, worry,	T-tests and ANOVA used to examine differences between compliant and non-compliant. Used post-hoc contrasts with the Tukey HSD procedure.	Non-compliant individuals were significantly lower on agreeableness and intellect/openness, and significantly higher on extraversion. Higher agreeableness $t(1573) = -3.88$, $p < .001$ ($\alpha = .78$), higher intellect/openness $t(1573) = -.201$, $p < .04$ ($\alpha = .72$) and lower extraversion $t(1573) = 3.16$, $p < .001$ ($\alpha = .85$) scored higher on compliance. For extraversion, the $M = 12.14$, $SD = 3.68$ for non-compliance, was higher than for compliance $M = 11.07$, $SD = 4.12$. Therefore, extraversion related to non-compliance e.g., planned to visit family/friends in the forthcoming week. While for intellect and agreeableness, the means were higher for compliant: Intellect mean for non-compliance $M = 14.67$, $SD = 2.82$, compliance $M = 15.18$, $SD = 3.09$; Agreeableness mean for non-compliance $M = 14.73$, $SD = 3.01$, compliance $M = 15.73$, $SD = 3.13$.	Potential selection bias, but large sample. WEIRD sample (Western, Educated, Industrialised, Rich, Democratic) may not be generalisable.
Quality = 82.5%		Canada: $N = 303$			No significant difference in conscientiousness $t(1573) = -0.81$, $p = .42$ ($\alpha = .66$) and neuroticism $t(1573) = -1.04$, $p = .30$ ($\alpha = .78$) for compliance and non-compliance.	Use of brief psychometrics.

	Cross-sectional study design.	49.5% male 50.5% female $M=30.88$ $SD=10.41$ Range=N/A. UK: $N=366$ 33.61% male 66.39% female $M=35.21$ $SD=30.88$ Range=N/A. US: $N=297$ 45.22% male 54.88% female $M=32.77$ $SD=12.40$ Range=N/A.	prosocial and antisocial behaviours, protective behaviours and self-reported compliance). N/A.		Conscientiousness non-compliance $M=13.62$, $SD=2.94$, compliance $M=13.83$, $SD=2.33$. Neuroticism non-compliance $M=11.54$, $SD=3.75$, compliance $M=11.85$, $SD=3.62$.	
Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Milad & Bogg (2021)	Baseline data collected between 24 th -26 th March 2020 using Prolific.	US public population signed up to Prolific.	Big Five Inventory (44 items). N/A.	Correlational analysis to test strength of associations.	Openness was associated with more frequent guideline adherence $r=.12$, $p<.01$ and mask-wearing $r=.12$, $p<.01$ correlationally, but not in the PATH Model.	Limited by Prolific sampling strategy.
US	Current study is a follow-up from Bogg and Milad (2020), results collected between 29 th April-17 th May 2020.	$N=500$ for baseline data, $N=451$ for follow up. At baseline: 48.6% male 51.4% female $M=45.49$ $SD=15.78$ (gender/age data is not reported at follow-up). Range=N/A.	Guideline Adherence Questionnaire Ranged from $\alpha=.83$ to $\alpha=.91$.	Blom Transformation due to skew. Then Path Modelling using AMOS V26. Model fit assessed using Comparative Fit Index. Bi-variate relations carried out, then independent	Agreeableness was associated with greater guideline adherence $r=.21$, $p<.01$, but not mask-wearing $r=.09$, $p>.05$, correlationally, but not in the PATH model. Conscientiousness was associated with greater guideline adherence $r=.18$, $p<.01$, but not mask-wearing $r=-.03$, $p>.05$, correlationally but not in the PATH model. Extraversion was associated with greater guideline adherence $r=.15$, $p<.01$ but not mask-wearing ($r=.05$, $p>.05$), correlationally, but not in the PATH model. Neuroticism was not associated with greater guideline adherence $r=-.09$, $p>.05$, nor mask-wearing $r=-.01$, $p<.05$. Neuroticism positively correlated with symptom count $r=.26$, $p<.01$.	Limited by self-report. Household composition not investigated e.g., vulnerability associated with preventative behaviours.

	consensus data for age, sex and race.			samples t-tests to examine differences for guideline adherence (for other factors, not personality traits).	The PATH Model showed good internal fit $X^2=153.3$, $df=122$, $p<.03$: CFI=.987, RMSEA=.02; symptom count $r^2=.11$, mask-wearing $r^2=.14$, guideline adherence $r^2=.45$, which included greater baseline neuroticism (but no other personality traits).	
	Cross-sectional study design (first come, first served basis).				In general, greater guideline adherence was associated (correlationally) with greater agreeableness, conscientiousness, extraversion and openness ($ps<.01-.05$).	
Note. <i>df</i> 's not provided for correlations.						
Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Muccia et al. (2022)	Data collected between mid-April and mid-May 2020	French Healthcare Worker sample $N=299$ 96% female, 12% male $M=26.9$ $SD=11.0$ Range=N/A.	HEXACO-60 items. Internal consistency ranged $\alpha=.69$ to $\alpha=.78$	Correlational analysis. Then multiple linear regression (enter method) to explain the compliance with health measures and personality traits (only honest-humility and openness to experience were used due to significant correlations previously).	Spearman correlations (after parametric testing assessed) were used to study the relationship between compliance and personality styles. Then completed linear regression on the significant correlations between personality trait and compliance. Honest-humility correlated positively with compliance $r=.14$, $p<.05$. Honest-humility also significant result in the linear regression i.e., $\beta=.15$, $p<.05$. Openness to experience correlated negatively with compliance $r=-.12$, $p<.05$. Openness to experience also showed significant result in the linear regression $\beta=-.12$, $p<.05$. Negative correlation, higher need for openness to experience is associated with poor compliance. Other traits did not correlate with compliance nor show a relationship in the linear regression analyses. Concluded: honest-humility was associated with greater compliance among health workers than those more open to experience who were less likely to comply with health measures.	Cross-sectional design meant limited sample. Limited number of questions due to stressful nature of the pandemic for healthcare workers in hospital. 96% were women, limiting impact of research. There may have been difference between how men and women coped during this time. Lower Cronbach's alpha than threshold usually acceptable ($\alpha=.60$). Ought to have asked exact profession of healthcare workers to explore differences in compliance.

Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Smrdu et al. (2021)	Data collected between 14 th March–14 th July 2020 using an online platform survey.	Slovenian public population using www.1ska.si N=963 34.3% male 65.7% female M=N/A SD=N/A Range=N/A	Big Five Questionnaire (132 items measured on a 5-point Likert scale; Slovenian version). A=.75 to α =.85 internal consistency range across personality dimensions.	Big Five traits transformed to T-scores. Spearman's Rho correlations were then used, and six Linear Regression models. Used Kendall Tau correlation coefficients were used to examine COVID-19 rule-breaking and personality traits.	Note. Perceived stress levels not discussed re. Phenomenon of Interest. Results below focus on personality and COVID-19 compliance data. Hygiene measures: Extraversion, agreeableness, conscientiousness and openness positively associated with measures related to hygiene measures: extraversion $r=.067, p<.05$; agreeableness, $r=.062, p<.05$; conscientiousness, $r=.099, p<.01$; openness, $r=.098, p<.01$. Emotional stability was unrelated to hygiene measures: $r=.050, p>.01$. Avoidance measures: Conscientiousness $r=.014, p<.01$ and openness $r=.087, p<.01$ were correlated to avoidance measures. Extraversion $r=.019, p>.01$, agreeableness $r=.035, p>.01$, and emotional stability $r=.013, p>.01$ were unrelated to avoidance measures. All measures: Agreeableness $r=.074, p<.05$, conscientiousness $r=.112, p<.01$, emotional stability $r=.068, p<.01$ and openness $r=.084, p<.01$ were all correlated with adherence to all measures. Extraversion was unrelated to <i>overall adherence of all measures</i> $r=.037, p>.10$ (i.e., not significant). No personality traits were significantly correlated with mask-wearing behaviour. Conscientiousness was the most relevant <i>predictor</i> of health-promoting behaviours i.e., adherence to most measures, including social-distancing and hygiene precautions. Note. <i>df's</i> not provided for correlations.	Responses may reflect stress of the first COVID-19 wave. Biased sample, including individuals with higher education who worked in cultural, educational and scientific domains. Based on self-report.
Quality = 67.5%.	Snowball/convenience sample recruited using Facebook and Twitter. Cross-sectional design (although authors do not explicitly state this).	Study used same participant sample/data from Turk et al. (2021), and was published several months after.	Adherence to COVID-19 measures to 25 guidelines (e.g., social-distancing, ventilation, mask use). Focussed on grouping this data into: all measures, hygiene measures, avoidance measures and mask measures (differentiating from Turk et al. (2021) who examined each of the 25 guidelines). Unlike Turk et al. (2021), Smrdu et al. (2021) examined <i>emotional stability</i> (the	Note. Only correlational analyses examined COVID-19 rule-breaking (which are discussed). Regression analyses examined stress components (not related to COVID-19 rule-breaking; Phenomenon of Interest) so this is not discussed.		

Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Turk et al. (2021)	Data collected between 14 th March–14 th July 2020 using an online platform survey.	Slovenian public population using www.1ka.si N=963	Big Five Questionnaire (132 items measured on a 5-point Likert scale; Slovenian version).	Likelihood ratio Chi-Square, then used the Man Whitney U/Kruskal Wallis H test.	Note. Authors only provide significance levels in the supplementary information (the correlation coefficient is not provided). Study used same data from Smrdu et al. (2021), analysing different elements of the data initially collected. The study also analysed other factors for adherence (e.g., employment, gender), the below data focuses only on personality traits i.e., Phenomenon of Interest.	Limits in generalisability, all participants Slovenian.
Quality = 67.5%.	Snowball/convenience sample recruited using Facebook and Twitter.	65.7% female 34.3% male M=N/A SD=N/A Range=N/A	$\alpha=.75$ to $\alpha=.85$ internal consistency range across personality dimensions.	Howell post-hoc multiple Comparison test performed for the significant Kruskal Wallis H Test. Then applied Jonckheere Trend Test to check for significant trends.	83% of participant often adhered to the basic preventative measures. Adherence to guidelines considerably related to higher conscientiousness, particularly avoiding unnecessary contact with surfaces outside the home ($p<.001$), keeping safe interpersonal distance ($p<.001$), and wiping/disinfecting packages from shops ($p<.001$). High conscientiousness was the greatest <i>predictor</i> of compliance with mitigation measures (i.e., showed the most significant results). Other significant correlations ($p<.05$) were seen. Lower scores of conscientiousness related to less adherence of guidelines. One negative correlation seen for high conscientiousness, correlating with low use of a scarf rather than facemask ($p<.026$). Out of 25 guidelines, conscientious significantly positively correlated with 13 adherence items. Second most relevant personality <i>predictor</i> of compliance was openness. Positive correlations seen between avoiding touching face and mask having not washed hands ($p<.001$) and regular handwashing/disinfecting ($p<.001$). Other significant positive correlations ($p<.05$) were seen. Out of 25 guidelines, openness significantly correlated with 7 adherence items. Energy/extraversion was significantly correlated positively with regular indoor ventilation ($p<.001$). Other significant positive correlations ($p<.05$) were seen. A negative correlation was seen with having shopping done by a less vulnerable person ($p<.006$). Out of 25 guidelines, energy significantly correlated positively with 5 adherence items. Extraversion was positively correlated to regular indoor ventilation, but negatively to allowing another (less vulnerable) person to complete shopping. Those with higher extraversion do keep safe in interpersonal distance, but do not limit physical contacts (aware of measures, but do not resist socialisation).	Sample bias towards higher education. Those with less internet use are under-representative. Based on self-report.
	Cross-sectional design (although authors do not explicitly state this).	Study used same participant sample from Smrdu et al. (2021), and was published several months before.	Adherence to COVID-19 measures to 25 guidelines (e.g., social-distancing, ventilation, mask use). N/A.	Note. Within the study, only Kendall Tau Correlations used to test adherence correlation and personality dimensions.		

Some relationship between neuroticism with the guidelines, although all correlations ($p < .05$) as opposed to ($p < .001$). e.g., for high neuroticism most related to adherence to hygiene. Out of 25 items, neuroticism significantly correlated positively with 4 adherence items (avoiding touching the face and mask with unwashed hands, adherence to the rules of cough hygiene, discarding potentially infected objects, regular hand washing).

Some relationship between agreeableness with the guidelines, although all correlations ($p < .05$) as opposed to ($p < .001$). With agreeableness, most also related to hygiene and social-distancing. Out of 25 guidelines, agreeableness significantly correlated positively with 5 adherence items (avoiding touching face and mask with unwashed hands, keeping safe interpersonal distance, regular and thorough handwashing, discarding potentially infected objects, adherence to rules of cough hygiene).

Conscientiousness, agreeableness and openness related to positive adherence to hygiene guidelines (with most significantly positive correlations).

Conscientious and openness related to limited physical distancing i.e., only contact with household.

Six of 25 guidelines showed no relation to personality e.g., meeting with vulnerable people.

Note. *df's* are not provided.

Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Wallace et al. (2021)	Data collected between September–December 2020 using an online survey and university participant recruitment scheme.	Psychology undergraduate students. $N=1374$ 25.5% male 74.2% female 3% N/A $M=19.58$ $SD=2.25$ Range=N/A.	Ten Item Personality Inventory (Big Five), Spearman-Brown coefficient ranged from .37 (agreeableness) to .82 (extraversion). COVID-19 Containment Behaviour questionnaire	Pairwise correlations, then three structural equation models using linear regression. Model fit was assessed using Comparative Fit Index, and estimates of the model using	Results only regarding the Big Five are extracted (Phenomenon of Interest, using standardised measure of personality, not focusing on one strain of personality trait e.g., impulsivity, sensation seeking as included in the study). Higher extraversion predicted less engagement in containment behaviour $B(52)=.34, p < .05$. Lower agreeableness predicted less engagement in containment behaviour $B(52)=-.04, p < .001$. Higher emotional stability predicted less containment behaviour $B(52)=.03, p < .05$.	Limitations of a cross-sectional design as containment behaviour may have varied as a result of changing external circumstances. Over-represented college sample. Convenience sampling could

	Cross-sectional sample of young adults.	(eight item self-report regarding the past two weeks). $\alpha=.833$ internal consistency.	Maximum likelihood estimation with standard error and Chi-Square.	Higher risk seeking, extraversion, emotional stability, negative urgency and lack of premeditation were risk factors for less compliance. Higher agreeableness was considered a protective factor.	introduce selection bias.	
			Model 3 contained the Big Five personality traits.	Openness to Experience was not a significant predictor of compliance $B(52)=-.01, p>.05$.	Dominance of female population.	
				Conscientiousness was not a significant predictor of compliance $B(52)=-.02, p>.05$.	Ten Item Personality Inventory is short and not as well validated as other Big Five measures.	
				Note. Authors did not report R^2 values.		
				Overall personality regression model: $X^2=182.96$, CFI=.96, TLI=.94, RMSEA=.05, SRMR=.04, $p<.05$. i.e., personality trait model was significant in predicting COVID-19 containment behaviour, with higher extraversion, lower agreeableness, higher emotional stability as significant predictors.		
Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Wright et al. (2021)	Data collected between 17 th November–23 rd December 2020 using an online survey.	UK general population who opted in to a wider 70,000 participant panel study. $N=20,947$	Big Five Inventory (five domains, 15 facets). N/A	Maximum likelihood estimation. Selected final model based on Bayesian information, entropy values, average latent class probability.	Data split into full compliers (Class 1, 52.5% of the sample), frequent compliers (Class 2, 36.7% of the sample), occasional compliers (Class 3, 6.3% of the sample) and household mixers (Class 4, 4.5% of the sample).	Reliance on self-reported compliance.
UK	Convenience sample strategy, targeted recruitment (individuals from low-income background/individuals unemployed), promotion via partnerships/third sector organisations.	25.66 % Male 74.34% Female $M=N/A$ $SD=N/A$ Range=N/A	Compliance Behaviour Questionnaire: analysing six compliance behaviours (hand washing, facemask wearing, social-distancing, household mixing indoors, household mixing outdoors and compliance with other guidelines (over last seven	Selected a final latent class solution and used multinomial logistic regression to predict compliance patterns (using R statistical package).	Class 1 (full compliers): openness ($M=14.86$, $SD=3.31$), conscientiousness ($M=16.04$, $SD=2.9$), extraversion ($M=12.46$, $SD=4.28$), agreeableness ($M=15.63$, $SD=3.31$, neuroticism ($M=11.27$, $SD=4.4$). Highest openness and conscientious M compared to other classes. Class 2 (frequent compliers): openness ($M=14.65$, $SD=3.1$), conscientiousness ($M=15.39$, $SD=2.79$), extraversion ($M=12.57$, $SD=4.22$), agreeableness ($M=15.18$, $SD=3.01$), neuroticism ($M=11.24$, $SD=4.31$). Higher extraversion than full compliers class. Class 3 (occasional compliers): openness ($M=14.2$, $SD=3.42$), conscientiousness ($M=15.29$, $SD=3.07$), extraversion ($M=12.38$, $SD=4.6$), agreeableness ($M=14.87$, $SD=3.35$), neuroticism ($M=11.54$, $SD=4.45$). Highest neuroticism M across classes. Class 4 (household mixers) consisted of openness ($M=14.79$, $SD=3.5$), conscientiousness ($M=15.99$, $SD=3.05$), extraversion ($M=12.84$, $SD=4.29$), agreeableness ($M=15.77$, $SD=3.41$), neuroticism ($M=11.11$, $SD=4.37$). Highest extraversion M across classes. Authors reported this class (i.e., highest household mixing) was unrelated to specific personality traits.	Cross-sectional design may be biased by unobserved confounding.
						Concerns about socially desirable responding.
						As pandemic is ongoing, participants may not recall compliance accurately.
						COVID-19 guidelines changed over the study period.

Panel study/cohort study but of cross-sectional design.	days). $\alpha=.61$ for the six items.	Further analysis estimated models of the predictors using ordinal regression.	Authors report in text: compared with full compliers (52.5%; Class 1), evidence that frequent compliers (36.7%; Class 2) had lower trait openness ($M=14.65$, $SD=3.1$; compared to $M=14.86$, $SD=3.31$ in the full complier group) and were less conscientious (frequent compliers: $M=15.39$, $SD=2.79$; full compliers: $M=16.04$, $SD=2.9$). In the results, authors only discuss extraversion explicitly, which was considered most strongly related to lower compliance with indoor and outdoor household mixing guidelines. Authors report: ORs=0.75[0.69, 0.81] and ORs=0.65 [0.61, 0.7], respectively. This was consistent with the data in the supplementary information: Ordinal regression models predicting compliance behaviour by individual characteristics provided in supplementary materials. Authors specify Odds Ratio are presented, OR>1 suggests rule-compliance, OR<1 suggests rule-breaking. Results: Social-distancing compliance: odds ratio highest for conscientiousness OR=1.36[1.27, 1.45], followed by openness OR=1.35[1.26, 1.44], then agreeableness OR=1.03[0.96, 1.1]. Social-distancing non-compliance: neuroticism OR=0.92[0.85, 1], lowest for extraversion OR=0.91[0.85, 0.97]. Indoor mixing compliance: odds ratio highest for openness OR=1.2[1.07, 1.24], followed by conscientiousness OR=1.15[1.07, 1.24], then agreeableness OR=0.92[0.85, 1]. Indoor mixing non-compliance: neuroticism OR=0.85[0.77, 0.93], lowest for extraversion OR=0.75[0.69, 0.81]. Outdoor mixing compliance: odds ratio highest for conscientiousness OR=1.16[1.08, 1.25], followed by openness OR=1.14[1.06, 1.23]. Outdoor mixing non-compliance: agreeableness OR=0.89 [0.82, 0.96], then neuroticism OR=0.83[0.76, 0.91], lowest for extraversion OR=0.65[0.61, 0.7]. Wearing mask compliance: odds ratio highest for agreeableness OR=1.26[1.1, 1.43], followed by neuroticism OR=1.19[1.02, 1.39], then openness OR=1.15[1.02, 1.3]. Wearing mask non-compliance: conscientiousness OR=0.98[0.86, 1.1], lowest for extraversion OR=0.85[0.75, 0.96].	Data was non-representative, and high compliers likely over-represented.

Sanitise hands compliance: odds ratio highest for conscientiousness OR=1.45[1.36, 1.54], followed by openness OR=1.28[1.21, 1.54], then neuroticism OR=1.2[1.11, 1.3], then extraversion OR=1.1[1.03, 1.17], agreeableness OR=1.06[0.99, 1.14] (no traits related to sanitise hands non-compliance).

Guidelines (other) compliance: odds ratio highest for conscientiousness OR=1.28[1.3, 1.37], followed by openness OR=1.23[1.2, 1.37], agreeableness OR=1.1[1.03, 1.19]. Guidelines (other) non-compliance: neuroticism OR=0.96[0.88, 1.05], lowest for extraversion OR=0.92[0.86, 0.98].

Above results in line with authors in text interpretation: extraversion is related to higher COVID-19 rule-breaking. Conscientiousness and openness tended to relate to higher COVID-19 rule-compliance. Neuroticism related to higher indoor/outdoor mixing and social-distancing, but higher wearing mask/sanitising hands (similar pattern to agreeableness).

Note. Authors provide a multivariate ordinal regression graph.

Study Details	Design	Participants	Psychometrics	Statistical Analysis	Results/Outcome/findings	Limitations
Zajenkowski et al. (2020)	Data collected between 14 th -30 th April 2020 using online social media platforms.	Polish general population <i>N</i> =263 27.8% male 71.5% female 0.7% other <i>M</i> =28.96 <i>SD</i> =10.64 Range=18-80.	International Personality Pool (20 items; four items per trait; Polish version) Note: other personality measures were used e.g., Levenson's self-report psychopathy scale, the Situational Eight Scale; these are not discussed given the exclusion criteria. N/A.	Correlational analysis. Three multiple regression models, then combined into hierarchical multiple regression.	Results extracted specifically focus on Big Five personality traits, not the Dark Triad or perceptions of the COVID-19 situation (in line with "Phenomenon of Interest"). Big Five traits accounted for 2.4% of the variance $F[5, 256]=2.21, p<.05$. Agreeableness was associated with compliance through correlation $r=.31, p<.01$ and multiple regression $\beta=.20, p<.01$. This was the only Big Five trait significantly associated with greater compliance. Openness was associated with compliance through correlation $r=.26, p<.001$, but not multiple regression $\beta=.05, p>.05$. Conscientiousness was negatively correlated with compliance through correlation $r=-.16, p<.05$, but not multiple regression $\beta=.02, p>.05$. Neuroticism and extraversion showed no significant results within correlations and multiple regression.	Sample was WEIRD limiting generalisability. Study was conducted online, so likely more educated sample. Participants may have suppressed darker aspects of personality. Dominant female sample.
Quality = 77.5%	Convenience sample strategy. Cross-sectional study design.				Note. <i>df</i> 's are not provided. Authors did not report R^2 values.	Compliance measured with a single item and self-report i.e., declarations about compliance, not actual behaviour.

Compliance with
governmental
restrictions
measured in
single item:
participants rated
percentage they
complied.
N/A.

Note. *M*, *SD*, %, *F* and *r* within Table 5 reflect authors presentation of results (i.e., not APA 7 one/two decimal place style).

Appendix E

Study Aims

Authors (date)	Summary of Overall Aims
Biondi et al. (2021)	(1) Increase understanding of Italian University students' psychological condition during the COVID-19 lockdown. (2) Examine whether the sample can be classified using personality variables. (3) Identify differences between student groups in relation to depression, anxiety, stress and compliance with health guidance.
Bogg & Milad (2020)	(1) Examine the relationship between demographic variables and COVID-19 rule-compliance. (2) Examine whether perceived control, exposure and consequences relate to with guideline adherence. (3) Investigate whether/how personality traits are related to COVID-19 rule-compliance.
Čavojová et al. (2022)	(1) To explore whether behaviour reflecting active avoidance of preventative measures against COVID-19 (curfew regulations, hygiene, facial masks and social-distancing) was best predicted by personality traits (Big Five), health beliefs, or feelings of threat. (2) To examine demographic factors, beliefs, Big Five personality traits, and the threat of COVID-19 pandemic as predictors of questionable health behaviours conceptualised as avoiding preventative measures against the COVID-19. Specifically, during the second wave of the COVID-19 pandemic.
Kleitman et al. (2021)	(1) Identify groups with similar patterns of COVID-19 behaviour and attitudes. (2) Examine differences between groups (comply/rule-break) on several psychological factors e.g., personality traits.
Milad & Bogg (2021)	(1) Confirm findings (from a baseline study) that conscientiousness predicts guideline adherence. (2) Examine whether those higher in neuroticism report more symptoms at follow-up. (3) Complete exploratory analyses to examine the relationship between demographic characteristics, personality traits, guideline-related social cognitions and symptom counts and viral testing.
Muccia et al. (2022)	(1) Study the factors associated with the compliance with health measures among health professionals receiving patients during lockdown in France in the COVID-19 pandemic. (2) Examine whether compliance is linked to personality.

	(3) Examine whether better coping and psychological flexibility is positively associated with greater compliance.
	(4) Examine whether anxiety and depression are associated with compliance.
Smrdu et al. (2021)	(1) Explore the interaction between personality, stress, interpersonal relationships and COVID-19 rule-compliance.
Turk et al. (2021)	(1) Confirm who perceive COVID-19 rules as more important and comply to them more often (e.g., females, elderly). (2) Assess the relationship between Big Five traits and COVID-19 rule-compliance.
Wallace et al. (2021)	(1) Examine individual differences in COVID-19 behaviours. (2) Find recommendations for promoting compliance by testing whether compliance behaviours fit into a health-risk behaviour model in young adults. (3) Explore the relationship between compliance behaviours and personality traits that have been antecedents to other health-risk behaviours.
Wright et al. (2021)	(1) Explore self-reported compliance with six COVID-19 compliance measures using 20,000 UK adults after the first lockdown. (2) Test behavioural patterns and their relationship to several demographic, socioeconomic and personality characteristics.
Zajenkowski et al. (2021)	(1) Understand who complies with COVID-19 rules in Poland, in terms of personality traits and situation perception. (2) Examine relationship between personality and situation perception.

Appendix F**AXIS Quality Assessment Extraction Form (Downes et al., 2016)**

Personality and lockdown: A study on Italian undergraduates during the COVID-19 pandemic. Biondi et al., 2021 Total score = 70%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				The aims were clear.
Method	2. Was the study design appropriate for the stated aim(s)?	X				A cross-sectional design was appropriate (however authors did not explicitly describe it as so).
Method	3. Was the sample size justified?			X		Sample size was not justified.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X				It is clear the research was about Italian undergraduate students.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X				Sampling frame was not provided; however, it was clear a small population of the wider target population (students) was used.
Method	6. Was the selection process likely to select subjects/participants that were representative of the		X			Sample was across four Italian universities. Susceptible to some selection

	target/reference population under investigation?		bias given participants may have opted into the study if they held awareness of COVID-19 rule-breaking or their own personality traits.
Method	7. Were measures undertaken to address and categorise non- responders?	X	There was no discussion regarding non-responders or comparators to assess sample representativeness.
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	The DSM-5 Brief Form and compliance questionnaire were appropriate for study aims.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The DSM-5 Brief Form has been trialled/piloted previously. Understandably the COVID-19 rule- compliance questionnaire was novel.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	Yes, $p < .001$ was provided as a significance level.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	Yes, the methods for the main analysis were clear. Of note, further analysis regarding the sample population would have been beneficial.

Results	12. Were the basic data adequately described?	X		Yes, it was clear. Cluster Analysis then ANOVA was used to assess the significance of clustering effects.
Results	13. Does the response rate raise concerns about non-response bias? *		X	There was no discussion regarding non-response bias.
Results	14. If appropriate, was information about non-responders described?		X	Unknown.
Results	15. Were the results internally consistent?	X		Partial, the data added up, but lacked discussion regarding how missing data was dealt with.
Results	16. Were the results presented for all the analyses described in the methods?	X		Yes, all results were reported, including non-significant results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X		Yes.
Discussion	18. Were the limitations of the study discussed?	X		The authors discussed limitations such as the undergraduate population, unknown psychological functioning prior to the COVID-19 outbreak, and majority female sample.
Other	19. Were there any funding sources or conflicts of interest that may		X	Unknown

affect the authors' interpretation of the results? *			
Other	20. Was ethical approval or consent of participants attained?	X	Ethics approval by Institutional Board of the Department of Human Neuroscience, Faculty of Medicine and Dentistry at Sapineza University of Rome.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Demographic, personality, social cognition correlates of coronavirus guideline adherence in a US sample. Bogg and Milad, 2020 Total = 85% Quality						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				The aims were well presented, and it was clear what the authors wanted to achieve and their investigation plan.
Method	2. Was the study design appropriate for the stated aim(s)?	X				A cross-sectional design was appropriate. The authors acknowledged in the long-term a longitudinal/prospective study would be beneficial (although this was not

			conducive at the time of the current study).
Method	3. Was the sample size justified?	X	500 participants were targeted to ensure power requirements for small to medium effect size were met and the requirements for multivariate path modelling using bootstrapping procedures.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X	It was clear the research is about a US population.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X	The sample was based on representative data from Prolific based on age, race and gender. The authors acknowledged they would have liked to stratify based on other demographics but Prolific did not allow for this.
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	The authors used Prolific Consensus data. The authors acknowledged some self-selection bias given that participants may have opted into the study if they were particularly aware of COVID-19 rule-breaking or their own personality traits.
Method	7. Were measures undertaken to address and categorise non-responders?	X	There was no discussion regarding non-responders. The authors used Prolific census data as a comparator to assess sample representativeness.

Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	The Big Five Inventory (44 questions) was appropriate to the study aims.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The Big Five Inventory has been trialled/piloted previously. Understandably at the time of the study, the COVID-19 compliance survey was a newly developed measure.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	Yes, $p > .05$ is provided as a significance level, and the 95% confidence intervals are discussed. The authors also mention a CFI score of over 0.9 suggests adequate fit.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	Yes, the methods are extremely clear.
Results	12. Were the basic data adequately described?	X	It was clear correlations then Path Analysis were used. The demographic information was described clearly using a table.
Results	13. Does the response rate raise concerns about non-response bias? *	X	There was no discussion regarding non-response bias.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	The data appeared to add up and there is justification regarding missing data e.g., four cases of

				missing values for age and one for perceived risk exposure. These were dealt with using mean substitution to meet bootstrapping assumptions.
Results	16. Were the results presented for all the analyses described in the methods?	X		Yes, all results were reported, including non-significant results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X		Yes. The authors could have provided discussion regarding confounding variables.
Discussion	18. Were the limitations of the study discussed?	X		The authors discussed limitations such as age, sex and race restrictions, and retrospective framing.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *		X	There does not appear to be any funding sources or conflicts of interest.
Other	20. Was ethical approval or consent of participants attained?	X		Ethics approval granted by Wayne State University Institutional Review Board with exempt status.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Being nice or being scared? Personality traits, beliefs and threat of COVID-19 as predictors of non-normative health behaviours during second wave pandemic Čavojová et al. (2022) Total score = 67.5%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				The aims were very clear.
Method	2. Was the study design appropriate for the stated aim(s)?	X				A cross-sectional design was appropriate (however authors did not explicitly describe it as so).
Method	3. Was the sample size justified?			X		Sample size was not justified.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X				It was clear the research was about the Slovak general population.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X				The authors reported the sample was representative of the Slovak general population in terms of gender and age distribution.
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X				The authors did not claim any limitations regarding the selection process. The authors used a participant recruitment agency, and it appeared the selection process and stratification was

				likely to select participants of interest (general population).
Method	7. Were measures undertaken to address and categorise non-responders?	X		There was no discussion regarding non-responders or comparators to assess sample representativeness. Participants signed up to complete the study themselves, so non-responding was likely not an issue.
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X		The DSM-5 Brief Form and compliance questionnaire were appropriate for study aims.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X		The Big Five Inventory (BFI-2-S) 30-items (Soto & John, 2017a) has been trialled/piloted previously. The avoiding prevention measures against COVID-19 questionnaire was novel.
Method	10. Is it clear what was used to determine statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X		Yes, for descriptive analysis $p > .05$ is provided as a significance level. For correlational and regression analysis $p < .001$, $p < .01$ and $p < .05$ are used for significance level.

Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	Yes, the methods for the main analysis were clear.
Results	12. Were the basic data adequately described?	X	Yes, it was clear correlational analysis was used, and then hierarchical linear regression to examine prediction of avoiding health regulations for each factor.
Results	13. Does the response rate raise concerns about non-response bias? *	X	There was no discussion regarding non-response bias.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	Partial, the data adds up, but lacks discussion regarding how missing data was dealt with. The study mentions neuroticism was positively correlated with social-distancing rules, however this was reported as non-significant in the supplementary information.
Results	16. Were the results presented for all the analyses described in the methods?	X	Most results were reported, including non-significant results. However, initial correlational analyses

			between personality traits and specific types of rule-breaking were discussed in the results, but were not contained within the supplementary information as advised by the author.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	Yes.
Discussion	18. Were the limitations of the study discussed?	X	Partial. The authors discussed limitations related to relatively low effect size and Cronbach's alpha. The authors do not have a specified 'limitations' section which would have been beneficial to list areas of improvement and drawbacks from the current study.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	The study was financially supported by the Slovak Research and Development Agency as part of a wider study 'reducing the spread of disinformation, pseudoscience and bullshit' and a scientific grant agency of the Ministry of Education Science, Research and Sport

			of the Slovak Republic as part of a wider project 'Examining unfounded beliefs about controversial issues'. No apparent issues regarding conflicts of interest that may affect result interpretation are present.
Other	20. Was ethical approval or consent of participants attained?	X	Ethical approval was not discussed in the write-up. The authors discussed that the study was based on the data collected as part of a larger project examining epistemically beliefs (generic and related to COVID-19), and their cognitive predictors and association with non-normative social action (pre-print). There was no discussion in either study regarding ethical approval or consent. It is assumed consent was gained, but this is not explicitly stated by the authors.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

To comply or not comply? A latent profile analysis of behaviours and attitudes during the COVID-19 pandemic. Kleitman et al. (2021) Total score = 82.5%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/ NA/ Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				The two aims of the study were clear. First to examine the prevalence of distinct groups (comply and not comply) and then examine the characteristics to inform targeted public health policies.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The cross-sectional design was appropriate.
Method	3. Was the sample size justified?	X				The authors estimated the power required and employed a typical heuristic for multi-variate data analysis (a minimum of 10, but preferably 20 cases per variable in the model). The sample size estimate was a minimum of $N=280$ participants in each country.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X				The researchers wanted to examine a general population and limited this to English-speaking counties.
Method	5. Was the sample frame taken from an appropriate population base so that	X				The authors collected data from a large and diverse sample in four

	it closely represented the target/reference population under investigation?		countries providing good power and generalisability within the sample.
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	Prolific was used, however a university sample was included (not necessarily representative of the target general population).
Method	7. Were measures undertaken to address and categorise non-responders?		X There was no discussion regarding non-responders.
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	They were appropriate.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	Most measures were trialled and published previously. The authors reported reasonable to excellent reliability estimates. The newly developed COVID compliance questionnaire showed promising preliminary psychometric properties and the authors acknowledged it required further validation.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	The authors used a range of $p < .05$, $p < .01$ and $p < .001$ to determine significance. The authors provided evidence of confidence intervals (presented clearly in a table).
Method	11. Were the methods (including statistical methods) sufficiently	X	Yes, it was clear cluster analysis was used, then ANOVA t-tests to examine differences between

	described to enable them to be repeated?		compliant and non-compliant groups.
Results	12. Were the basic data adequately described?	X	All basic and demographic data was described thoroughly.
Results	13. Does the response rate raise concerns about non-response bias? *	X	There was no discussion regarding non-response bias.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	The authors discussed how they dealt with missing data e.g., delete data with 40% missing, and random missing data was imputed. The authors report the results were internally consistent.
Results	16. Were the results presented for all the analyses described in the methods?	X	Yes, all results were reported, including non-significant results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims and it was positive the authors discussed non-significant results.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding a WEIRD sample, brief psychometric versions. Positively, the authors also discussed the strengths of the study.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	The authors state they received no specific funding for the work, and they declared no competing interests.
Other	20. Was ethical approval or consent of participants attained?	X	Ethics approval was granted by the University of Sydney Human

Research Ethics Committee and the
University of Saskatchewan
Behavioural Research Ethics Board
(protocol/ID numbers are provided).

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Spring 2020 COVID-19 surge: Prospective relations between demographic factors, personality traits, social cognitions and guideline adherence, mask wearing and symptoms in a US sample.

Milad & Bogg (2021)

Total score = 77.5%

Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims were very clear: to examine further previous results and further questions regarding rule adherence a couple of months after a previous study.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The cross-sectional design was appropriate. Authors did not explicitly term the study as cross-sectional given the use of follow-up questionnaire.
Method	3. Was the sample size justified?	X				The authors explained a sample size of $N=500$ ($N=451$ at follow-up) was targeted to ensure power

				requirements for small to moderate effect sizes were met, as well as requirements for the multi-variate path modelling.
Method	4.	Was the target/reference population clearly defined? (Is it clear who the research was about?)	X	The authors were clear they used a stratified sample based on Census data from the 2015 American Community Survey.
Method	5.	Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X	The authors stratified their data using Prolific terms for income, race and sex (which was representative of the population), however higher age range was overrepresented.
Method	6.	Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	Subjects needed access to the internet to complete the survey and already have a Prolific profile. Selection process likely representative of the baseline data collected previously.
Method	7.	Were measures undertaken to address and categorise non-responders?	X	Authors explained that only 90% of responders completed the questionnaire at follow-up. However there was no discussion or categorisation of this.
Method	8.	Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	They were appropriate.
Method	9.	Were the risk factor and outcome variables measured correctly using instruments/measurements that had	X	Most measures were trialled and published previously. The questions regarding COVID-19 rule adherence

	been trialled, piloted or published previously?		were invented for the purpose of this study (some questions previously used in the previous study for baseline data). The symptoms and guidelines were obtained from the CDC's list of symptoms and guideline adherence that was publicly announced in April 2020.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	The authors used $p>.05$ and $p>.001$ to determine significance.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	It was clear correlations were used initially, then independent T-tests. A path model is used after. The statistical analyses are very clear and detailed.
Results	12. Were the basic data adequately described?	X	All basic and demographic data was described thoroughly for the baseline data. Gender and age of follow-up participants ($N=451$) was not provided.
Results	13. Does the response rate raise concerns about non-response bias? *	X	Partially, 10% did not respond to further questions. The authors acknowledged this raised questions about whether these participants had recently died from COVID-19.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.

Results	15. Were the results internally consistent?	X	It was clear missing continuous data were modelled using the Full Information Maximum Likelihood which estimated procedures using all available data in the likelihood function. This has been shown to outperform other strategies for handling missing data.
Results	16. Were the results presented for all the analyses described in the methods?	X	Yes, all results were reported, including non-significant results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims, and it was positive the authors discussed non-significant results.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding Prolific's sampling strategy, limited baseline data (due to quick needed ethics approval), and no questions regarding living with a vulnerable person.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	Unknown.
Other	20. Was ethical approval or consent of participants attained?	X	Ethics approval was granted by the Wayne State University Institutional Review Board with exempt status.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Determinants of sanitary measures and lockdown compliance among health professionals during the COVID-19 pandemic. Muccia et al. (2022) Total score = 75%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				The aims, objectives and purpose were clear.
Method	2. Was the study design appropriate for the stated aim(s)?	X				A cross-sectional design was appropriate. The authors acknowledged that conclusions could be drawn about causality and generalisation among healthcare workers.
Method	3. Was the sample size justified?			X		Sample size was not justified.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X				It was clear the research was about healthcare workers in France.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?		X			The survey was available for a month for all health workers in France and was shared on social networks. Health workers were both in private practice and in hospital settings. It seems

			the sample frame was from an appropriate population that the authors targeted, however 96% of the sample were women and it is unknown if this gender split is representative of the target population (hence partial score).
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	The selection process (cross-sectional sampling) was likely to select participants representative of the population. However, the authors did not ask participants their exact profession, therefore the selection process was hindered to find out if the population was representative.
Method	7. Were measures undertaken to address and categorise non-responders?	X	N=501 participants started the questionnaire, only N=299 completed it fully. These non-full responders were not categorised. This was not discussed further by the authors.
Method	8. Were the risk factor and outcome variables measured	X	The HEXACO-60 (Ashton & Lee, 2009) and

	appropriate to the aims of the study?		‘Compliance with health measures’ questionnaires were appropriate to the study aims.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The HEXACO-60 was a well validated measure that has been trialled, piloted and published. The ‘Compliance with health measures’ questionnaire was novel.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	Yes, $p < .001$, $p < .01$ and $p < .05$ were used for significance level.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	Yes, the methods for the main analysis were clear.
Results	12. Were the basic data adequately described?	X	Yes, socio-demographic data was presented, correlational analysis was used and then regression analysis. This is all described to a good standard.
Results	13. Does the response rate raise concerns about non-response bias? *	X	There is no discussion regarding non-response bias. $N=202$ participants did not fully complete the survey, and the authors did not

			consider the reasons for this. The lack of responses from male health workers could raise concerns about non-response bias.
Results	14. If appropriate, was information about non-responders described?	X	The authors acknowledged, but do not detail reasons for missing data. There is no discussion about non-responders directly, therefore this was scored as partial.
Results	15. Were the results internally consistent?	X	Yes, the data added up and internal consistency was examined. The authors acknowledged and discussed how missing data was dealt with.
Results	16. Were the results presented for all the analyses described in the methods?	X	Yes, all results are described, including those that were non-significant.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	Yes.
Discussion	18. Were the limitations of the study discussed?	X	The authors provided a detailed limitation section, regarding cross-sectional limitations, gender bias, limited internal consistency for the compliance

				questionnaire, and not asking about specific health worker professions.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *		X	The study was conducted without any funding.
Other	20. Was ethical approval or consent of participants attained?	X		The study was approved by the Research Ethics Committee of Toulouse (2020-270) on 22/04/2020.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

COVID-19 pandemic and lockdown: associations with personality and stress components. Smrdu et al. (2021) Total = 67.5% quality						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims of the study were clear: to examine personality and stress in relation to COVID-19 mitigation guidance.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The cross-sectional design was appropriate.

Method	3. Was the sample size justified?	X	Sample size was not justified according to the planned statistical analysis. Authors did comment they had a 'large' sample size.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X	It is clear the study was about the general population.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X	The sample partially represented the general population, however it was acknowledged there was an over-representation of higher educated participants working in cultural, educational and scientific domains.
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	Partial as the authors reported the sample size was biased due to the online survey distribution and data collection methods.
Method	7. Were measures undertaken to address and categorise non-responders?	X	There was no discussion regarding non-responders.
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	They were appropriate.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The Big Five personality scale have been trialled previously. There are some concerns the authors added in further questions which were not trialled previously.
Method	10. Is it clear what was used to determined statistical significance	X	The authors used $p > .05$ as the significance level.

	and/or precision estimates? (e.g., p-values, confidence intervals)		
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	The stages of regression analysis and use of t- and z-scores were clear.
Results	12. Were the basic data adequately described?	X	Information was provided regarding the basic data and sample.
Results	13. Does the response rate raise concerns about non-response bias? *	X	Out of 2467, only 963 participants completed the survey and there was no discussion regarding this non-completion.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	All the data appeared to add up, however there was no discussion regarding missing data.
Results	16. Were the results presented for all the analyses described in the methods?	X	Yes, all results were reported, including non-significant results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding limited generalisability across cultures, sample size bias towards higher educated, and based on self-report scales.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	Unknown.

Other	20. Was ethical approval or consent of participants attained?	X	Ethics approval was unknown, however the authors reported the study was in line with Slovenia's GDPR standards and informed consent was obtained.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Adherence to COVID-19 mitigation measures: The role of socio demographic and personality factors. Turk et al. (2021) Total score = 67.5%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims of the study were clear: to examine the role of socio demographic and personality factors on COVID-19 guideline adherence.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The cross-sectional design was appropriate.
Method	3. Was the sample size justified?				X	There was no discussion regarding whether sample size was appropriate.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X				It was clear the study is about the general population.

Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X	The sample partially represented the general population, however it was acknowledged there was an over-representation of higher educated participants working in cultural, educational and scientific domains.
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	Partial as the authors reported the sample size was biased due to the online survey distribution and data collection methods.
Method	7. Were measures undertaken to address and categorise non-responders?	X	There was no discussion regarding non-responders.
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	They were appropriate.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The Big Five personality scale have been trialled previously. Understandably the COVID-19 questionnaire was not, and the authors report the questionnaire was subjective to Slovenia's specific guidance.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	The authors used $p > .05$ as the significance level.
Method	11. Were the methods (including statistical methods) sufficiently	X	The stages of analysis were very clear and detailed.

	described to enable them to be repeated?		
Results	12. Were the basic data adequately described?	X	Information was provided regarding the basic data and sample. All data was well presented and clear. The use of tables was beneficial.
Results	13. Does the response rate raise concerns about non-response bias? *	X	Out of $N=2467$, only $n=963$ participants completed the survey and there was no discussion regarding this non-completion.
Results	14. If appropriate, was information about non-responders described?		X Unknown.
Results	15. Were the results internally consistent?	X	All the data appeared to add up. There was brief discussion regarding participants missing data resulting in exclusion.
Results	16. Were the results presented for all the analyses described in the methods?	X	Yes, results were reported, including non-significant results. However, this is scored partial as correlation coefficients were not provided in the write-up, only whether they were significant, limiting understanding of the results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding limited generalisability across cultures, sample size bias towards higher educated, and based on self-report scales.

Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	Unknown.
Other	20. Was ethical approval or consent of participants attained?	X	Ethics approval was unknown; however the authors report the study was in line with Slovenia's GDPR standards and informed consent was obtained.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Applying a health-risk behaviour lens to understand individual differences in Covid-19 containment behaviour among young adults. Wallace et al. (2021) Total score = 70%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims of the study were clear: to examine personality traits and containment behaviours, and to examine whether these were similar to other health protective behaviours.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The cross-sectional design was appropriate for the aims.
Method	3. Was the sample size justified?				X	There was no discussion regarding whether sample size was appropriate.

Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X		It was clear the study was about young adults.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?		X	The sample partially represented the general population as university students of higher economic status were the ‘dominant social identifies’. There was also an over-representation of females (75% of the total sample).
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?		X	The authors acknowledge there may have been a selection bias given that university students were chosen.
Method	7. Were measures undertaken to address and categorise non-responders?			X There was no discussion regarding non-responders.
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X		They were appropriate.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X		The Ten Item Personality Inventory has been published previously. Understandably (due to the timing of the study) the COVID-10 containment behaviour scale and health risk behaviour scales were new within this study.
Method	10. Is it clear what was used to determined statistical significance	X		The authors use $p>.05$, $p>.01$ and $p>.001$ were used for significance,

	and/or precision estimates? (e.g., p-values, confidence intervals)		and 95% confidence intervals were discussed.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	The stages of analysis were very clear and detailed.
Results	12. Were the basic data adequately described?	X	Information was provided regarding the basic data and sample characteristics.
Results	13. Does the response rate raise concerns about non-response bias? *	X	There was no discussion regarding non-responders.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	All the data appeared to add up. The authors discussed that missing data was handled using the full information maximum likelihood with MLR estimators: parameters were estimated using all available data for each variable and cases were only excluded if they had missing data on all variables in the model.
Results	16. Were the results presented for all the analyses described in the methods?	X	Yes, all results were reported, including non-significant results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding generalisability given the student sample, female majority, change of attitudes over time and the

				use of the Ten Item Personality Inventory short version lacking sensitivity.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *		X	Unknown.
Other	20. Was ethical approval or consent of participants attained?	X		Ethics approval was provided by the Institutional Review Board of the participating university in Colorado.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Patterns of compliance with COVID-19 preventative behaviours: A latent class of 20,000. Wright et al. (2021) Total score = 80%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims of the study were clear: explore patterns of self-reported compliance with six COVID-29 preventative measures after the first UK lockdown and test whether behavioural patterns related to a wide range of demographic, socio-

			economic and personality trait characteristics.
Method	2. Was the study design appropriate for the stated aim(s)?	X	The cross-sectional design was appropriate for the aims.
Method	3. Was the sample size justified?	X	There was no discussion regarding whether sample size was appropriate, however partial given that a sample of over 20,000 participants is likely to fulfil any sample size need for statistical tests.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X	It was clear the study was about UK residents.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X	The authors discussed using entropy balance to create survey weights according to gender, age, ethnicity, country of residence and educational level using UK population statistics. The authors acknowledged using a non-representative sample, however the sample was heterogenous and weighted.
Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	The authors acknowledged that high compliance was likely to be over-represented (hence the participant choice to complete the survey).
Method	7. Were measures undertaken to address and categorise non-responders?	X	The authors acknowledged a substantial attrition rate but no further discussion (partial as they have acknowledged this).

Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	They were appropriate.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The Big Five Inventory-2 measure has been previously published (although unclear if they used the long or short form). COVID-19 compliance behaviour was measured using six questions (but not previously published).
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	The authors used 95% confidence intervals however significance levels are not further discussed.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	The stages of analysis were very clear and detailed (however this was only when read in combination with the supplementary material).
Results	12. Were the basic data adequately described?	X	Information was provided regarding basic data.
Results	13. Does the response rate raise concerns about non-response bias? *	X	The authors raised concerns there was a substantial attrition rate.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	All the data appeared to add up. The authors provided details regarding 119 participant exclusion due to missing data on key demographic information that was used to construct survey weights.

Results	16. Were the results presented for all the analyses described in the methods?	X	Yes, all results appeared to be reported, but this must be examined using the supplementary material.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding cross-sectional design (biased by unobserved confounding), compliance related to self-report, social desirability, the ongoing pandemic, not recalling compliance accurately, COVID-19 guidance changing over the study period, and non-representative sample.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	The authors reported the study was funded by Nuffield Foundation, MARCH mental Health Network, Cross Disciplinary Mental Health Network and UK research innovation, Wellcome Trust and economic and social research council (UCL university, Bloomsbury and East London Doctoral Training Partnership). It was also funded by Health Wise Wales and Care Research Wales Initiative. The authors reported the funders had no final role in study design, collection, analysis and interpretation or in decision to submit paper for

			publication. All authors were independent of the funders. The study was externally peer reviewed.
Other	20. Was ethical approval or consent of participants attained?	X	Ethics approval was provided by UCL research ethics committee, and participants gave informed consent.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Who complies with the restrictions to reduce the spread of COVID-19?: Personality and perceptions of the COVID-19 situation. Zajenkowski et al. (2020) Total: 77.5%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/ NA/ Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims of the study were clear: examine the influences of personality and perception and the relationship to compliance, and to re-assess this relationship in a real situation.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The cross-sectional design was appropriate for the aims.
Method	3. Was the sample size justified?	X				The authors noted the necessary sample size was determined based on the average effect size in personality

				psychology ($r=.2$) and guidelines ($N=250$) were set for reducing estimation error in personality psychology.
Method	4.	Was the target/reference population clearly defined? (Is it clear who the research was about?)	X	It was clear the study is about Polish residents.
Method	5.	Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	X	The frame was a convenience sample and age appeared to be representative, however there was an over-representation of females.
Method	6.	Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	The authors reported the use of social media to advertise the study may have attracted those of higher income and education (not necessarily representative of the Polish population).
Method	7.	Were measures undertaken to address and categorise non-responders?	X	No discussion regarding this.
Method	8.	Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	They were appropriate.
Method	9.	Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The 20 item International Personality Pool has been published/trialled. There was only one question regarding compliance that was not pre-tested.

Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	It was clear $p < .05$ and $p < .01$ were used as significance levels.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	The regression models were clear. However, the supplementary information was needed to understand the full statistical method design.
Results	12. Were the basic data adequately described?	X	Information was provided regarding basic data.
Results	13. Does the response rate raise concerns about non-response bias? *	X	The authors did not discuss this.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	All the data appeared to add up. However the authors did not discuss how they dealt with missing data.
Results	16. Were the results presented for all the analyses described in the methods?	X	All results appear to be reported in the write up and supplementary information.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding a WEIRD sample, social media sample, low scorers on personality traits unlikely to participate, and issues with measuring compliance with a single question.

Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	The authors were awarded funds by the Ministry of Science and Higher Education in the form of a subsidy for maintenance and development of research and the second author was funded by the Polish National Agency for Academic Exchange. No conflicts are observed from this.
Other	20. Was ethical approval or consent of participants attained?	X	Ethics approval committee board not named, however the authors reported the procedures were performed in accordance with ethical standards of the institutional research ethics committee.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Appendix G

AXIS Quality Assessment Studies Not Meeting Cut-off (60% or Lower)

Sociodemographic and psychological correlates of compliance with the COVID-19 public health measures in France. Brouard et al. (2020) Total score = 50%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims of the study were very clear and its positive hypotheses were provided for each IV.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The longitudinal cohort cross-sectional design was appropriate.
Method	3. Was the sample size justified?			X		The authors provided no detail regarding how they decided upon a sample size.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	X				It was clear the study was about a French sample.
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?		X			Partial, as the participants opted into the study via the French Election Survey (not necessarily representative of the population).

Method	6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	X	No detail is provided regarding how the 1010 participants were selected from the French Election Survey (hence a partial score).
Method	7. Were measures undertaken to address and categorise non-responders?	X	No discussion regarding this.
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	The study followed the same research design to assess emotional responses to the 2015 Paris terrorist attacks. The risk factor and outcome variables appeared appropriate (and design was previously tested).
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The 20 item International Personality Pool has been published/trialled. The COVID compliance survey was new for this study.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	The authors use a range of $p > .05$, $p > .01$, $p > .001$ to determine significance.
Method	11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	X	These were clear.
Results	12. Were the basic data adequately described?	X	Demographic data discussion was not clear (e.g., no range of age, unknown how many individuals of

			specific gender). The supplementary information also did not provide this.
Results	13. Does the response rate raise concerns about non-response bias? *	X	The authors did not discuss this.
Results	14. If appropriate, was information about non-responders described?	X	Unknown.
Results	15. Were the results internally consistent?	X	All the data appeared to add up. However there was no justification regarding missing data. Internal consistency regarding the COVID-19 behaviour questionnaire was discussed, however the personality questionnaire does not have internal consistency scores.
Results	16. Were the results presented for all the analyses described in the methods?	X	Most results appear to be reported in the write up, including non-significant results. However, pre-data checks prior to regression analyses would have been beneficial to report and state. The authors stated controlling for fear, anger and hope as research suggested they would be intercorrelated. No correlations were presented in the results as confirmation of this.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X	The study achieved its aims, however the discussion is limited and does not link to previous research or theory. For example, although personality traits linked to COVID-

			19 rule-breaking were included in the results, and discussed briefly, the specific personality traits are not discussed fully in the discussion. The conclusions are rather limited in their explanations. The authors claimed the results can provide a basis for future policymakers to evaluate the effectiveness of their measures, however give no detail about how to do this in relation to the current results.
Discussion	18. Were the limitations of the study discussed?	X	The authors discussed limitations regarding social desirability and changes in compliance increasing after study completion. Scored as partial given the authors only provide two limitations (e.g., representativeness of the sample could have been discussed).
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	Unknown.
Other	20. Was ethical approval or consent of participants attained?	X	It was assumed ethical consent was needed for the initial French Election Survey, however this is not discussed.

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Personality and early susceptibility to Covid-19 in the United Kingdom. Kanazawa (2021) Total score = 57.5%						
Area of study	Question	Score: Yes (2pts)	Score: Partial (1pt)	Score: No (0pts)	Score: Unclear/NA/Unknown (0pts)	Explanation
Introduction	1. Were the aims/objectives of the study clear?	X				Aims of the study were clear and how this contributed to the wider literature. More specific aims/hypotheses could have been provided.
Method	2. Was the study design appropriate for the stated aim(s)?	X				The longitudinal cohort cross-sectional design was appropriate.
Method	3. Was the sample size justified?			X		The authors provided no detail regarding sample size justification.
Method	4. Was the target/reference population clearly defined? (Is it clear who the research was about?)		X			It is clear the study is about a UK sample. The study does not advise that it was specifically examining COVID-19 behaviour for a 62 year old range (instead suggesting it is generalisable to the overall general population).
Method	5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?		X			Partial given that participants were all of the same age/majority Caucasian (from the same cohort) and therefore not representative of the current UK population.
Method	6. Was the selection process likely to select subjects/participants that were representative of the			X		All participants within the wider cohort study were contacted for the COVID compliance questionnaire,

	target/reference population under investigation?		however all participants were 62 years old (according to the author), yet the author makes conclusions regarding the general population. Therefore the selection process of using these participants was unlikely to be representative of the general population.
Method	7. Were measures undertaken to address and categorise non-responders?	X	Only 58.9% returned the questionnaire. No detail was provided regarding the representativeness of those who completed the survey (despite this data being available from the wider cohort study).
Method	8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	X	They were appropriate.
Method	9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	X	The International Personality Item Pool questionnaire has been trialled/piloted previously. The COVID compliance survey was new within the study and therefore not trialled/published.
Method	10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)	X	The authors use a range of $p < .05$, $p < .01$, $p < .001$ to determine significance.
Method	11. Were the methods (including statistical methods) sufficiently	X	Yes, the study was clear about the statistical analysis and methods used.

	described to enable them to be repeated?			
Results	12. Were the basic data adequately described?	X		Demographic information was discussed, however there was some information missing e.g., no information regarding gender ratio.
Results	13. Does the response rate raise concerns about non-response bias? *		X	Given there was such a substantial non-response, non-response bias could have been present, however this was difficult to determine given the answer to question 14.
Results	14. If appropriate, was information about non-responders described?		X	The author did not discuss this, despite acknowledgement of a substantial non-response. Given the wider cohort data available, there would have been opportunity to analyse non-response.
Results	15. Were the results internally consistent?	X		Internal consistency was not reported for either the personality or COVID-19 questionnaires. There was some discussion regarding missing data e.g., the participant may have died of COVID-19.
Results	16. Were the results presented for all the analyses described in the methods?	X		All results appeared to be reported in the write up, including non-significant results.
Discussion	17. Were the authors' discussions and conclusions justified by the results?	X		The study achieved its aims.
Discussion	18. Were the limitations of the study discussed?		X	The author mentions limitation with regards to same age of participants

			(cohort study). Unfortunately, no further limitations were discussed, which does not provide opportunity for future research to build on the current research (accounting for its acknowledged limitations). Therefore a score of 0 was provided.
Other	19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *	X	The author reported there were no real or perceived conflicts of interest, and no external funding was used for the research.
Other	20. Was ethical approval or consent of participants attained?	X	There author reported no ethical approval was needed given there were no human or animal subjects involved in the research e.g., participants consented to the wider study. Concerns are raised about whether participants consented for this study to be published/their data to be included (and whether additional consent was needed for the COVID-19 survey they completed).

*Question is reverse scored e.g., 2 = 0, 1 = 1, 0 = 2

Appendix H**Overall AXIS Quality Assessment Scores (Downes et al., 2016)**

Authors	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	13b.	14.	15.	16.	17.	18.	19.	19b.	20.	Total	Quality %
Biondi et al. (2021)	2	2	0	2	2	1	0	2	2	2	2	2	0	0	0	1	2	2	2	0	0	2	28	70
Bogg & Milad (2020)	2	2	2	2	2	2	0	2	2	2	2	2	0	0	0	2	2	2	2	0	2	2	34	85
Čavojová et al., 2022	2	2	0	2	2	2	0	2	2	2	2	2	0	0	0	1	1	2	1	0	2	0	27	67.5
Kleitman et al. (2021)	2	2	2	2	2	1	0	2	2	2	2	2	0	0	0	2	2	2	2	0	2	2	33	82.5
Milad & Bogg (2021)	2	2	2	2	2	2	1	2	2	2	2	1	1	0	0	2	1	2	2	0	0	2	31	77.5
Muccia et al. (2022)	2	2	0	2	1	1	0	2	2	2	2	2	2	0	1	2	1	2	2	0	2	2	30	75
Šmrdu et al. (2021)	2	2	0	2	2	1	0	2	1	2	2	2	2	0	0	1	2	2	2	0	0	2	27	67.5
Turk et al. (2021)	2	2	0	2	1	1	0	2	2	2	2	2	2	0	0	2	1	2	2	0	0	2	27	67.5
Wallace et al. (2021)	2	2	0	2	1	1	0	2	2	2	2	2	0	0	0	2	2	2	2	0	0	2	28	70
Wright et al. (2021)	2	2	1	2	1	1	1	2	2	1	2	2	1	1	0	2	2	2	2	0	2	2	31	80
Zajenkowski et al. (2020)	2	2	2	2	1	1	0	2	2	2	1	2	0	0	1	1	2	2	2	0	2	2	31	77.5

Question 13b and 19b reversed scored; 13 and 19 therefore not included in total; (No=2, Partial=1, Yes=0, don't know/unknown=0)

Question numbers refer to:

1. Were the aims/objectives of the study clear?
2. Was the study design appropriate for the stated aims?
3. Was the sample size justified?
4. Was the target/reference population clearly defined? (Is it clear who the research was about)?
5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?
6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?
7. Were measures undertaken to address and categorise non-responders?
8. Were the risk factor and outcome variables measured appropriate to the study aims?
9. Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?
10. Is it clear what was used to determine statistical significance and/or precision estimates? (e.g., p-values, confidence intervals)
11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?
12. Were the basic data adequately described?
13. Does the response rate raise concerns about non-response bias?
- 13b. Question 12 REVERSE SCORING
14. If appropriate, was information about non-responders described?
15. Were the results internally consistent?
16. Were the results presented for all the analyses described in the methods?
17. Were the authors' discussions and conclusions justified by the results?
18. Were the limitations of the study discussed?
19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?
- 19b. Question 19 REVERSE SCORING
20. Was ethical approval or consent of participants attained?

Appendix I**Research Advertisement/Participant Invitation**

Dear all,

I am a Trainee Forensic Psychologist on the Forensic Psychology Practice Doctorate at the University of Birmingham.

You are invited to take part in this survey which explores human characteristics and behavioural responses to the COVID-19 Pandemic. The study will take approximately 30 minutes to complete, and consists of a survey you can complete online.

Please click on the link below, and you will be provided with further information about the study and a consent form which needs to be agreed to prior to your participation.

Link

Thank you,

Louise Latham
University of Birmingham

Appendix J**Participant Demographic Information**

Demographic	Subtype	<i>N</i>	%
Gender Identity	Overall	469	N/A
	Male	90	19.2%
	Female	375	80.0%
	Other	3	0.6%
	Do not wish to disclose	1	0.2%
Ethnicity	White British	318	67.8%
	White European	0	0
	White Other	13	2.8%
	Black British	20	4.3%
	Black European	1	0.2%
	Black Other	4	0.9%
	Asian British	63	13.4%
	Asian European	4	0.9%
	Asian Other	19	4.1%
	Any other mixed/multiple ethnic background	21	4.5%
Religion	Any other ethnic background	5	1.1%
	Christian	111	23.5%
	Islam	41	8.7%
	Hindu	12	2.6%
	Catholic	12	2.6%
	Buddhist	3	0.6%
	Agnostic	19	4.1%
	Atheist	40	8.5%
	Jewish	15	3.2%
	Other	17	3.6%
Employment	No religion	182	38.8%
	In full-time education	226	48.2%
	In part-time education	8	1.7%
	Employed (full-time or part-time)	114	24.3%
	In education and employed	67	14.3%
	Unemployed	10	2.1%
	Retired	38	8.1%
Disability	N/A	6	1.3%
	No	446	95.1%
Mental Health Condition	Yes	18	3.8%
	No	395	84.2%
Marital Status	Yes	65	13.9%
	Single	297	63.3%
	Married	94	20%
	Civil Partnership	2	0.4%
	Co-habiting	48	10.2%
	Other	23	4.9%

Country	England	454	96.8%
	Wales	6	1.3%
	Scotland	8	1.7%
	Northern Ireland	1	0.2%
Residence	Town	136	29.0%
	City	269	57.4%
	Village	58	12.4%
	Countryside	5	1.1%

Appendix K

Participant Information Sheet

Participant Information Sheet

What is the purpose of the study?

This study will examine the relationship between human characteristics and behavioural responses to COVID-19 Pandemic.

Why have I been chosen to take part?

You are invited to take part in this study because you are over the age of 18 years, and you have lived in the UK since December 2019. You have accessed the study through XX.

What is involved?

The survey will take approximately 30 minutes to complete and it will include a number of questionnaires regarding your own individual characteristics and behavioural response towards the COVID-19 Pandemic. Specifically it will consist of:

- A demographic questionnaire to gather some basic information about you.
- A questionnaire about your behavioural responses to the COVID-19 Pandemic.
- Two questionnaires about your own personal characteristics.

What are the benefits of me taking part?

- The results of the survey will benefit wider society by informing and evaluating COVID-19 behavioural responses.
- All participants will be given the choice at the end of the survey to provide their email to be entered into three prize draws for £20 Amazon vouchers. There will be a separate link to another survey to provide your email address if you wish to be entered for the prize draw. This will ensure your answers in the survey are not identifiable, and your email will be stored separately from the research data for the purposes of the prize draw.

What are the risks of me taking part?

- There are no foreseeable personal risks in taking part in the survey.
- Some of the questions will ask about your behaviour in relation to the government guidelines and rules during the COVID-19 Pandemic. Please be aware that your responses are fully anonymised i.e. no information by which you could be identified will be collected. As such, there will be no consequences or actions regarding your answers, so please try to answer the questions honestly.

Are my answers confidential and anonymous?

All the answers you provide in the survey will remain confidential and anonymous. The data will only be seen by the researcher and research supervisor, and this will not be identifiable.

What if I want to withdraw from the study?

Your participation is entirely voluntary, and you are able to withdraw at any stage of the survey. You can do this by:

1. Choosing not to provide consent for the survey.
2. Closing the survey on your internet browser.
3. After completion of the survey you will be provided with the debrief information. There is an option here to withdraw if you wish. Please note, you cannot withdraw your data after this stage.

Please note, if something goes wrong when completing the study, re-start the Qualtrics page, and the previous survey you completed will be deleted (as there will be missing answers to questions). If you have any further issues, please email the lead researcher.

What will happen to the information I have provided?

The data you provide will be stored for 10 years in accordance with the General Data Protection Regulations (GDPR) under the Data Protection Act (2018). Your data will be archived by the University of Birmingham, which can be accessed by the lead researcher, Louise Latham, and the research supervisor, Dr Zoe Stephenson. After 10 years, the data will be deleted. The anonymised research data will be used in a research project, published articles, and presentations. If you decide to provide your email address for the prize draw, the email address will be stored separately in an encrypted password protected document on the University of Birmingham Research Data Store. Your e-mail address will not be shared with any third parties and will be deleted following the prize draw.

Louise Latham
Researcher, Forensic Psychology Practice Doctorate
University of Birmingham
Email: [REDACTED]

Dr Zoe Stephenson
Research Supervisor
University of Birmingham
Email: [REDACTED]

Do you wish to continue? If you click 'Yes', you will be taken to the consent form. If you click 'No', you will exit the study.
Yes / No

Appendix L

Participant Consent Form

Consent Form

This study aims to examine human characteristics and behavioural response to the COVID-19 Pandemic.

The research is being conducted by Louise Latham, a Trainee Forensic Psychologist, on the University of Birmingham Forensic Psychology Practice Doctorate.

You have been invited to complete this survey because you are aged 18 years or over, and you have lived in the UK since December 2019. The survey involves a number of questionnaires to complete. Each questionnaire will be explained so you understand how to answer the questions.

The data you will provide is being collected as part of the research project and the anonymised information can only be accessed by the lead researcher and research supervisor. The information will be stored by the University of Birmingham for 10 years, and your data will only be used for this study. The survey should take approximately 30 minutes.

By consenting to this study, you are agreeing to the following:

- I confirm that I have read and understood the research participation information sheet provided.
- I understand my participation is voluntary, and I can withdraw at any time, either by exiting the browser, or clicking the option to withdraw at the end of the study. If I withdraw, I understand my data will be permanently deleted.
- I understand my answers are confidential and anonymous. The data will be used solely for this research.
- I understand the project was approved by the University of Birmingham Ethics Committee on 20th December 2021.
- I am over the age of 18 years.
- I have lived in the UK since December 2019.
- Based on the above, I agree to taking part in the research.

If you consent to participating in the study please click ‘I consent’

If you would like to see the information sheet again please click ‘Go back to previous page’.

If you do not consent, please click ‘I do not consent’ and you will be taken to the exit page.

Participants who click ‘Yes I consent’ will be taken to the start of the survey.

Appendix M

Demographic Questionnaire

The first section asks questions about your demographic information.

For all of these demographic questions, please select N/A if you do not wish to disclose.

1. What is your gender identity?

- a. Female
- b. Male
- c. Other
- d. Do not wish to disclose

2. How old are you? (please enter N/A if you prefer not to disclose)

3. Ethnicity: (select N/A if you do not wish to disclose)

- a. White British
- b. White European
- c. White Other
- d. Black British
- e. Black European
- f. Black Other
- g. Asian British
- h. Asian European
- i. Asian Other
- j. Any other mixed/multiple ethnic background
- k. Any other ethnic group
- l. N/A

4. Religion: (select N/A if you do not wish to disclose)

- a. Christianity
- b. Islam
- c. Hinduism
- d. Catholicism
- e. Buddhism
- f. Agnostic
- g. Atheist
- h. Judaism
- i. Other
- j. No religion
- k. N/A

If other, please specify: _____

5. Employment Status:

- a. In full-time education
- b. In part-time education
- c. Employed (full or part-time)
- d. In education and employed
- e. Unemployed
- f. Retired
- g. N/A

6. Do you consider yourself disabled?

- a. Yes
- b. No
- c. N/A

If yes, please indicate type or nature of disability

7. Do you have a current mental health condition or diagnosis?

- a. Yes
- b. No
- c. N/A

If yes, please indicate type or nature of mental health condition or diagnosis

8. What is your marital status?

- a. Single
- b. Married
- c. Civil Partnership
- d. Co-habiting
- e. Other
- f. N/A

9. Where do you currently reside?

- a. England
- b. Scotland
- c. Wales
- d. Northern Ireland

10. Where do you live?

- a. City
- b. Town
- c. Village
- d. Countryside
- e. N/A

Appendix N

COVID-19 Rule-Breaking Questionnaire

Behavioural Responses to the COVID-19 Pandemic Questionnaire

This questionnaire will ask you about your behaviour during the COVID-19 Pandemic. Please note, this questionnaire is for research purposes, and there will be no consequences regarding your answers. The answers to this questionnaire are anonymous, and your answers will not be linked to personally identifiable information. Please answer each question as honestly as you can.

Preliminary questions:

1. **To your knowledge, are you, or have you been, infected with COVID-19?**
 - a. Yes
 - b. No
 - c. Unsure
- a. **If yes, was your Coronavirus:**
 - (i) Severe
 - (ii) Mild
 - (iii) I did not notice symptoms
 - b. **If yes, was your Coronavirus:**
 - (i) Confirmed by a test
 - (ii) Not confirmed by a test
2. **Do you know friends or family who are, or have been, infected with COVID-19?**
 - a. Yes
 - b. No
3. **Did any of your friends or family die from COVID-19?**
 - a. Yes
 - b. No
4. **Did you understand the guidance, rules and laws implemented by the Government during the COVID-19 Pandemic?**
 - a. Yes
 - b. No
 - c. Some
5. **Did you follow the guidance and rules of how to protect yourself from COVID-19?**
 - a. Always
 - b. Most of the time

- c. Sometimes
 - d. Never
- 6. During the COVID-19 pandemic were you classified as a keyworker (e.g., health care worker, teacher etc)?**
- a. Yes
 - b. No
 - c. I don't know
- 7. During the COVID-19 Pandemic were you classified as vulnerable or very clinically vulnerable?**
- a. Yes
 - b. No
 - c. I don't know
- i. If yes, were you classified as vulnerable or very clinically vulnerable due to:**
- 1. Age
 - 2. Health condition
 - 3. Other
- 8. During the COVID-19 Pandemic were you asked to shield?**
- a. Yes
 - b. No
 - c. I don't know
- 9. Have you ever been convicted of a criminal offence?**
- a. Yes
 - b. No
 - c. I don't know
 - d. I don't want to disclose
- 10. Have you served a sentence for a criminal offence?**
- a. Yes
 - b. No
 - c. I don't know
 - d. I don't want to disclose
- 11. Have you ever received a caution, reprimand or warning for a criminal offence?**
- a. Yes
 - b. No
 - c. I don't know
 - d. I don't want to disclose

12. Have you ever received a Fixed Penalty Notice or Penalty Notice for Disorder? (not within the COVID-19 Pandemic).

- a. I have received a Fixed Penalty Notice
- b. I have received a Penalty Notice for Disorder
- c. I have received both
- d. No
- e. I don't want to disclose

If you have received a Fixed Penalty Notice or Penalty Notice for Disorder, please provide details e.g., why you received this, how much was the fine?

13. Have you received a Fixed Penalty Notice for breaking the COVID-19 Laws?

- a. Yes
- b. No
- c. I don't know
- d. I don't want to disclose

If you have received a Fixed Penalty Notice for breaking the COVID-19 Laws, please provide details e.g. why you received this, how much was the fine?

The next set of questions examine your behaviour during the COVID-19 Pandemic.

Please note, these questions refer to the following periods:

- First National Lockdown (March to June 2020).
- Second National Lockdown (November 2020).
- Third National Lockdown (January to March 2021).

Each question specifies whether it relates to advice/recommendations (e.g., NHS/Government guidance) or Legislation (laws).

In terms of laws, the questions refer to the overall UK Health Protection (Coronavirus Regulations) 2020. A list of specific laws is provided below:

- The Health Protection (Coronavirus, Wearing of Face Coverings in a Relevant Place) Regulations 2020, Requirement to wear a face covering whilst entering or remaining within a relevant place.

- The Health Protection (Coronavirus, Wearing of Face Coverings on Public Transport) Regulations 2020, Requirement to wear a face covering when on public transport.
- The Health Protection (Coronavirus Restrictions) 2020, Restrictions on movement e.g., to travel for the purposes of work or to provide voluntary or charitable services, where it is not reasonably possible for that person to work, or to provide those services, from the place where they are living and during the emergency period, no person may leave the place where they are living without reasonable excuse.
- The Health protection (Coronavirus Restrictions) 2020, Restrictions on gatherings.
- The Health Protection (Coronavirus, Restrictions) (Self-Isolation), Regulations 2020, Requirements on person notified as a close contact of a person who has tested positive for coronavirus.
- Government Legislation: The Health Protection (Coronavirus, International Travel) Regulations 2020, Requirement to self-isolate.
- Wales Government Legislation: The Health Protection (Coronavirus Restrictions) (Wales) (Amendment) Regulations 2020 e.g., Regulations so that the requirement to take all reasonable measures to ensure that a distance of 2 metres is maintained between persons in a place of worship, crematorium or community centre does not apply to persons from the same household or to carers and persons they are caring for.
- Scotland Legislation: The Health Protection (Coronavirus) (Restrictions and Requirements) (Scotland) Regulations 2020 e.g., an employee of that person or a volunteer at that place, where (i) there is a partition between the person, employee or volunteer and members of the public, or (ii) a distance of at least two metres is maintained between the person, employee or volunteer and members of the public.
- Northern Ireland Legislation: The Health Protection (Coronavirus, Restrictions) Regulations (Northern Ireland) 2021 e.g., that the persons referred to in paragraph maintain a distance of 2 metres from each other (unless members of the same or a linked household) by altering the layout of a relevant place including those parts to which visitors do not customarily have access, managing and controlling the use of points of access and egress, shared facilities (such as toilets) and managing and controlling the means of moving from one part of a relevant place to another; that persons waiting to enter a relevant place maintain a distance of 2 metres from each other (unless members of the same or a linked household).

In terms of advice/recommendations, the questions refer to:

- HM Government and NHS COVID-19 Prevention Guidance.
- NHS COVID-19 guidance to avoid catching and spreading COVID-19.
- Government advice Stay at Home: Guidance for households with possible or confirmed coronavirus (COVID-19) infection (2020): Anyone who has any of the main symptoms of COVID-19 should stay at home and, self-isolate immediately. They should order a PCR test unless they have already taken a

Lateral Flow Device test and the result was positive.

Hygiene practises

- 1. During the COVID-19 Pandemic, did you follow advice and recommendations to wash your hands?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
- 2. During the COVID-19 Pandemic, did you follow advice and recommendations to avoid touching your eyes, mouth and nose with unwashed hands?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
- 3. During the COVID-19 Pandemic, did you follow the law to wear a mask (e.g., on public transport, in shops)?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
- 4. During the COVID-19 Pandemic, did you think it was necessary to follow the law to wear a mask that covered the nose and mouth when entering indoor venues (e.g., shops, doctors surgeries, public transport)?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never

Social-distancing and social-activity

- 1. During the COVID-19 Pandemic, did you follow the social interaction laws (e.g., social distancing, gathering restrictions)?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
- 2. During the COVID-19 Pandemic, did you abide by physical distancing advice and recommendations e.g., 1 or 2 metres?**
 - a. Always

- b. Most of the time
 - c. Sometimes
 - d. Never
3. **During the COVID-19 Pandemic, did you follow the law related to meeting up with others (i.e., only exercising with one person, group of six)?**
- a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
4. **During the COVID-19 Pandemic, did you follow the law not to meet people either outdoors or indoors?**
- a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never

Isolation

1. **During the COVID-19 Pandemic, if you had been in contact with someone who tested positive for COVID-19, did/would you follow advice and recommendations to get tested?**
- a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
2. **During the COVID-19 Pandemic, if you had been in contact with someone who tested positive for COVID-19, did/would you abide by the self-isolation laws?**
- a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
3. **During the COVID-19 Pandemic, if you tested positive for COVID-19 and were asked to share with health authorities the names of people you have been in contact with, did/would you follow the law and share all names?**
- a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
4. **During the COVID-19 Pandemic, did you follow the law to avoid leaving the house more than once a day (other than for essential reasons or reasons sanctioned by the Government)?**
- a. Always

- b. Most of the time
- c. Sometimes
- d. Never

Travel

- 1. During the COVID-19 Pandemic, did you abide by laws regarding public (e.g., only essential travel)?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
- 2. During the COVID-19 Pandemic, did you follow the law to avoid travelling on public transport for leisure activities?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
- 3. During the COVID-19 Pandemic, did/would you abide by the law to self-isolate after travelling abroad (e.g., to self-isolate for 10 days to two weeks after)?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
- 4. During the COVID-19 Pandemic, did you follow the law to *stay local* to your area when leaving the house?**
 - a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never

Final questions

- 1. During the COVID-19 lockdown periods, approximately how many times in total would you say you broke the COVID-19 laws?**

Please note, the House of Commons Library Coronavirus Lockdown Laws summarises the laws into the following categories:

- Gathering Restrictions (e.g., household mixing, rule of six).
- Movement Restrictions (e.g., leaving home without a reasonable excuse, laws preventing travel outside of local area, ban on leaving the UK).
- Business restrictions (e.g., restricted opening hours, sale of alcohol).
- Face coverings (in certain public places).

- Self-isolation (for those who tested positive for the coronavirus and their close contacts to self-isolate).
- Businesses Restrictions (e.g., to ensure distancing between and to limit the size of parties making bookings).
- International Travel Restrictions (e.g., requiring those arriving in the UK from specified countries to quarantine).
- Requirements for entry to certain venues/events.

Please enter a number/estimate of the number of times you broke these laws:

2. What were the reasons why you broke the rules? Please select all that apply.

- a. Financial/economic
- b. Social
- c. Psychological
- d. Political
- e. Cultural
- f. Practical
- g. Exercise
- h. Other

If 'other', please explain

3. If you broke the Coronavirus rules, regulations, guidance, and laws, what were your reasons for doing so? Please select all appropriate answers

- a. I visited family members/friends
- b. I attended a special event (e.g., birthday party).
- c. There were reasons I wasn't able to self-isolate after being told to do so.
- d. I thought the government rules were not going to be effective in reducing the spread of COVID-19.
- e. I thought the government rules weren't necessary.
- f. I didn't like wearing a mask.
- g. I needed to see friends and/or family for my mental health.
- h. I needed to leave the house more than once a day for my mental health.
- i. I am an extrovert so I need to have human contact.
- j. I needed to leave the house more than the government guidelines allowed.
- k. I didn't like/agree with the rules/guidance/laws/boundaries/restrictions.
- l. Other people were sticking by the rules, so I would be safe.
- m. I thought I would be safe when I broke the rules
- n. Other people broke the rules, so I thought I would too.
- o. The information provided in the media/government about the severity of COVID-19 is false.
- p. Other

As you chose 'other', please explain:

Appendix O

International Personality Disorder Examination-Screening Questionnaire (IPDE-SQ) Example Items (Loranger et al., 1997)

Directions

This questionnaire examines your own behavioural characteristics. The main aim of this questionnaire is to learn what type of person you have been in general throughout the last five years, or since the age of 18 years. Please answer TRUE or FALSE to the questions (Loranger et al., 1997).

Example Items

Question Example	Reverse Scored?	Personality Trait
"I'm a very cautious person".	No	Anankastic
"I fight for my rights even when it annoys people".	No	Paranoid
"Everyone needs a friend or two to be happy".	Yes	Schizoid
"I often seek advice or reassurance about everyday decisions".	No	Dependent

Note. 59 items in total, scoring is described in Chapter 3 Method. For copyright purposes the full measure and scoring is not included here. Source: Loranger et al. (1997, p. 135).

Appendix P

HEXACO-PI-R-100 Personality Questionnaire Example Items (Lee & Ashton, 2018)

Directions

On the following pages you will find a series of statements about you. Please read each statement and decide how much you agree or disagree with that statement using the following scale:

- 5 = Strongly agree
- 4 = Agree
- 3 = Neutral (neither agree nor disagree)
- 2 = Disagree
- 1 = Strongly Disagree

Please answer every statement, even if you are not completely sure of your response.

Example Items

Question Example	Reverse Scored?	Personality Trait
"I don't mind doing jobs that involve dangerous work".	Yes	Emotionality
"In social situations, I'm usually the one who makes the first move".	No	Extraversion
"I make a lot of mistakes because I don't think before I act".	Yes	Conscientiousness
"I don't think of myself as the artistic or creative type".	No	Openness to Experience

Note. 100 items in total, scoring is described in Chapter 3 Method. For copyright purposes the full measure and scoring is not included here. Source: Lee and Ashton (2018).

Appendix Q

Participant Debrief Sheet

Participant Debrief Sheet

Please note, your survey is not completed until you have provided a response to the final question at the end of the debrief information.

Thank you for your participation in the survey. The answers have now been submitted to the researcher.

The current study aims to examine the relationship between personality traits and COVID-19 rule-breaking behaviour. The two characteristics questionnaires you completed examined personality traits, and the research hopes to find which personality traits are linked to COVID-19 rule-breaking and which are linked to rule-compliance.

Please note, individual feedback regarding personality traits will not be provided, and the two questionnaires used were screening tools only and are not to be used for further assessment.

The results the study will have important implications for the evaluation of government guidance for COVID-19 rule-breaking, and understanding the personality traits related to both non-compliance and low-level crime. The study findings could be helpful to design further COVID-19 rules and regulations, and inform potential future disease outbreak guidance. The data will not be identifiable and there will be no consequences of taking part in the study.

If you have any further questions, please contact:

Louise Latham
Researcher, Forensic Psychology Practice Doctorate
University of Birmingham
Email: [REDACTED]

Dr Zoe Stephenson
Research Supervisor
University of Birmingham
Email: [REDACTED]

If you have experienced any distress after the survey, and would like further support or advice, please look at the list below. Details regarding the most up-to-date COVID-19 rules and regulations can also be found below:

Red Cross COVID-19 support:
Contact number: 0808 588 1957
Website: <https://www.redcross.org.uk/get-help/coronavirus>

SupportLine:

A confidential emotional support line, specific for COVID-19.

Contact Number 01708 765200

Email: info@supportline.org.uk

Website: <https://www.supportline.org.uk/problems/coronavirus-COVID-19/>

Coronavirus information:

<https://www.gov.uk/coronavirus>

<https://www.gov.uk/guidance/national-lockdown-stay-at-home>

Now you have read the debrief information regarding the real nature of the study, are you happy for your data to be used for the research?

‘Yes, I am happy for my data to be used for the research’.

‘No, I am not happy for my data to be used for the research and I wish to withdraw’.

If participants click ‘Yes’, they will be asked:

If you wish to be provided with feedback regarding the results to the study, or you wish to be entered in to the three £20 Amazon prize draws, please click here (link to separate Qualtrics survey).

Appendix R

Amazon Prize Draw Form

As you have agreed for your data to be used for the research, you can now enter to win one of three £20 Amazon vouchers, and be provided with feedback regarding the study results.

Please note, this is a separate survey to ensure your data is anonymous and confidential. Your email address will not be linked to the data you provided in the survey.

1. If you would like to be entered for the opportunity to win one of three £20 Amazon voucher please type your email address here:

.....

2. If you would like to be provided with feedback regarding results to the study please type your email address here:

.....

Thank you for your participation!

Appendix S

Outcome Variables (Rule-Breaking Types) Further Information

Rule-Breaking Type	COVID-19 Behaviour Questions	Guidance /Law?	Legislation/Example	Reference
Hygiene rule-breaking	During the COVID-19 Pandemic, did you follow advice and recommendations to wash your hands?	Guidance	HM Government and NHS COVID-19 Prevention Guidance (2020). NHS COVID-19 guidance to avoid catching and spreading COVID-19 (2020).	NHS (2020a); UK Health Security Agency (2020). NHS (2020b).
	During the COVID-19 Pandemic, did you follow advice and recommendations to avoid touching your eyes, mouth and nose with unwashed hands?	Guidance	HM Government and NHS COVID-19 Prevention Guidance (2020). NHS COVID-19 guidance to avoid catching and spreading COVID-19 (2020).	NHS (2020a); UK Health Security Agency (2020). NHS (2020b).
	During the COVID-19 Pandemic, did you follow the law to wear a mask (e.g., on public transport, in shops)?	Law	The Health Protection (Coronavirus, Wearing of Face Coverings in a Relevant Place) Regulations 2020, “Requirement to wear a face covering whilst entering or remaining within a relevant place” (Coronavirus Act 791, 2020, para. 1).	England: Coronavirus Act 791 (2020). Northern Ireland: Coronavirus Act 151 (2020). Scotland: Coronavirus Act 279 (2020). Wales: Coronavirus Act 1609 (2020).
		Law	The Health Protection (Coronavirus, Wearing of Face Coverings on Public Transport) Regulations 2020 “Requirement to wear a face covering when on public transport” (Coronavirus Act 592, 2020, para. 1).	England: Coronavirus Act 592 (2020). Northern Ireland: Coronavirus Act 151 (2020). Scotland: Coronavirus Act 103 (2020). Wales: Coronavirus Act 1609 (2020)
	During the COVID-19 Pandemic, did you think it was necessary to follow the law to wear a mask that covered the nose and mouth when entering indoor venues (e.g., shops, doctors surgeries, public transport)?	Law	The Health Protection (Coronavirus, Wearing of Face Coverings in a Relevant Place) Regulations 2020, “Requirement to wear a face covering whilst entering or remaining within a relevant place” (Coronavirus Act 791, 2020, para 1).	England: Coronavirus Act 791 (2020). Northern Ireland: Coronavirus Act 151 (2020). Scotland: Coronavirus Act 279 (2020). Wales: Coronavirus Act 1609 (2020).
		Law	The Health Protection (Coronavirus, Wearing of Face Coverings on Public Transport) Regulations 2020 “Requirement to wear a face	England: Coronavirus Act 592 (2020). Northern Ireland: Coronavirus Act 151 (2020).

			covering when on public transport” (Coronavirus Act 592, 2020, para. 1).	Scotland: Coronavirus Act 103 (2020). Wales: Coronavirus Act 1609 (2020).
Social-distancing/social-activity rule-breaking	During the COVID-19 Pandemic, did you follow the social interaction laws (e.g., social distancing, gathering restrictions)?	Law	The Health protection (Coronavirus Restrictions) 2020 “Restrictions on gatherings” (Coronavirus Act 907, para 1)/ “Powers relating to events, gatherings and premises” in Northern Ireland/Scotland/Wales (e.g., Coronavirus Act Schedule 22, 2020(a, b, c), para. 1).	England: Coronavirus Act 907 (2020). Northern Ireland: Coronavirus Act Schedule 22 (2020a). Scotland: Coronavirus Act Schedule 22 (2020b). Wales: Coronavirus Act Schedule 22 (2020c).
	During the COVID-19 Pandemic, did you abide by physical distancing advice and recommendations e.g., 1 or 2 metres?	Scotland: Law	Scotland Legislation: The Health Protection (Coronavirus) (Restrictions and Requirements) (Scotland) Regulations 2020 e.g., “an employee of that person or a volunteer at that place, where - (i) there is a partition between the person, employee or volunteer and members of the public, or (ii) a distance of at least one metres is maintained between the person, employee or volunteer and members of the public” (Coronavirus Act, 277, 2021, Requirement 5(1) d(i)).	Scotland: Coronavirus Act 277 (2021).
		Wales: Law	Wales Government Legislation: The Health Protection (Coronavirus Restrictions) (Wales) (Amendment) Regulations 2020 e.g., “Regulations so that the requirement to take all reasonable measures to ensure that a distance of 2 metres is maintained between persons in a place of worship, crematorium or community centre does not apply to persons from the same household or to carers and persons they are caring for” (Coronavirus Act 399, 2020, para. 6, Regulation 4).	Wales: Coronavirus Act 399 (2020).
		Northern Ireland: Law	Northern Ireland Legislation: The Health Protection (Coronavirus, Restrictions) Regulations (Northern Ireland) 2021 e.g., “that the persons referred to in paragraph (a; a shop) maintain a distance of 2 metres from each other (unless members of the same or a linked household) by altering the layout of a relevant place including those parts to which visitors do not customarily have access, managing and controlling the use of points of access and egress, shared facilities (such as toilets) and managing and controlling the means of moving from one part of a relevant place to another; (c) that persons waiting to enter a relevant place maintain a distance of 2 metres from each other (unless members of the same or a linked household)” (Coronavirus Act 93, 2020, section 4E, 3b).	Northern Ireland: Coronavirus Act 93 (2020).

		England: Guidance	England: Staying at home and away from others (social-distancing) Guidance. No specific laws about 1-2 metres.	England: Cabinet Office (2020).
	During the COVID-19 Pandemic, did you follow the law related to meeting up with others (i.e., only exercising with one person, group of six)?	Law	The Health Protection (Coronavirus Restrictions) 2020, “Restrictions on movement... [e.g.,] to travel for the purposes of work or to provide voluntary or charitable services, where it is not reasonably possible for that person to work, or to provide those services, from the place where they are living... [and] during the emergency period, no person may leave the place where they are living without reasonable excuse” (Coronavirus Act 350, 2020, para. 1-8).	England: Coronavirus Act 350 (2020). Northern Ireland: Coronavirus Act 55 (2020b). Scotland: Coronavirus Act 103 (2020b). Wales: Coronavirus Act 353 (2020).
		Law	The Health Protection (Coronavirus Restrictions) 2020 “Restrictions on gatherings” (Coronavirus Act 828, 2020, para. 1.).	England: Coronavirus Act 828 (2020). Northern Ireland: Coronavirus Act 55 (2020a). Scotland: Coronavirus Act 103 (2020a). Wales: Coronavirus Act 353 (2020).
	During the COVID-19 Pandemic, did you follow the law not to meet people either outdoors or indoors?	Law	The Health Protection (Coronavirus Restrictions) 2020 “Restrictions on gatherings” (Coronavirus Act 828, 2020, para. 1).	England: Coronavirus Act 828 (2020). Northern Ireland: Coronavirus Act 55 (2020a). Scotland: Coronavirus Act 103 (2020a). Wales: Coronavirus Act 353 (2020).
Isolation rule-breaking	During the COVID-19 Pandemic, if you had been in contact with someone who tested positive for COVID-19, did/would you follow advice and recommendations to get tested?	England, Wales: Law	The Health Protection (Coronavirus, Restrictions) (Self-Isolation) Regulations 2020, “Requirements on person notified as a close contact of a person who has tested positive for coronavirus” (Coronavirus Act 1045, 2020, part 1, 2(b)).	England: Coronavirus Act 1045 (2020). Wales: Coronavirus Act 1609 (2020).
		Northern Ireland: Law	Government Powers relating to a potentially infected person “a public health officer may require the person to be assessed/biological sample” (Coronavirus Act Schedule 21, 2020, part 3, 75(2), a(i)).	Northern Ireland: Coronavirus Act Schedule 21 (2020).
		Scotland: Law	Government Powers relating to a potentially infected person: “a public health officer may require the person to be assessed/biological sample” (Coronavirus Act, 2020, part 5, 31(2), a(i)).	Scotland: Coronavirus Act Schedule 21 (2020).
		Other guidance	Government advice: Stay at home: guidance for households with possible or confirmed coronavirus (COVID-19) infection (2020): “Anyone who has any of the main symptoms of COVID-19 should stay at home and, self-isolate immediately. They should order a PCR test unless they have already taken a Lateral Flow Device test and the result was positive” (UK Health Security Agency, 2020, part 6).	England, Northern Ireland, Scotland, Wales: UK Health Security Agency (2020).

During the COVID-19 Pandemic, if you had been in contact with someone who tested positive for COVID-19, did/would you abide by the self-isolation laws?	England, Wales: Law	The Health Protection (Coronavirus, Restrictions) (Self-Isolation) Regulations 2020, e.g., England “Period of Self-Isolation” (Coronavirus Act 1045, 2020, part 3, Wales “Requirement to Isolate” (Coronavirus Act 1609, 2020, part 3, chapter 1).	England: Coronavirus Act 1045 (2020). Wales: Coronavirus Act 1609 (2020).
	Northern Ireland: Law	Government powers relating to a potentially infected person: “to remain at a specified place for up to 14 days” (Coronavirus Act Schedule 21, 2020, part 5, section 80).	Northern Ireland: Coronavirus Act Schedule 21 (2020).
	Scotland: Law	Government powers relating to a potentially infected person: “to remain at a specified place for up to 14 days” (Coronavirus Act Schedule 21, 2020, section 59).	Scotland: Coronavirus Act Schedule 21 (2020).
	Other guidance:	Government advice 'Stay at home: guidance for households with possible or confirmed coronavirus (COVID-19) infection' (2020): “Anyone who has any of the main symptoms of COVID-19 should stay at home and, self-isolate immediately. They should order a PCR test unless they have already taken a Lateral Flow Device test and the result was positive” (UK Health Security Agency, part 6).	England, Northern Ireland, Scotland, Wales: UK Health Security Agency (2020).
During the COVID-19 Pandemic, if you tested positive for COVID-19 and were asked to share with health authorities the names of people you have been in contact with, did/would you follow the law and share all names?	England, Wales: Law	The Health Protection (Coronavirus, Restrictions) (Self-Isolation) Regulations 2020, “Requirements on person notified as a close contact of a person who has tested positive for coronavirus” (Coronavirus Act 1045, 2020, part 1).	England: Coronavirus Act 1045 (2020). Wales: Coronavirus Act 1609 (2020) and Coronavirus Act Schedule 21 (2020).
	Northern Ireland: Law	Government powers relating to a potentially infected person: “to provide information to the public health officer” (Coronavirus Act Schedule 21, part 5, section 79, 3(a)).	Northern Ireland: Coronavirus Act Schedule 21 (2020).
	Scotland: Law	Government powers relating to a potentially infected person: “to provide information to the public health officer” (Coronavirus Act Schedule 21, part 3, section 35, 3(a)).	Scotland: Coronavirus Act Schedule 21 (2020).
During the COVID-19 Pandemic, did you follow the law to avoid leaving the house more than once a day (other than for essential	Law	The Health Protection (Coronavirus Restrictions) 2020, restrictions on movement e.g., “to travel for the purposes of work or to provide voluntary or charitable services, where it is not reasonably possible for that person to work, or to provide those services, from the place where they are living” (Coronavirus Act 350, 2020, regulation 6,	England: Coronavirus Act 350 (2020). Northern Ireland: Coronavirus Act 55 (2020b). Scotland: Coronavirus Act 103 (2020b). Wales: Coronavirus Act 353 (2020).

	reasons or reasons sanctioned by the Government)?		2(f)) and “during the emergency period, no person may leave the place where they are living without reasonable excuse” (Coronavirus Act 350, 2020, regulation 6 (1)).	
Travel rule-breaking	During the COVID-19 Pandemic, did you abide by laws regarding public (e.g., only essential travel)?	Law	The Health Protection (Coronavirus, Wearing of Face Coverings on Public Transport) Regulations 2020 “requirement to wear a face covering when on public transport” (Coronavirus Act 592, 2020, part 2(3)).	England: Coronavirus Act 592 (2020). Northern Ireland: Coronavirus Act 151 (2020). Scotland: Coronavirus Act 103 (2020). Wales: Coronavirus Act 1609 (2020).
		Law	The Health Protection (Coronavirus Restrictions) 2020, restrictions on movement e.g., “to travel for the purposes of work or to provide voluntary or charitable services, where it is not reasonably possible for that person to work, or to provide those services, from the place where they are living” (Coronavirus Act 350, 2020, regulation 6, 2(f)) and “during the emergency period, no person may leave the place where they are living without reasonable excuse” (Coronavirus Act 350, 2020, regulation 6 (1)).	England: Coronavirus Act 350 (2020). Northern Ireland: Coronavirus Act 55 (2020b). Scotland: Coronavirus Act 103 (2020b). Wales: Coronavirus Act 353 (2020).
	During the COVID-19 Pandemic, did you follow the law to avoid travelling on public transport for leisure activities?	Law	The Health Protection (Coronavirus, Wearing of Face Coverings on Public Transport) Regulations 2020 “requirement to wear a face covering when on public transport” (Coronavirus Act 592, 2020, part 2(3)).	England: Coronavirus Act 592 (2020). Northern Ireland: Coronavirus Act 151 (2020). Scotland: Coronavirus Act 103 (2020). Wales: Coronavirus Act 1609 (2020).
		Law	The Health Protection (Coronavirus Restrictions) 2020, restrictions on movement e.g., “to travel for the purposes of work or to provide voluntary or charitable services, where it is not reasonably possible for that person to work, or to provide those services, from the place where they are living” (Coronavirus Act 350, 2020, regulation 6, 2(f)) and “during the emergency period, no person may leave the place where they are living without reasonable excuse” (Coronavirus Act 350, 2020, regulation 6 (1)).	England: Coronavirus Act 350 (2020). Northern Ireland: Coronavirus Act 55 (2020b). Scotland: Coronavirus Act 103 (2020b). Wales: Coronavirus Act 353 (2020).
	During the COVID-19 Pandemic, did/would you abide by the law to self-isolate after travelling abroad (e.g., to self-isolate for 10 days to two weeks after)?	Law	Government Legislation: The Health Protection (Coronavirus, International Travel) Regulations 2020, “Requirement to self-isolate” (Coronavirus Act 582, 2020, part 2, regulation 4).	England: Coronavirus Act 582 (2020). Northern Ireland: Coronavirus Act 90 (2020). Scotland: Coronavirus Act 169 (2020). Wales: Coronavirus Act 174 (2020).
		Law	Government Legislation (Coronavirus, International Travel) (England, Scotland, Wales, Northern Ireland) Regulations 2020.	England: Coronavirus Act 568 (2020). Northern Ireland: Coronavirus Act 90 (2020). Scotland: Coronavirus Act 169 (2020). Wales: Coronavirus Act 174 (2020).

During the COVID-19 Pandemic, did you follow the law to <i>stay local</i> to your area when leaving the house?	Law	The Health Protection (Coronavirus Restrictions) 2020, restrictions on movement e.g., “to travel for the purposes of work or to provide voluntary or charitable services, where it is not reasonably possible for that person to work, or to provide those services, from the place where they are living’ (Coronavirus Act 350, 2020, regulation 6, 2(f)) and “during the emergency period, no person may leave the place where they are living without reasonable excuse” (Coronavirus Act 350, 2020, regulation 6 (1)).	England: Coronavirus Act 350 (2020). Northern Ireland: Coronavirus Act 55 (2020b). Scotland: Coronavirus Act 103 (2020b). Wales: Coronavirus Act 353 (2020).

Appendix T

Inter-Correlation Table

Pearson Correlation Coefficient																							
Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Total Rule-Breaking	23.8	6.4	--																				
2 Hygiene Rule-Breaking	5.9	1.6	.74***	--																			
3 Social-Distancing/Social-Activity Rule-Breaking	6.6	2.3	.85***	.53***	--																		
4 Isolation Rule-Breaking	5.8	2.2	.81***	.46***	.52***	--																	
5 Travel Rule-Breaking	5.4	1.8	.84***	.50***	.64***	.60***	--																
6 Self-Reported Total Rule-Breaking	4.8	10.2	.43***	.20***	.42***	.32***	.44***	--															
7 IPDE Paranoid	2.2	1.4	.15**	.06	.12**	.14**	.16***	.12*	--														
8 IPDE Schizoid	2.5	1.7	.01	.00	-.05	.06	.04	.01	.27***	--													
9 IPDE Dissocial	0.6	1.0	.14**	.05	.08	.15**	.18***	.14**	.39***	.38***	--												
10 IPDE Impulsive	1.3	1.3	.23***	.17***	.19***	.14**	.26***	.21***	.42***	.25***	.45***	--											
11 IPDE Borderline	1.5	1.4	.14**	.06	.14**	.08	.16***	.11*	.36***	.27***	.30***	.48***	--										
12 IPDE Histrionic	1.9	1.4	.22***	.14**	.23***	.12*	.21***	.21***	.35***	.10*	.30***	.44***	.42***	--									
13 IPDE Anankastic	3.4	2.0	-.01	-.02	-.01	.01	-.02	-.01	.38**	.33***	.20***	.23***	.29***	.17***	--								
14 IPDE Anxious	2.8	1.9	.01	-.01	.02	.13	.00	-.03	.43***	.45***	.22***	.31***	.49***	.17***	.57***	--							
15 IPDE Dependent	2.0	1.5	.09*	.02	.12*	.04	.12*	.00	.25***	.23***	.13**	.29***	.49***	.29***	.32***	.50***	--						
16 HEXACO Honest-Humility	3.5	0.6	-.37***	-.26***	-.35***	-.27***	-.32***	-.19***	-.38***	-.18***	-.34***	-.41***	-.32***	-.45***	-.21***	-.17***	-.26***	--					
17 HEXACO Emotionality	3.5	0.5	-.01	-.04	.05	-.04	-.03	.00	.16***	-.17***	-.13**	.05	.20***	.19***	.29***	.34***	.29***	-.03	--				
18 HEXACO Extraversion	3.2	0.6	.05	.02	.05	.05	.04	.08	-.28***	-.47***	-.19***	-.21***	-.41***	.05	-.42***	-.69***	-.33***	.05	-.16***	--			
19 HEXACO Agreeableness	3.0	0.5	-.18***	-.16***	-.13**	-.13**	-.18***	-.02	-.48***	-.07	-.26***	-.42***	-.22***	-.22***	-.27***	-.22***	-.04	.34***	-.11*	.21***	--		
20 HEXACO Conscientiousness	3.5	0.5	-.25***	-.14**	-.23***	-.17***	-.26***	-.19***	-.12*	-.06	-.18***	-.35***	-.33***	-.29***	.21***	-.09	-.25***	.23***	.08	.11*	.13**	--	
21 HEXACO Openness to Experience	3.3	0.6	-.16***	-.13**	-.18***	-.07	-.14**	-.02	-.08	-.06	-.05	-.07	-.13*	-.05	-.12*	-.20***	-.18***	.16***	-.10*	.15***	.05	.06	--

*** $p < .001$; ** $p < .01$; * $p < .05$; N=469, except N(Self-Reported Total)=458 Pearson Two-tailed Correlational Analyses between all Predictor and Outcome Variables

Appendix U

Personality Inventory for DSM-5, HEXACO, ICD-10 Personality Trait Definitions

Source	Personality Trait	Definition
DSM-5 (PID-5)	Negative Affect	Those with higher levels have a “tendency to experience unpleasant feelings such as anger or anxiety, hostile or passive interpersonal behaviour, and labile or restricted emotionality (like Big Five neuroticism)” (Hopwood et al., 2013, p. 2). Those with lower levels have increased positive affect (e.g., cheerfulness, pride, enthusiasm, happiness; Hopwood et al., 2013).
	Detachment	Those with higher levels have a “depressive affect and interpersonal withdrawal and mistrust (like Big Five low extraversion)” (Hopwood et al., 2013, p. 2). Those with lower levels experience more emotional connection with others (Hopwood et al., 2013).
	Antagonism	Those with higher levels exhibit “callous or antisocial traits as well as grandiosity and attention-seeking (like low Big Five agreeableness)” (Hopwood et al., 2013, p. 2). Those with lower levels are more cordial, hospitable and friendly towards others (Hopwood et al., 2013).
	Disinhibition	Those with higher levels exhibit “irresponsible, impulsive, and risk-taking behaviours, such as distractibility and carelessness (like Big Five low conscientiousness)” (Hopwood et al., 2013, p. 2). Those with lower levels may present as more inhibited (i.e., have more control over personal responses to environmental stimuli; Hopwood et al., 2013).
	Psychoticism	Those with higher levels exhibit “eccentricity, perceptual problems, and odd behaviour (like Big Five Openness to Experience)” (Hopwood et al., 2013, p. 2). Higher psychoticism is considered the opposite pole to neuroticism (Eysenck & Eysenck, 1976). Those with lower levels are considered more sensible, logical, rational and clear-headed (Eysenck & Eysenck, 1976).
HEXACO	Honest-Humility (H)	High scores relate to avoidance of manipulation for personal gain, reduced temptation to rule-break, lack of interest in financial attainment, and no wish to gain social status (Lee & Ashton, 2009). Low scorers likely compliment others for their own gain, rule-break for their own gain, are motivated by material items and abide by their own self-importance (Lee & Ashton, 2009).
	Emotionality (E)	High scores relate to fear and anxiety of danger and life stress; need emotional support from other people; feel empathy and strong attachments with others (Lee & Ashton, 2009).

		Low scores relate to lack of fear/anxiety regarding physical harm, exhibit low worry regarding life stress, keep their emotional wellbeing to themselves, and in general feel an emotional detachment from other individuals (Lee & Ashton, 2009).
	Extraversion (X)	High scores relate to feelings of positivity about themselves and others (Lee & Ashton, 2009). Such individuals are confident and enjoy social interaction, and typically approach life with an enthusiastic, high-energy attitude (Lee & Ashton, 2009). Low scores relate to symptoms of low self-esteem i.e., consider themselves as unworthy compared to others, dislike being the centre of attention in social situations, and are generally less enthusiastic and optimistic than others (Lee & Ashton, 2009).
	Agreeableness (A)	High scores relate to calmness and are easily able to control their temper and cooperate with other people (Lee & Ashton, 2009). Low scores relate to feeling critical of others' actions, grudge holding, tend to feel easily angry in relation to others' perceived wrong-doing, and they can present as stubborn (Lee & Ashton, 2009).
	Conscientiousness (C)	High scores relate to increased organisation, discipline, goal-setting, accuracy and perfection (Lee & Ashton, 2009). Such individuals are careful planners when it comes to decision-making (Lee & Ashton, 2009). Low scores relate to lack of organisation, lack of planning around decision-making and schedules (Lee & Ashton, 2009). Such individuals tend to avoid challenging/difficult tasks, and do not mind if errors are presented in their work (Lee & Ashton, 2009). They might make impulsive decisions, and struggle to reflect and empathise (Lee & Ashton, 2009).
	Openness to Experience (O)	High scores relate to using imagination, being open to different ideas/people, and such individuals are curious, and tend to take interest in art/nature (Lee & Ashton, 2009). Low scores relate to lack of interest in art/nature, lack curiosity and inquisitiveness, and such individuals experience little creativity, and tend to stick to social norms (Lee & Ashton, 2009).
ICD-10	Anankastic	Such individuals strive for perfectionism, although this can interfere with completing tasks, and they exhibit conscientiousness with excessive feelings of fear and cautiousness (Krueger et al., 2013; WHO, 2013, 2015). They focus on rule-compliance and organisation, and tend to adhere to social norms, to the extent that they may present as rigid and inflexible (Krueger et al., 2013; WHO, 2013, 2015). They tend to have <i>their way of doing things</i> and stick to this even in social situations (Krueger et al., 2013; WHO, 2013, 2015).

Anxious (Avoidant)	Such individuals tend to avoid social situations due to an inherent fear/preoccupation of criticism or rejection, and they may be cautious within social situations unless they know others will like them and may restrict themselves in terms of lifestyle and prioritise physical security/comfort (Krueger et al., 2013; WHO, 2013, 2015). They may feel continuously tense and concerned, and believe themselves as unappealing and unskilled within social situations (Krueger et al., 2013; WHO, 2013, 2015).
Borderline	Such individuals exhibit intense and unstable relationships, and they may present as preoccupied with self-image, and may internally feel unclear about their own self (Krueger et al., 2013; WHO, 2013, 2015). Such individuals attempt to avoid potential abandonment by others, and usually have a sense of emptiness within themselves (Krueger et al., 2013; WHO, 2013, 2015). Suicide ideation and self-harm are frequent, and can be used as threats to avoid abandonment by others (Krueger et al., 2013; WHO, 2013, 2015).
Dependent	Such individuals can present as clingy and fearful of being alone, so can be submissive within social situations, and they tend to lack independence and struggle to decision-make (Krueger et al., 2013; WHO, 2013, 2015). They fear being alone, yet tend to lack insight about this, therefore, as soon as a relationship ends, they will strive to start a new one (Krueger et al., 2013; WHO, 2013, 2015). Such individuals also tend to be sensitive to criticism (Krueger et al., 2013; WHO, 2013, 2015).
Dissocial	Such individuals tend to blame others, and struggle to experience feelings of guilt and tend to be irresponsive to punishment (Krueger et al., 2013; WHO, 2013, 2015). They tend to show aggression/violence easily, and can act irresponsibly by rule-breaking and disrespecting social norms (Krueger et al., 2013; WHO, 2013, 2015). They tend not to keep friendships and are unconcerned about the feelings of others, although they can establish relationships with others (Krueger et al., 2013; WHO, 2013, 2015).
Histrionic	Such individuals may present as superficial, exhibit dramatic/theoretical behaviour and exaggeration, and tend to be self-centred and excitable emotionally (Krueger et al., 2013; WHO, 2013, 2015). They may experience difficulty within interpersonal relationships due to an over-dependence on others (Krueger et al., 2013; WHO, 2013, 2015).
Impulsive	Such individuals present with emotional instability, are unable to control impulses and may react in violent/aggressive/threatening behaviour, which is particularly common when they may have been criticised by other individuals/groups (Krueger et al., 2013; WHO, 2013, 2015).

Paranoid	Such individuals may experience sensitiveness, and easily react to life set-backs (Krueger et al., 2013; WHO, 2013, 2015). They may hold grudges, be suspicious of others (e.g., family, friends; with little justification) and distort such experiences and perceive others' intentions as antagonistic (Krueger et al., 2013; WHO, 2013, 2015). They may put their own feelings first due to a tenacious sense of personal rights, and feeling of self-importance (Krueger et al., 2013; WHO, 2013, 2015).
Schizoid	Such individuals do not experience pleasure from social interaction, do not place value in friendships, tend not to get close to others and typically present with flattened affect and may appear emotionally cold (Krueger et al., 2013; WHO, 2013, 2015). They struggle to verbalise/express other feelings (e.g., warmth, anger) towards others and when others provide them with praise (Krueger et al., 2013; WHO, 2013, 2015). They have minimal interest in sexual experiences, and tend to engage in activities alone (Krueger et al., 2013; WHO, 2013, 2015). They may have a pre-occupation with fantasy and exhibit an insensitive to social norms (Krueger et al., 2013; WHO, 2013, 2015).
