



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Personality and motivational predictors of well-being and coping during COVID-19: A reversal theory analysis

Joanne Hudson^{a,*}, Yusuke Kuroda^{b,1}, Patrick C.H. Morel^c

^a Swansea University, Applied Sports Technology, Exercise and Medicine Research Centre, College of Engineering, Bay Campus, SA1 8EN, UK

^b University of Tsukuba, Faculty of Health and Sports Sciences, 1-1-1 Tennodai, Tsukuba, Ibaraki 305-8574, Japan

^c Massey University, School of Agriculture and Environment, Private Bag 11 222, Palmerston North 4442, New Zealand

ARTICLE INFO

Keywords:

Reversal theory
Well-being
Coping
Personality
Motivational dominance
Psychodiversity

ABSTRACT

This study used reversal theory to examine motivational predictors of well-being and coping during the COVID-19 pandemic in 2020. 149 UK based respondents completed an online survey including measures of demographics, well-being, coping, motivational style, and dominance. Well-being was predicted by optimism (positively), autistic and mastery (negatively) dominances, by alloic sympathy, optimism and paratelic motivation styles (positively), and, negatively by arousal seeking, arousability and pessimism. Coping was positively predicted by optimism and negativism dominances and by negativist, paratelic and telic motivations, and, negatively by arousability and pessimism. Using motivational dominances, indirect support was identified for the link between psychodiversity and well-being, but not coping. Findings suggest that well-being and, to a lesser degree, coping could be enhanced by encouraging individuals to experience a range of motivations, possibly focusing on those identified here as significant predictors. Future research needs to determine the context specificity of these findings and explore psychodiversity, well-being and coping using both metamotivational states and composite profiles incorporating the full range of motivational constructs.

1. Introduction

The global pandemic caused by COVID-19 in March 2020 has currently (September 2020) resulted in 25.8 million cases and 859,000 deaths, having changed and continuing to change people's lives. In the UK, people are experiencing months of national or local lockdown; at times being only permitted to leave their homes to meet essential needs. Thousands of people have lost their jobs and the gap between rich and poor has widened. School and workplace closures meant that children have been home-schooled by parents, and employees who can, have worked at home (e.g., see [Hiscott et al., 2020](#)).

Inevitably, people have experienced fear, loss, physical illness, anxiety, depression, stress, living with uncertainty, and loneliness, potentially with long-term consequences ([Dubey et al., 2020](#); [Qiu et al., 2020](#)). Whilst the devastating impact of COVID-19 cannot be downplayed, there are benefits. For example, reduced global air pollution ([Zambrano-Monserrate et al., 2020](#)), communities supporting the vulnerable, and home-working enabling more time with family, and less work-related

stress.

Not all individuals will respond in the same way to the same stressor (e.g., [Lazarus & Folkman, 1984](#)) and theories of personality suggest that individual difference factors can help explain this. There is ample evidence that personality is related to both well-being and coping (e.g., [Carver & Connor-Smith, 2010](#); [Diener et al., 2003](#); [Lucas, 2018](#)) although insufficient scope to discuss this in detail here. Of note, however, [Lucas \(2018\)](#) highlights that individual differences are the most consistent and strongest predictor of subjective well-being, but this research has mainly focused on the Big Five Personality Dimensions ([Costa Jr. & McCrae, 1992](#)), predominantly extraversion and neuroticism. In addition, further evidence identifies that personality is related to different responses to acute laboratory-induced stress, societal transition ([Van den Berg & Pitarui, 2005](#); [Xin et al., 2017](#)), and is related to differences in coping approaches during incarceration ([Leszko et al., 2020](#)).

Given the potential stressful impact of COVID-19, enhancing our understanding of people's well-being and coping in this context is

* Corresponding author at: Swansea University, Applied Sports Technology, Exercise and Medicine Research Centre, College of Engineering, Bay Campus, SA1 8EN, UK.

E-mail addresses: joanne.hudson@swansea.ac.uk (J. Hudson), kuroda.yusuke.gt@utsukuba.ac.jp (Y. Kuroda), P.C.Morel@massey.ac.nz (P.C.H. Morel).

¹ kuroda.yusuke.gt@utsukuba.ac.jp.

important. Whilst research has explored these relationships previously, in this study we did so using reversal theory (Apter, 2001). As discussed below, personality characteristics described in reversal theory explain a range of health-related factors but this does not yet include well-being or resilience coping, on which this study focused.

1.1. Theoretical framework

Reversal theory (Apter, 2001) proposes metamotivational states (Apter et al., 1998) that are structured into bipolar opposite pairs and each pair has a specific underlying focus. The telic-paratelic pair is concerned with means and ends; in the telic state we prefer serious, goal-oriented activities with important consequences. In the paratelic state, we prefer playful activities with no long-term consequences and focus on the current moment. The mastery-sympathy pair is focused on interactions with others. In a mastery state, we want to feel powerful, in control and dominant, whereas in a sympathy state we focus on caring, supporting and connecting. The negativist-conformist pair centres on rules and norms and in the negativist state, we are motivated to oppose these and value freedom and change. In the conformist state, we are motivated to maintain rules and norms and focus on belonging through conforming. The autic-alloic pair is focused on relationships and whether, in the autic state, we want to fulfil our own needs, or, in the alloic state, we want to fulfil others' needs. We experience combinations of metamotivational states from different pairs (e.g., alloic sympathy, when we are motivated to support and care for others) but do not experience states from the same pair simultaneously (e.g., negativist and conformist). We frequently reverse between states within each pair but prefer to spend time in one state from each pair. This tendency is termed dominance and is how reversal theory views personality, although not as a fixed, inherent trait, but as a disposition that is open to modification. Reversal theory also proposes the importance of additional motivational constructs. First, arousal avoidance and arousal seeking, where, respectively, the individual seeks a peaceful state and avoids problems or challenges, or seeks intense feelings and stimulation, including problems and challenges. Second, optimism and pessimism, characterised, respectively, by hope that things will turn out positively, and an expectation for things to turn out badly. Finally, arousability and effortfulness, described, respectively, as a tendency to be easily emotionally aroused, and a tendency to apply oneself to achieving goals even during difficulties.

Reversal theory (Apter, 2001) makes predictions about the relationship between motivational constructs and well-being through its concept of psychodiversity. Psychodiversity refers to the experience of multiple metamotivational states rather than consistently experiencing the same metamotivational states. As each state contributes to fulfilling different universal needs, failure to experience the full range of states is detrimental to well-being. For instance, constantly striving to meet the achievement and future-oriented needs of the telic state offers no opportunity to experience the playful paratelic state, and, being stuck in specific states can result in negative emotions, such as anxiety in the telic state, detrimentally affecting well-being and coping (Apter, 2013). Only one study has so far supported psychodiversity and its link with indices of well-being (i.e., psychological need satisfaction; Thomas et al., 2018). Lack of psychodiversity is characterised by inflexibility of motivational experience. We propose that individuals who demonstrate extreme dominance in multiple motivational states, and as a result are likely to more consistently remain in their preferred motivational states, will report lower well-being than individuals who demonstrate no extreme dominances. Thus we carried out an indirect test of psychodiversity based on extreme dominance (see Kuroda et al., 2015).

1.2. Reversal theory research on personality and health-related outcomes

Research has identified links between motivational style and dominance and various health-related variables, including stress responses,

exercise, drug use, risky sexual activities, use of energy drinks, eating pathology, and social and emotional need fulfilment. Table 1 presents a summary of this research, notably only one (Lustig & Cramer, 2015) has indirectly measured well-being and in a specific context. Thus there is a need for studies that explore the use of reversal theory for advancing understanding of the links between personality, well-being and coping. The present research is the first study to examine the role of reversal theory motivational constructs (Apter, 2001) for predicting well-being and coping during a global crisis.

1.3. Hypotheses

Our hypotheses were:

- (1) well-being will be positively predicted by telic, conformist, alloic, sympathy, optimism, and arousal avoidance dominances;
- (2) well-being will be positively predicted by telic, conformist, alloic sympathy, optimistic, effortfulness, and, arousal avoiding motivational styles, and, will be negatively predicted by arousability;
- (3) coping will be positively predicted by paratelic, negativistic, autic, mastery, optimism, and, arousal seeking dominances;
- (4) coping will be positively predicted by paratelic, negativist, autic mastery, optimism, and, arousal seeking motivational styles, and, negatively predicted by effortfulness and arousability, and,
- (5) well-being and coping will be significantly higher in individuals with no extreme dominances than those with multiple extreme dominances.

2. Materials and methods

2.1. Participants

Participants were 149 individuals residing in the UK, aged 16 to 79 years, including 89 females and 58 males (2 non-responses). At the time of responding, the majority had not contracted COVID-19 ($n = 140$), nor had anyone in their household ($n = 135$), were currently working from home ($n = 104$), lived in households of 2–4 people ($n = 123$), without school-aged children ($n = 106$), and were not home-schooling children ($n = 112$).

2.2. Procedures

The College Research Ethics Committee granted study approval and the research adhered to the British Psychological Society ethical principles. Participants were recruited via email and social media campaigns during May/June 2020 which was a period of lockdown in the UK. The invitation email included a link to the survey which provided an information sheet requiring informed consent prior to completing the online survey, described below.

2.3. Measures

Demographic details included: age group, sex, household size, number of school-aged children living at home and the number being home-schooled, occupational status, personal and household COVID-19 status.

Personality was assessed using the Motivational Style Profile (MSP; Apter et al., 1998) which measures metamotivational dominance and characteristics using 70 items. Respondents provide responses using a 6-point Likert type scale, anchored by 1 = *Never* and 6 = *Always*. Its 14 subscales each comprise 5 items and measure the following motivational characteristics: telic, paratelic, negativism, conformity, arousal avoiding, arousal seeking, autic mastery, autic sympathy, alloic mastery, alloic sympathy, optimism, arousability, and effortfulness. Metamotivational dominance scores are calculated for telic, negativism, optimism, arousal avoidance, autic, and mastery dominance. Thus an individual's motivational profile indicates their motivational styles (e.

Table 1
Summary of reversal theory research examining predictors of health-related outcomes.

Authors and date	Participants and context	Health-related outcomes	Findings
Kuroda et al. (2011)	Telic and paratelic dominant individuals performing leg extension exercise	Stress, indicated by tension in passive muscle during exercise	Telic dominant individuals displayed muscle tension in passive muscle during stressful exercise conditions. No tension was observed in paratelic dominant individuals.
Boddington and McDermott (2012)	Undergraduate students	Resistance to health messages about cannabis use	Resistance was positively predicted by rebelliousness (negativism) and negatively predicted by autistic mastery.
Lafreniere et al. (2013)	Older adolescents	Illicit drug use and risky sexual activities	Proactive rebelliousness (a form of negativism) was positively related to illicit drug use and risky sexual activities.
Segatto and Lafreniere (2013)	High and low frequency exercisers	Exercise frequency	Paratelic dominance higher in high frequency exercisers compared with low frequency exercisers.
Ianni and Lafreniere (2014)	University students	Energy drink use	Negativism was positively related to an inability to stop using energy drinks.
O'Neill and Lafreniere (2014)	University students	Eating pathology	Autic sympathy was positively related to eating pathology in females.
Lustig and Cramer (2015)	Pet owners	Social, practical and emotional need fulfilment from pet ownership	Arousal avoidance and telic dominances predicted social and emotional need fulfilment. Alloic mastery predicted practical and emotional need fulfilment. Effortfulness predicted practical and emotional need fulfilment. Optimism, negativism, arousal avoidance and alloic sympathy predictors of all three types of need fulfilment.
Rahman et al. (2018)	Male and female exercisers	Exercise length, type and consistency	Exercise length was positively predicted by mastery dominance in males and negatively by autistic dominance in both males and females. Exercise type was positively predicted by telic and autistic dominance in males and by autistic dominance in females. Mastery and negativist dominance negatively predicted

Table 1 (continued)

Authors and date	Participants and context	Health-related outcomes	Findings
			exercise type in females. Exercise consistency was negatively predicted by negativist dominance in males and females and positively by telic dominance in females.

g., high in telic, low in conformity etc.) and their degree of motivational dominance (e.g., telic dominant). The MSP has acceptable face, construct and concurrent validity, test-retest reliability, and internal consistency (e.g., Cronbach's alpha and test-retest correlations ranging from 0.7 to 0.9; *ibid*).

Coping was conceptualised as the tendency to respond to stress in a highly adaptive manner, with tenacity, creativity, optimism, an aggressive approach to problem solving, and gaining personal growth from experienced problems, in line with the definition adopted in the Brief Resilient Coping Scale (Sinclair & Wallston, 2004), our measure of coping.

This measure includes four items capturing tendencies to cope with stress in a highly adaptive manner, using a 5-point Likert type scale, anchored with 1 = *Does not describe me at all* to 5 = *Describes me very well*. Sinclair and Wallston (2004) demonstrated sound psychometric properties: internal consistency ($r = 0.76$), test-retest reliability ($r = 0.71$) and convergent validity was supported by expected correlations with personal coping resources (e.g., optimism), pain coping behaviours, and psychological well-being.

Well-being Our conceptualisation of well-being was adopted from that used in our measure, the Warwick-Edinburgh Mental Well-Being Scale (NHS Health Scotland (2016)). Namely, that well-being incorporates subjective experience of affect and life satisfaction, positive psychological functioning, relationships with others, and self-realisation. Therefore well-being was assessed using the Warwick-Edinburgh Mental Well-Being Scale (NHS Health Scotland, Universities of Warwick and Edinburgh, 2016). Participants use a 5-point Likert type scale anchored with 1 = *None of the time* to 5 = *All of the time* to respond to 14 items describing thoughts and feelings over the preceding two weeks. The measure has good psychometric properties: internal consistency (Cronbach's alpha = 0.89) and test-retest reliability (intra-class correlation = 0.83).

2.4. Data analysis

Shapiro-Wilks tests indicated that only the following variables were normally distributed: well-being, telic, arousal avoidance, conformist, autistic mastery, arousability, telic dominance, arousal avoidance dominance, and autistic dominance. Pearsons and Spearman's Rank correlation coefficients were calculated for normally and non-normally distributed variables, respectively.

Regression analyses using proc. Stepwise in SAS at 0.1 to be included were conducted separately for each set of predictor variables and each dependent variable to identify if motivational characteristics and dominance scores predicted well-being and coping. Linearity, multicollinearity, homoscedasticity, and multivariate normality assumptions were met in all analyses.

We calculated the mean dominance score for each motivational pair, and participants were identified as dominant in one of the two motivational characteristics if they scored either more than 1 standard deviation above the mean, or less than 1 standard deviation below the mean (as used previously; Kuroda et al., 2015). Table 2 presents

Table 2
Categorisation thresholds for dominance groups.

Metamotivational pair	Mean	SD	Upper threshold	Lower threshold
Telic - Paratelic	4.57	5.12	≥9.69 (TD; n = 26)	≤ -0.55 (PD; n = 21)
Negativist - Conformist	-9.07	6.13	≥ -2.94 (ND; n = 24)	≤ -15.20 (CD; n = 19)
Optimist - Pessimist	7.09	8.24	≥ 15.33 (OD; n = 22)	≤ -1.15 (PED; n = 23)
Arousal avoid - Arousal seek	2.81	6.23	≥ 9.05 (AAD; n = 22)	≤ -3.42 (ASD; n = 23)
Mastery - Sympathy	0.07	3.89	≥ 3.96 (MD; n = 24)	≤ -3.82 (SD; n = 22)
Autic - Alloic	-4.79	3.90	≥ -0.89 (AUD; n = 20)	≤ -8.69 (ALD; n = 21)

TD = Telic dominant; PD = Paratelic dominant; ND = Negativist dominant; CD = Conformist dominant; OD = Optimist dominant; PED = Pessimism dominant; AAD = Arousal avoidance dominant; ASD = Arousal seeking dominant; MD = Mastery dominant; SD = Sympathy dominant; AUD = Autic dominant; ALD = Alloic dominant.

descriptive data and thresholds used to define dominance groups. We then identified the number of dominance groups each participant belonged to (range: 0 to 6) and used an independent *t*-test to compare well-being in participants who belonged to 0 dominance groups with those who belonged to 4 or 5 dominance groups (none belonged to 6, and only 3 participants belonged to 5 therefore we combined them with the 4 dominances group; 1 outlier for well-being was removed). To compare groups on coping, we used a Wilcoxon Two-Sample Test.

3. Results

As shown in Table 3, and according to Ursachi et al. (2015), most measures have at least acceptable reliability (Cronbach's $\alpha = 0.6-0.7$) whilst some demonstrate very good reliability ($\alpha \geq 0.80$).

3.1. Motivational characteristics, well-being and coping

Well-being was significantly, albeit not strongly, correlated with all motivational characteristics apart from arousal avoidance, negativism, conformity, autic mastery and autic sympathy. Similarly, small but significant correlations were evident between coping and all motivational characteristics apart from conformity, alloic mastery, alloic

Table 3
Descriptive data for motivational, well-being and coping measures.

Variable	N	Mean	SD	Cronbach's alpha
Telic*	147	22.78	3.98	0.77
Paratelic*	147	18.21	3.53	0.67
Arousal avoiding	147	20.46	3.79	0.64
Arousal seeking*	147	17.64	4.22	0.78
Negativism	147	11.69	3.50	0.66
Conformity*	147	20.76	3.95	0.69
Autic mastery*	147	19.23	3.97	0.67
Autic sympathy	147	18.47	4.76	0.74
Alloic mastery	147	23.36	3.88	0.88
Alloic sympathy	146	23.99	3.75	0.80
Optimism*	147	20.62	4.19	0.77
Pessimism	146	13.54	4.97	0.85
Arousability	147	18.44	5.06	0.85
Effortfulness	147	23.60	4.15	0.87
Well-being*	146	47.22	9.58	0.92
Coping	146	14.72	2.74	0.61
Telic dominance*	147	4.57	5.12	
Optimism dominance	146	7.09	8.24	
Negativism dominance	147	-9.07	6.13	
Autic dominance*	146	-4.79	3.90	
Mastery dominance	146	0.07	3.89	
Arousal avoidance dominance*	147	2.81	6.23	

* normally distributed

sympathy, and arousal avoidance (see Table 4).

Regression indicated that 6 of the 14 motivational characteristics significantly predicted well-being, accounting for 58% of the variance (Model $R^2 = 0.55$; $F(6, 138) = 31.85$, $p < 0.01$), the majority of which was predicted by optimism (44%). Paratelic, alloic sympathy and optimism were positive predictors and, arousal seeking, arousability and pessimism were negative predictors (see Table 5).

Five motivational characteristics significantly predicted coping, accounting for 33% of the variance (Model $R^2 = 0.33$; $F(5, 139) = 5.83$, $p < 0.01$), with 17% predicted by pessimism. Telic, paratelic and negativism positively predicted coping, and, pessimism and arousability were negative predictors (see Table 5).

3.2. Motivational dominance, well-being and coping

Apart from telic, mastery and negativist dominances, the remaining dominances shared significant relationships with well-being, displaying low to medium correlations. Coping was not related to autic and telic dominance but shared small, significant relationships with all other dominances.

Optimism, mastery and autic dominance were significant predictors of well-being, accounting for 53% of its variance (Model $R^2 = 0.53$; $F(3, 141) = 53.79$, $p < 0.01$), mostly predicted by optimism dominance (50%). Optimism dominance was a positive predictor, and mastery and autic dominances were negative predictors of well-being, although mastery did not independently add to the variance in well-being (see Table 5). Coping was positively predicted by optimism and negativist dominance, accounting for 22% of its variability (Model $R^2 = 0.22$; $F(2, 142) = 19.45$, $p < 0.01$; see Table 5) with the majority predicted by optimism dominance (19%).

Well-being was significantly higher in participants belonging to 0 dominance groups ($n = 25$) than those belonging to 4 or 5 dominance groups ($n = 16$): $t(18.12) = 2.12$, $p = 0.048$. The former group mean was 49.84 ± 6.11 and the latter was 41.44 ± 15.09 . Coping did not differ between the 0 ($n = 32$) and 4/5 dominances ($n = 21$) groups: $Z = -0.40$, $p > 0.05$ (mean = 14.38 ± 2.23 and 14.20 ± 3.53 , respectively).

4. Discussion

This study explored the value of motivational constructs described in reversal theory (Apter, 2013) for predicting well-being and coping during a global health crisis when people's lifestyles, work and social

Table 4
Correlations between wellbeing, coping and motivational characteristics and dominances; (n for Wellbeing, n for Coping); * $p < 0.05$, ** $p < 0.01$.

Motivational construct	Well-being	Coping
Telic (145, 146)	0.20*	0.21*
Paratelic (146, 146)	0.36**	0.29**
Arousal avoiding (146, 146)	-0.13	-0.13
Arousal seeking (146, 146)	0.22*	0.25**
Negativism (146, 146)	0.10	0.31**
Conformity (146, 146)	-0.07	-0.07
Autic mastery (146, 146)	0.14	0.20*
Autic sympathy (146, 146)	-0.14	-0.17*
Alloic mastery (146, 146)	0.17*	0.13
Alloic sympathy (146, 145)	0.21*	0.02
Optimism (145, 146)	0.65**	0.37**
Pessimism (146, 145)	-0.59**	-0.37**
Arousability (145, 146)	-0.34**	-0.28**
Effortfulness (146, 146)	0.18*	0.17*
Telic dominance (146, 146)	-0.10	-0.07
Optimism dominance (146, 146)	0.68**	0.41**
Negativism dominance (146, 146)	0.12	0.21*
Autic dominance (145, 145)	-0.19*	-0.07
Mastery dominance (146, 145)	0.20*	0.22*
Arousal avoidance dominance (145, 146)	-0.22**	-0.23**

** $p < 0.01$

Table 5
Motivational characteristics and dominances that significantly predict well-being and coping.

	Significant predictors	Partial R	R ²	β	F	Significance
Motivational characteristics predicting well-being	Optimism	0.44	0.44	0.97	26.76	0.00
	Pessimism	0.06	0.51	-0.52	10.48	0.00
	Alloic sympathy	0.03	0.54	0.58	13.76	0.00
	Arousability	0.02	0.56	-0.36	7.37	0.01
	Arousal Seeking	0.01	0.57	-0.37	5.86	0.02
	Paratelic	0.01	0.58	0.38	4.16	0.04
Motivational characteristics predicting coping	Pessimism	0.17	0.17	-0.15	10.19	0.00
	Negativism	0.08	0.24	0.17	7.73	0.01
	Telic	0.04	0.29	0.14	7.78	0.01
	Arousability	0.02	0.31	-0.10	5.05	0.03
Motivational dominance predicting well-being	Paratelic	0.02	0.33	0.14	4.65	0.03
	Optimism dominance	0.50	0.50	0.85	147.99	0.00
	Autic dominance	0.03	0.52	-0.42	8.90	0.00
Motivational dominance predicting coping	Mastery dominance	0.01	0.53	-0.26	3.05	0.08
	Optimism dominance	0.19	0.19	0.14	30.61	0.05
	Negativism dominance	0.02	0.22	0.07	3.9	0.00

contexts were severely disrupted.

4.1. Major findings and interpretations

Findings lent partial support for hypothesis one, as well-being was significantly predicted by optimism (positively), mastery and autic (negatively) dominances, but, contrary to our hypothesis, not by telic, conformist, and arousal avoidance dominances. There was greater support for hypothesis two as well-being was positively predicted by alloic sympathy and optimism, and, negatively by arousal seeking, arousability and pessimism. However, conformity and effortfulness did not predict well-being, and, contrary to expectations, paratelic motivation positively predicted well-being.

Similar levels of support were identified for hypotheses three and four. Coping was significantly positively predicted by negativist and optimism dominances but, contrary to hypothesis three, not by paratelic, autic, mastery and arousal seeking dominances. Supporting hypothesis 4, paratelic and negativist motivations positively predicted, and arousability negatively predicted, coping. Whilst optimism did not positively predict coping as hypothesised, pessimism was a negative predictor. Contrary to our hypothesis, autic mastery, arousal seeking and effortfulness did not predict coping, whereas telic motivation was a positive predictor. Hypothesis five garnered mixed support; well-being was significantly lower in people belonging to multiple dominance groups, than those who did not belong to an extreme dominance group, but no differences were observed in coping.

Explaining these findings, optimism is consistently related to higher levels of well-being, hope, physical well-being, and coping with stress, mainly through the use of social support (Conversano et al., 2010). Thus pessimism, was, logically negatively related to well-being. The COVID-19 pandemic has caused a change in lifestyle for many, and opportunities for variety, excitement and elevated arousal are diminished. This helps explain the link between low arousal seeking and well-being. Similarly, the situation requires a collective effort, where personal needs are not always foremost, and people are spending increased time with a small group of people. Thus, it makes sense that higher alloic sympathy and lower autic and mastery dominance were associated with higher well-being. Not surprisingly, in such a volatile, emotion provoking, and possibly adverse situation, a lesser tendency to be easily emotionally aroused, appears helpful for well-being. We postulated that telic motivation would be associated with higher well-being as the current situation requires a focus on long-term goals with actions viewed as a means to an end (e.g., isolating to prevent infecting others). However, paratelic motivation was associated with higher well-being, suggesting that enjoying the moment for its own sake without need to focus on purposeful activities with long-term consequences, was associated with higher well-being. On reflection this makes sense, as the pandemic

has affected the capacity to plan and engage in some purposeful activities (e.g., work, competitions, volunteering). This also provides a potential explanation for the finding that effortfulness, telic and arousal avoiding dominances did not predict well-being, although this was hypothesised. The lack of predictive power of conformity is at first surprising given that the situation required strict adherence to rules. Possibly though this in fact rendered conformity irrelevant as everyone was compelled to conform, regardless of their degree of conformity.

Although not all predictors of coping were supported, optimism (and by extension pessimism) negativism, paratelic motivation and low arousability significantly predicted coping as hypothesised. Optimism is needed to approach problems positively and is associated with adaptive coping (Sinclair & Wallston, 2004), and low arousability will likely enable the cognitive processing needed for tenaciously approaching problems with adaptive coping. This latter relationship possibly helps to explain the lack of support for arousal seeking as a predictor of coping, although this contradicts our hypothesis. Resilience coping also involves creatively addressing problems (ibid) therefore it is logical that higher levels of coping are associated with greater negativism, a willingness to deviate from norms and conventions and with higher levels of paratelic motivation and a willingness to be spontaneous. This does not, however, correspond with the finding that paratelic dominance was not a significant predictor. Considering the focus on personal agency in our measure of resilience coping, it is surprising that effortfulness, autic and mastery motivations and dominances did not predict coping. Possibly this could be because of the lack of personal control and agency presented by the pandemic, and therefore under normal circumstances, this relationship would be evident. It is clear that future studies are needed when the pandemic has ended to enable us to discern if the findings here are upheld in normal circumstances or if a different pattern of relationships is identified.

Higher levels of well-being observed in people with no extreme dominances compared with those with multiple extreme dominances suggest indirect support for the link between psychodiversity and well-being, adding to initial evidence (Thomas et al., 2018). Based on this, examining dominances independently from each other, as in the present study, might not provide a full account of their influence. Instead, our data suggest the need to use a composite profile of dominances, as Apter et al. (1998) suggest. Although Apter (2013) suggests that psychodiversity is associated with enhanced coping in a dynamic environment, coping did not differ in relation to number of dominance group affiliations. Tentatively, we suggest that experiencing different states helps to maintain well-being but not coping because the pandemic was under mass, not personal control. Future research that untangles these issues would appear to be important.

Results from this study support established relationships that personality shares with well-being and coping (e.g., Carver & Connor-

Smith, 2010; Lucas, 2018) and illustrate that looking beyond the Big Five Personality Dimensions (Costa Jr. & McCrae, 1992) might further elucidate personality factors that are related to these variables. Importantly, as reversal theory proposes that dominances are tendencies rather than traits, and that all individuals can spend time in all meta-motivational states, regardless of whether or not they are aligned with their own dominances, means that people can be encouraged to spend time in states that are most associated with enhanced well-being and coping.

Direct comparison with previous research using reversal theory is limited as this research focused on specific health-related behaviours and cognitions whereas we focused on general well-being and coping. In addition, previous work has not always considered the full range of motivational styles and dominances, unlike our study. Regardless, our findings extend existing research supporting the role of reversal theory (Apter, 2001) constructs in predicting important health-related variables (e.g., Boddington & McDermott, 2012; Ianni & Lafreniere, 2014; Lafreniere et al., 2013; Lustig & Cramer, 2015; O'Neill & Lafreniere, 2014; Rahman et al., 2018; Segatto & Lafreniere, 2013). Our data tentatively indicate that motivational styles might be more influential predictors than motivational dominances, which also appeared to be the case in Lustig and Cramer's (2015) study, as only telic and arousal avoidance dominances were significant predictors. Although within different contexts, the outcomes of both studies are well-being oriented, thus future research is needed to identify if this phenomenon is replicated.

5. Conclusion

Our findings indicate that the motivational constructs proposed within reversal theory's structural phenomenological framework are useful for predicting well-being, and, to a lesser degree, coping. To optimise well-being, in line with the concept of psychodiversity, we should encourage the experience of a wide range of motivational states. Those people with extreme dominances, who are likely to spend the majority of their time in preferred motivational states, thus might benefit from actively inducing reversals to their non-preferred states. Recently, authors have discussed the feasibility of self-induced reversals (e.g., Apter, 2013; Thomas et al., 2018) including methods to do so (Desselles & Apter, 2013) such as the threat of performance evaluation and imagery (e.g., Hudson & Day, 2012; Legrand & Thatcher, 2011). However, more research is needed across the whole range of motivational states, to illustrate their efficacy.

Within the context of a shared global crisis, people reporting higher well-being displayed the following motivational profile: paratelic, optimistic, alloic sympathy, low arousability, pessimism and low arousal seeking, with optimism and alloic sympathy dominance. Those reporting optimism and negativist dominance, high negativist, paratelic and telic motivations, and low arousability and pessimism displayed higher levels of resilience coping. These motivational profiles support their adaptive value for well-being and coping in such a situation, thus we might suggest encouraging their experience in similar situations.

5.1. Study strengths, limitations and future research

This study was conducted within a specific crisis, including only a UK based sample with internet access. Thus, future research should explore whether these findings are replicated and can be generalised to other samples, adverse contexts and to non-adverse situations. Also, as our study was correlational, we cannot state with certainty that encouraging these motivational experiences will lead to enhanced well-being and coping; longitudinal studies are required to explore this. If confirmed, studies need to establish if interventions that manipulate motivational states do lead to enhanced well-being and coping. In addition, this study used a proxy measure of psychodiversity, thus, to further advance theory, future research needs to measure metamotivational states.

Nevertheless, by predicting well-being and coping using reversal theory motivational constructs (Apter, 2001), this study makes a novel contribution and extends the line of inquiry beyond the Big Five Personality Dimensions (Costa Jr. & McCrae, 1992).

CRedit authorship contribution statement

Joanne Hudson: Conceptualization, Methodology, Investigation, Resources, Writing – original draft. **Yusuke Kuroda:** Conceptualization, Investigation, Resources, Visualization, Writing – review & editing. **Patrick C. Morel:** Formal analysis.

Declaration of competing interest

None.

References

- Apter, M. J. (2001). *Motivational styles in everyday life: A guide to reversal theory*. Washington, D.C: American Psychological Association.
- Apter, M. J. (2013). Developing reversal theory: Some suggestions for future research. *Journal of Motivation, Emotion, and Personality*, 1, 1–8. <https://doi.org/10.12689/jmep.2013.101>.
- Apter, M. J., Mallows, R., & Williams, S. (1998). The development of the motivational style profile. *Personality and Individual Differences*, 24, 7–18. doi [https://doi.org/10.1016/S0191-8869\(97\)00148-7](https://doi.org/10.1016/S0191-8869(97)00148-7).
- Boddington, E. L., & McDermott, M. R. (2012). Predicting resistance to health education messages for cannabis use: The role of rebelliousness, autistic mastery, health value and ethnicity. *Journal of Health Psychology*, 18, 157–166. <https://doi.org/10.1177/1359105312438111>.
- Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61, 679–704.
- Conversano, C., Rotondo, A., Lensi, E., Della Vista, O., Arpone, F., & Reda, M. A. (2010). Optimism and its impact on mental and physical well-being. *Clinical Practice and Epidemiology in Mental Health*, 6, 25–29. <https://doi.org/10.2174/1745017901006010025>.
- Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: PAR.
- Desselles, M. L., & Apter, M. J. (2013). Manipulating motivational states: A review. *Journal of Motivation, Emotion, and Personality*, 1, 44–49. <https://doi.org/10.12689/jmep.2013.106>.
- Diener, E., Oishi, S., & Lucas, E. E. (2003). Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. *Annual Review of Psychology*, 54, 403–425.
- Dubey, S., Biswas, P., Ghosh, R., Chatterjee, S., Dubey, M. J., Chatterjee, S., ... Lavie, C. J. (2020). Psychosocial impact of COVID-19. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 14, 779–788. <https://doi.org/10.1016/j.dsx.2020.05.035>.
- Hiszcott, J., Alexandridi, M., Muscolini, M., Tassone, E., Palermo, E., Soultioti, M., & Zevini, A. (2020). The global impact of the coronavirus pandemic. *Cytokine and Growth Factor Reviews*, 53, 1–9. <https://doi.org/10.1016/j.cytogfr.2020.05.010>.
- Hudson, J., & Day, M. (2012). Athletes' experiences of expressive writing about sports stressors. *Psychology of Sport and Exercise*, 13, 798–806. <https://doi.org/10.1016/j.psychsport.2012.05.005>.
- Ianni, P. A., & Lafreniere, K. D. (2014). Personality and motivational correlates of energy drink consumption and misuse among female undergraduate students. *Personality and Individual Differences*, 69, 110–114. <https://doi.org/10.1016/j.paid.2014.05.022>.
- Kuroda, Y., Hudson, J., & Thatcher, R. (2015). Motivational state and personality in relation to emotion, stress, and HRV responses to aerobic exercise. *Journal of Psychophysiology*, 29(4), 147–160. <https://doi.org/10.1027/0269-8803/a000146>.
- Kuroda, Y., Thatcher, J., & Thatcher, R. (2011). Metamotivational state and dominance: Links with EMG gradients during exercise and a test of the misfit effect. *Journal of Sports Sciences*, 29, 403–410. <https://doi.org/10.1080/02640414.2010.537673>.
- Lafreniere, K. D., Menna, R., & Cramer, K. M. (2013). Rebelliousness, effortful control, and risky behavior: Metamotivational and temperamental predictors of risk-taking in older adolescents. *Journal of Motivation, Emotion, and Personality*, 1, 17–26. <https://doi.org/10.12689/jmep.2013.103>.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Legrand, F. D., & Thatcher, J. (2011). Acute mood responses to a 15min-long walking session at self-selected intensity: Effects of an experimentally-induced telic or paratelic state. *Emotion*, 11(5), 1040–1045. <https://doi.org/10.1037/a0022944>.
- Leszko, M., Iwanski, R., & Jarzebinska, A. (2020). The relationship between personality traits and coping styles among first-time and recurrent prisoners in Poland. *Frontiers in Psychology*, 10, Article 2969.
- Lucas, R. E. (2018). Exploring the associations between personality and subjective well-being. In E. Diener, S. Oishi, & L. Tay (Eds.), *Handbook of well-being*. Salt Lake City, UT: DEF Publishers. nobascholar.com.
- Lustig, K. A., & Cramer, K. (2015). Characteristics of pet owners: Motivation and need fulfillment. *Journal of Motivation, Emotion, and Personality*, 4, 45–52. <https://doi.org/10.3389/fpsyg.2017.01416>.

- NHS Health Scotland. (2016). *Warwick-Edinburgh Mental Well-being Scale (WEMWBS)*. Edinburgh, Scotland: NHS Health Scotland.
- O'Neill, A. L., & Lafreniere, K. D. (2014). Metamotivational tendencies, sociocultural attitudes, and risky eating behaviors. *Journal of Motivation, Emotion, and Personality*, 2, 50–57. <https://doi.org/10.12689/jmep.2014.206>.
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *General Psychiatry*, 33, Article e100213. <https://doi.org/10.1136/gpsych-2020-100213>.
- Rahman, R. J., Keenan, J. R., & Hudson, J. (2018). Exploring rural palliative care patients' experiences of accessing psychosocial support through telehealth: A longitudinal approach. *Qualitative Research in Medicine and Healthcare*, 4, 31–42. <https://doi.org/10.4081/qrmh.2020.8821>.
- Segatto, B. L., & Lafreniere, K. D. (2013). Motivational and personality predictors of body esteem in high- and low-frequency exercisers. *Journal of Motivation, Emotion, and Personality*, 1, 27–35. <https://doi.org/10.12689/jmep.2013.104>.
- Sinclair, V. G., & Wallston, K. A. (2004). The development and psychometric evaluation of the brief resilient coping scale. *Assessment*, 11, 94–101. <https://doi.org/10.1177/1073191103258144>.
- Thomas, L., Hudson, J., & Oliver, E. (2018). Modelling motivational dynamics: Demonstrating when, why, and how we self-regulate motivation. *Journal of Motivation, Emotion, and Personality*, 7, 33–47. <https://doi.org/10.12689/jmep.2018.704>.
- Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How reliable are measurement scales? External factors with indirect influence on reliability estimators. *Procedia Economics and Finance*, 20, 679–686.
- Van den Berg, P. T., & Pitarui, H. (2005). The relationships between personality and wellbeing during societal change. *Personality and Individual Differences*, 39, 229–234. <https://doi.org/10.1016/j.paid.2005.01.007>.
- Xin, Y., Wu, J., Yao, Z., Guan, Q., Aleman, A., & Luo, Y. (2017). The relationship between personality and the response to acute psychological stress. *Scientific Reports*, 7, 16906. <https://doi.org/10.1038/s41598-017-17053-2>.
- Zambrano-Monserrate, M. A., Ruano, M. A., & Sanchez-Alcalde, L. (2020). Indirect effects of COVID-19 on the environment. *Science of the Total Environment*, 728, 138813. <https://doi.org/10.1016/j.scitotenv.2020.138813>.