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Coronavirus (COVID-19) in the UK:  
A personality-based perspective on concerns and intention to self-isolate

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## **Abstract**

**Objectives:** Public behaviour change is necessary to contain the spread of coronavirus (COVID-19). Based on the Reinforcement Sensitivity Theory (RST) framework, This study presents an examination of individual differences in some relevant psychological factors.

**Design:** Cross-sectional psychometric

**Methods:** UK respondents (N = 202) completed a personality questionnaire (RST-PQ), measures of illness-attitudes, concerns about the impact of coronavirus on health services and socio-economic infrastructures, personal safety, and likelihood of voluntary self-isolation.

**Results:** Respondents most concerned were older, had negative illness-attitudes, and scored higher on Reward Reactivity (RR), indicating the motivation to take positive-approach action despite prevailing worry/anxiety. Personal safety concerns were highest in those with negative illness-attitudes and higher Fight-Flight-Freeze System (FFFS, reflecting fear/avoidance) scores. Results suggest people are experiencing psychological conflict: between the urge to stay safe (FFFS-related) and the desire to maintain a normal, pleasurable (RR-related) life. Ways of ameliorating conflict may include maladaptive behaviours (panic buying), reflecting reward-related displacement activity. Intended self-isolation related to FFFS, but also low Behavioural Inhibition System (BIS, related to anxiety) scores. Older people reported themselves less likely to self-isolate.

**Conclusions:** Interventions need to consider individual differences in psychological factors in behaviour change, and we discuss relevant literature to inform policy makers and communicators.

**KEYWORDS:** coronavirus; Covid-19; pandemic; reinforcement sensitivity theory; personality

## Introduction

By March 19th 2020, the time data reported in this paper were collected, 3,300 people in the UK had tested positive for coronavirus (COVID-19) and of those tested, 114 had died (Public Health England, 2020). To tackle the coronavirus crisis, the UK Government embarked on legislative restrictions and a public health communications campaign. To be most effective, it is imperative to understand not only the socio-economic antecedents of behaviour but also the psychological ones, including how personality influences how individuals differ from one another in their behavioural reactions to messages (Dutta-Bergman, 2003).

Our study examines the role of personality factors in concerns about coronavirus, personal safety, and the intention to self-isolate through the lens of the Reinforcement Sensitivity Theory (RST) of personality. RST assumes personality is underpinned by biologically-driven systems of approach and avoidance motivation (Gray & McNaughton, 2000). Approach/avoidance motivational tendencies drive attention to social and environmental cues, manifesting in characteristic patterns of cognition and behaviour (Corr & Krupić, 2017). In the present context, this might be exemplified by an urge to stock up on “essentials” (approach), or voluntary self-isolation (avoidance). RST is widely recognised, in conceptual and psychometric terms, to represent valid personality traits of widespread application (for a summary, see Corr, DeYoung, & McNaughton, 2013).

RST defines a Behavioural Approach System, sensitive to appetitive stimuli and activating goal-directed behaviours - people who are especially responsive to reward cues are driven to seek situations that stimulate dopaminergic reward pathways in the brain. Striving toward rewards/goals requires a number of distinct processes: Reward interest (sensitivity to opportunity and novel experiences) and Goal-drive persistence (planning and motivation) characterize the early stages of approach. These can be distinguished from Reward Reactivity

(sensitivity to imminent reward and pleasure) and Impulsivity (risk taking to attain reward), processes closer to the final reinforcer. Activation of these approach systems leads to the experience of hopeful excitement, persistence to reach desired goals, and elation on goal attainment (Corr & Cooper, 2016; Corr et al., 2013). A second system, the Fight-Flight-Freeze System, mediates reactions to immediately aversive stimuli, leading to fear, avoidance and escape behaviours. Thirdly, a Behavioural Inhibition System is sensitive to goal-conflict, e.g. a combination of behavioural-inhibition (fear and trepidation) and behavioural-activation (the urge to act). Activation of the behavioural-inhibition system motivates caution and contributes to risk assessment, rumination on the past and worry about the future – cognitive-emotional processes leading to anxiety and depression (Katz, Matanky, Aviram, & Yovel, 2020; Levita, Bois, Healey et al., 2014; Vergara & Roberts, 2011). Activation of the fight-flight-freeze and behavioural-inhibition systems result in defensive behaviour and negative affect; accordingly, we would expect people with high activation of these systems (as indicated by questionnaire scores) to show a high level of concern about coronavirus.

That personality can influence health behaviours in general is well-documented, with most research focussed on the Big Five model (Strickhauser et al, 2017), although we know relatively little about personality in the context of infectious disease or pandemic. RST is a useful framework in the present context because it emphasises the roles of emotional and motivational personality traits known to influence perception of health-related persuasive communications. Behavioural inhibition system emotions (fear and emotional conflict) make individuals more receptive to loss messages, while emotions related to behavioural approach systems (including anger) are more receptive to gain messages (Yang, Dillard, & Shen, 2012). However, despite the potential to explain intentional and actual behaviours, there has been very little health-related research on RST in general, and none in the context of pandemic-related behaviour. What research exists has focused on mental health (e.g., Harnett,

et al., 2013) and addiction (e.g. Emory & Simons, 2017). The present research is, therefore, both novel and timely.

We examined the relationships between RST personality variables, specific concerns about coronavirus, personal safety, and the intention to self-isolate. We further considered individual differences in general illness attitudes and behaviours, such as fear of illness/death and overreaction to bodily sensations. As coronavirus is an intense aversive stimulus, individuals high in the fight-flight-freeze system should be more likely to self-isolate as an avoidance/escape response. We also predicted a role for the behavioural inhibition system, reflecting a conflict between behaviours aimed at avoiding contagion and the behavioural-activation system driven goal of continuing with normal life.

## Methods

### Participants

UK respondents (N = 202) were recruited via Prolific – an online research participants' platform, representative of the general population (Woods, Velasco, Levitan, Wan, & Spence, 2015): 127 identified as female, 74 male, and one as other ( $M_{age} = 33.79$ ,  $SD = 12.48$ , *range* 18-75). Socio-economic status (SES) was assessed with the MacArthur Ladder Scale, which ranks self-reported social class on a ladder with 10 rungs (Adler, Epel, Castellazzo, & Ickovics, 2000) – the higher rungs represent individuals who have more money, education and prestigious jobs. The mean report was 5.27 ( $SD = 1.61$ ) with 31 people (15%) placing themselves on the bottom three rungs, and 10 (5%) on the top three rungs. Data were collected on 18<sup>th</sup> and 19<sup>th</sup> March 2020, at which time just 9 respondents (5%) reported that either they or someone close to them had tested positive for the virus. One hundred and twelve participants (55%) reported themselves as already self-isolating or highly likely to do so. At the time of data collection, there were no mandatory restrictions in the UK.

All participants were UK residents and aged 18 or over. There were no other inclusion criteria.

### **Materials and Procedures**

University ethics committee approval was obtained. Participants accessed the study via a weblink. Details of the research were given and informed consent obtained before participants completed the following measures. Further details are available at: [*redacted for anonymity of review*].

*Beck Depression Inventory II* (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-report questionnaire which assesses the severity of depressive symptoms (e.g., sadness, crying or losing interest in life). In our sample, reliability of ‘Depression’ was excellent ( $\alpha = .82$ ).

*Generalised Anxiety Disorder-7* (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006) is a 7-item self-administered questionnaire used as a screening tool and severity measure for Generalised Anxiety Disorder (GAD). In our sample, reliability of ‘Anxiety’ was very high ( $\alpha = .92$ ).

*Illness Attitudes Scale* (IAS; Kellner, 1986) is a 27-item self-report measure that assesses fears, attitudes and beliefs associated with health concerns and abnormal illness behaviours. Reliability of ‘Ill-Attitude’ was very high in our sample ( $\alpha = .92$ ).

*Reinforcement Sensitivity Theory of Personality Questionnaire* (RST-PQ; Corr & Cooper, 2016) is a 65-item questionnaire yielding scores on RST traits, all of which showed good reliability with our sample: FFFS  $\alpha = .79$ ; BIS  $\alpha = .95$ ; BAS-RI  $\alpha = .80$ ; GDP  $\alpha = .87$ ; RR  $\alpha = .83$  and Impulsivity  $\alpha = .78$ .

Respondents also answered the following questions:



- How concerned are you about the effect on the NHS and health services generally?

Response on a 10 point scale where 1 = not at all concerned and 10 = extremely concerned.

- How concerned are you about the virus in terms of its effect on other aspects of the UK infrastructure in general (e.g., transport, economy, education)? Response on a 10-point scale, as previously.
- How concerned are you about your own personal safety and that of people close to you in terms of the virus? Response on a 10-point scale, as previously
- Are you, or do you intend to, voluntarily self-isolate because of the virus? (Yes/No)
- Have you, or someone close to you, tested positive for the virus? (Yes/No)

## Results

Bivariate correlations are shown in Table 1. Negative attitude to illness was positively associated with all RST factors, especially behavioural-inhibition and fight-flight-freeze. Concerns about NHS/health services and about other aspects of UK infrastructure showed positive associations with behavioural approach system factors of reward interest and reward reactivity, and with fight-flight-freeze, but not behavioural inhibition. Concern about personal safety was positively associated with behavioural inhibition and fight-flight-freeze, and likelihood of self-isolation with fight-flight-freeze only. Both depression and anxiety were highly correlated with fight-flight-freeze and behavioural-inhibition. For each concern, responses ranged from 1-10, pointing to marked individual differences.

Table 1. Descriptive statistics and correlations between RST personality factors, attitudes to ill health (Ill-attitude), concerns about health services (NHS), other national infrastructure (Infra), personal safety (safety), likelihood of self-isolation (isolate; coded as Yes = 1 and No = 0), depression and anxiety scores

	Mean/SD	GDP	RR	Imp	BIS	FFFS	Ill- Attitude	NHS	Infra	Safety	Isolate	Depress ion	Anxiety
RI	16.45/4.40	.60**	.44**	.36**	-.10	-.04	.14*	.18*	.19**	-.04	-.002	-.001	-.03
GDP	18.54/4.59	-	.49**	.33**	.01	.10	.18**	.13	.17*	.01	.01	.06	.05
RR	25.96/3.65		-	.57**	.18*	.34**	.24**	.32**	.35**	.14	.01	.14*	.17*
Imp	17.81/4.88			-	.31**	.26**	.19**	.16	.15	.05	.05	.25**	.25**
BIS	58.05/15.46				-	.47**	.47**	.07	-.03	.14*	.08	.69**	.81**
FFFS	23.33/6.61					-	.41**	.19**	.18*	.31**	.24**	.27**	.40**
Ill-Att	83.20/25.12						-	.24**	.11	.28**	.27**	.49**	.51**
NHS	7.64/1.99							-	.55**	.50**	.24**	-.01	.12
Infra	7.88/1.98								-	.41**	.08	-.03	.06
Safety	6.95/2.57									-	.27**	.07	.26**
Isolate	-										-	.15*	.11
Depression	47.62/11.82											-	.77**
Anxiety	15.05/5.82												-

RI = reward interest; GDP = goal-drive persistence; RR = reward reactivity; Imp = impulsivity; BIS = behavioural-inhibition; FFFS = fight-flight-freeze; Ill-att = negative attitudes to illness; NHS = level of concern about Health services; Infra = levels of concern about other infrastructure; Safety = level of concern about personal safety; Isolate = intention to self-isolate (Yes/No).

\*sig. at .05; \*\* sig. at .01

Table 2 presents regression analyses on each area of concern and likelihood of self-isolating. We entered age, sex (0 = female; 1 = male), SES, testing positive for the virus (0 = no; 1 = yes) and illness-attitude score alongside the RST variables. We did not include depression and anxiety due to their high intercorrelations with behavioural-inhibition and fight-flight-freeze. For concerns about the NHS, older people, higher socio-economic groups, those with more negative illness-attitudes, and higher Reward reactivity scores, were most concerned. Concerns about other aspects of UK infrastructure were also positively associated with age and reward reactivity. Personal safety concerns were significantly associated with illness-attitude and fight-flight-freeze. Finally, higher likelihood of self-isolation was related to being younger, having negative illness-attitude scores and higher fight-flight-freeze scores. The opposite effect, found in the negative association with behavioural inhibition, suggested that goal-conflicted (i.e., anxious) individuals are less inclined to self-isolate, perhaps as a coping mechanism, aiming to maintain a normal lifestyle, driven by approach processes inherent in reward reactivity.

Table 2. Results of regression analyses

	NHS/health services				Other infrastructure				Personal safety				Likelihood of self-isolation			
			95% CI				95% CI				95% CI				95% CI	
	$\beta$	p	Lower	Upper	$\beta$	p	Lower	Upper	$\beta$	p	Lower	Upper	$\beta$	p	Lower	Upper
Sex	-.05	.43	-.78	.33	-.07	.34	-.83	.29	-.04	.55	-.98	.53	-.06	.40	-.21	.08
Age	.24	.001	.02	.06	.29	<.001	.02	.07	.12	.08	-.00	.05	-.15	.04	-.01	-.001
SES	.23	.002	.11	.45	.12	.10	-.03	.32	.05	.51	-.16	.31	-.12	.12	-.08	.01
Virus	-.11	.11	-2.31	.24	-.05	.49	-1.72	.83	-.14	.06	-3.40	.04	-.09	.19	-.56	.113
Ill-att	.19	.02	.003	.03	.07	.41	-.01	.02	.21	.01	.01	.04	.23	.01	.001	.01
RI	.05	.55	-.05	.10	.03	.71	-.06	.09	-.09	.31	-.16	.05	.01	.91	-.02	.02
GDP	-.10	.25	-.12	.03	-.03	.71	-.09	.06	-.05	.61	-.12	.07	-.03	.76	-.02	.02
RR	.27	.003	.03	.16	.31	.001	.05	.17	.09	.31	-.04	.13	-.11	.24	-.03	.01
Imp	-.03	.73	-.08	.06	-.02	.85	-.07	.06	-.01	.87	-.10	.08	.08	.38	-.01	.03
BIS	.08	.40	-.01	.03	-.03	.75	-.03	.02	-.02	.84	-.03	.02	-.20	.04	-.01	-.001
FFFS	.08	.34	-.02	.07	.13	.09	-.01	.09	.24	.004	.03	.16	.25	.003	.01	.03
Adj. R <sup>2</sup>	.24				.23				.17				.16			

RI = reward interest; GDP = goal-drive persistence; RR = reward reactivity; Imp = impulsivity; BIS = behavioural-inhibition; FFFS = fight-flight-freeze; Ill-att = negative attitudes to illness; Virus = whether tested positive (Yes/No).

## Discussion

Results cast new theoretical light on coronavirus-related concerns and intended self-isolation. Personality factors were relevant, after controlling for generally negative attitudes to illness, and this has potential implications for interventions to influence behaviour.

Level of concerns about impact on NHS/health services and other national infrastructure were greatest in older and higher SES respondents. Of the RST traits, only reward reactivity was independently significant, reflecting a positive-approach orientation and the urge to take action, motivated by reward-related activities (Gray & McNaughton, 2000). Reward-reactivity is important in the neural processing of emotional stimuli, both positive and negative (DePascalis, Fracasso, & Corr, 2017). Coronavirus is a negative stimulus writ large and displacement activity, such as hoarding toilet rolls, may alleviate concern by maintaining a sense that a semblance of a normal lifestyle can be maintained – and queuing behaviour may suggest one way to cope is to emulate the behaviour of others (i.e., following social norms). Personal Safety concerns were associated with higher freeze-fight-flight scores, and older age was close to statistical significance. This indicates the likelihood of worry, fear and avoidance behaviour amongst older people, perhaps understandable given their potential susceptibility.

Younger participants and those higher on fight-flight-freeze tendencies reported they were more likely to self-isolate. These findings make sense in terms of fear/avoidance behaviours associated with fight-flight-freeze. However, it is interesting that older people reported themselves as less likely to self-isolate even though they are the most concerned in other respects (see above). This finding suggests that an increased level of concern does not necessarily lead to intention to self-isolate – indeed, the opposite may be true in some cases. Lower behavioural-inhibition was also a significant factor in this analysis, which may reflect the motivation to resolve goal-conflict (the urge to take action along with feelings of

trepidation) by maintaining as normal a life as possible. Younger people who choose to self-isolate may care less about maintenance of normality and, instead, take actions that are overtly preventative – they may also feel less isolated as they are higher users of social media.

Our results can explain the potential influence of factors such as those described within social cognitive theories (e.g., Bandura, 1986), which argue that cognitions such as outcome expectancies, self-efficacy and self-regulation mediate the relationship between environmental stimuli and behaviour. Individuals with tendencies towards fight-flight-freeze and/or behavioural inhibition are likely to adopt behaviours which carry expectancies of tension reduction, as has been shown in RST-based studies of alcohol dependency (e.g., Booth & Hasking, 2009). In the present context, hoarding “necessities” can be one such behaviour, possibly in response to negative expectancies around impending government driven lifestyle restrictions (which were not yet in place when the data were collected). Furthermore, individuals higher in fight-flight-freeze traits often attend most to negative aspects of their environment. As such, they may be more susceptible to fear contagion (Hatfield, Cacioppo, & Rapson, 1993), internalising the negative emotions and behaviours around them and perceiving them as social norms.

Overall, our findings point to both approach-related and defensive personality traits being involved in concerns about coronavirus. It seems that while some people will address their fears by isolating themselves, others are in a state of psychological (goal) conflict and their behaviour may reflect this as they attempt to relieve uncertainty through approach behaviours, such as panic buying. Health information/communications should consider both sides of this emotional-motivational coin and not assume a ‘one-size-fits-all’ approach - personality differences matter. Of special concern is the lower likelihood of older people to self-isolate, who we suggest maybe resolving psychological conflict by trying to maintain a

‘normal’ lifestyle. If found to be robust/replicable, health information/communications will need to target accordingly.

RST systems are found to influence perceptions of persuasive health messages (Yang et al., 2012). Schelle, Brandstatter, & Knopfil (2010) showed that an effective approach is to enhance the perception that goal-relevant personal resources, such as self-efficacy, are available in order to encourage positive outcome expectancies and subsequently increase approach behaviour. In the present context, these would be purposeful health-related behaviours such as an active approach to safety hygiene stimuli. Alongside self-efficacy, RST factors can also help to explain and alleviate deficits in motivation as highlighted in the capability, opportunity, and motivation (COM-B) system of health behaviour change (Mitchie et al, 2011).

Furthermore, RST traits are associated with preferences for different forms of social support, another important resource. High and Solomon (2014) showed that while individuals scoring highly on behavioural approach traits prefer problem-focused support, those with tendencies towards behavioural inhibition or fight-flight-freeze behaviours prefer emotion-focused support. More broadly, we can use RST constructs to understand better the perception of risk (Logan, Kay, & Lewis, 2019) and how to frame appropriate messages to reduce specific risky health behaviours and increase/maintain wellbeing (Goodwin, Browne, Hing, & Russell, 2017), alleviating uncertainty by framing health behaviours as social norms.

Limitations include a relatively small sample size and we assumed a basic level of health literacy in wording our coronavirus behaviour related questions, which might have influenced responses. We also did not differentiate between individuals already self-isolating and those intending to do so which might have been an interesting comparison given that health behavioural intentions do not always result in behaviour. In addition, the study is cross-sectional and although personality traits are considered to be fairly stable, it is possible that

concerns and responses to the virus may change over time as the situation evolves, for instance, compulsory “lockdown” was not in place when our data were collected.

Longitudinal studies of public responses to the situation would be potentially valuable.

Nevertheless, our study presents a useful preliminary investigation of individual differences in the psychological dynamics of concerns, attitudes and (potential) behaviours in the face of the one of the worst health crisis in living memory.



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