

How is the life without unicorns? A within-individual study on the relationship between uncertainty and mental health indicators: The moderating role of neuroticism

Ana Junça-Silva^{a,b,c,*}, Daniel Silva^{c,d}

^a Instituto Universitário de Lisboa (ISCTE-IUL), Lisboa, Portugal

^b Business Research Unit – BRU (UNIDE-IUL), Portugal

^c Instituto Politécnico de Tomar (IPT), Tomar, Portugal

^d Department of Management and Economics & NECE Research Unit in Business Sciences, University of Beira Interior, Covilhã, Portugal

ARTICLE INFO

Keywords:

Uncertainty
Negative affect
Mental health
Neuroticism
Diary study

ABSTRACT

The pandemic crisis of COVID-19 led to higher levels of uncertainty for individuals. Mental health has been outlined as a major key research priority to support and inform interventions. This study aimed to examine whether uncertainty influenced negative affect which in turn, resulted in worst levels of mental health, during the COVID-19 pandemic crisis, and test if neuroticism moderated the negative effect of uncertainty on mental health, via negative affect. To capture changes in daily uncertainty, negative affect and mental health, a daily design was adopted to test our model. We collected data through five consecutive days ($N = 320$), in the early “lockdown” stage of the pandemic. The multilevel results showed a significant mediation effect from daily uncertainty to daily mental health via daily negative affect. In addition, neuroticism moderated the mediated relationship, in such a way that the relationship between daily uncertainty on daily mental health, via daily negative affect was strengthened when neuroticism was higher. In sum, living without unicorns, or see the world through a black lens, is a factor that enhances the blackness of uncertainty.

1. Introduction

The COVID-19 pandemic crisis has resulted in diverse social, economic and organizational changes, such as, job uncertainty and job loss (Douglas et al., 2020). A primary strategy to reduce the spread of the COVID-19 pandemic was the use of social distancing. This strategy created a sense of uncertainty among the population in general, which in turn, impaired their mental health (Jonsson et al., 2020). General, economic and work-related uncertainty, are factors that negatively influence individuals' mental health (Godinc et al., 2019). Indeed, there are empirical evidences of the decrease in mental health during the pandemic crisis (e.g., Taylor et al., 2020). For instance, Xiong et al. (2020) reported an increase in anxiety, depression and stress, during the COVID-19 pandemic, in many countries.

Building on the integrative model of uncertainty tolerance (Hillen et al., 2017), we argued that, this time of crisis has increased individuals' uncertainty which, in turn, resulted in, more frequent, experiences of negative affect (a set of negative emotions, such as sadness, or anger that

has been recognized as causal entities in workplace behavior and well-being, e.g., Diener et al., 2020) and, as a consequence, has deteriorated their mental health (e.g., Anderson et al., 2019). In addition, we claimed that neuroticism – a trait linked to negative affect and poorer mental health (e.g., De Gucht et al., 2004; Shokrkon & Nicoladis, 2021; Slavish et al., 2018) would play a moderating role in this relationship. It is well established that trait neuroticism bears strong links with negative affect and mentally ill-health (Borghuis et al., 2020). Despite the empirical evidence that uncertainty leads to poorer mental health indicators, and makes the individual experiences negative affect (Anderson et al., 2019), so far as we know there are no studies testing this overall model, at the daily-level.

Thus, this study aimed to examine *how* and *when* uncertainty influences mental health. First, we explored *how* daily uncertainty affects individuals' mental health considering the effect of daily negative affect as a process through it occurs. Second, we explored *when* this occurs, by testing the moderating effect of neuroticism on the relationship between individuals' daily uncertainty, daily negative affect, and daily mental

* Corresponding author at: Instituto Universitário de Lisboa (ISCTE-IUL), Lisboa, Portugal.

E-mail address: ana_luisa_silva@iscte-iul.pt (A. Junça-Silva).

health.

2. Theoretical background and hypotheses development

2.1. Uncertainty and mental health

Recently, uncertainty has triggered interest among researchers (Peters et al., 2017). However, it has been not explicitly defined, or it has been defined in varying and often in inconsistent ways (Anderson et al., 2019). However, there are common ways through which scholars have agreed about its nature, that is, the notion that uncertainty “is fundamentally a mental state, a subjective, cognitive experience of human beings rather than a feature of the objective, material world. The specific focus of this experience, furthermore, is ignorance—i.e., the lack of knowledge.” (Anderson et al., 2019, p. 2).

In a constant changing world, uncertainty has increased by the pandemic situation we are going through. Volatility, uncertainty, complexity and ambiguity form the acronym VUCA. VUCA was initially used, in military context, to describe and interpret conditions on the battlefield. Recently, it has been applied to organizational management, to better understand the competitive work-related environments (Bennett & Lemoine, 2014). *Volatility* can be defined as something unstable or unpredictable (Bennett & Lemoine, 2014). *Uncertainty* is related to unclear situations/events (Caron, 2009). *Complexity* was defined by Drucker (2012) as the “threshold of chaos”, and has been characterized by technological disruption and globalization. Finally, *ambiguity* has its basis on the lack of knowledge of events' cause and effect, on which there is no precedent to base predictions (Bennett & Lemoine, 2014).

A primary strategy to reduce the spread of the COVID-19 was the use of social distancing (WHO, 2020), as well as mandatory confinement (Murugan et al., 2020). This strategy is known to be related to poorer mental health, deriving from stress and anxiety to the environment in which they live. Hence, the interplay between the pandemic environment, the containment strategies, adopted by the WHO – social distancing and isolation – intensified the negative effects of a VUCA world, which has affected mental health, on a large scale (Asmundson & Taylor, 2020). Some of the health-related consequences have been poorer mental health, psychological suffering (Espinosa & Rudenstine, 2020), decreased well-being (Satici et al., 2020) and depression (Santini et al., 2015) with uncertainty being a strong predictor of stress, anxiety and with the fear of the future (Taylor et al., 2018).

2.2. The mediating role of affect in the relationship between uncertainty and mental health

Uncertainty is a critical phenomenon because of its many negative psychological effects for the individual (e.g., mental health; Han et al., 2011). Even though uncertainty is an awareness of the unknown, it tends to create discomfort and anxiety, as human beings prefer what they know. Thus, it can be aversive, as evidenced by diverse studies, from multiple perspectives, that have demonstrated, for example, that uncertainty provokes fear, worry and anxiety, perceptions of vulnerability, and avoidance of decision-making (Hillen et al., 2017).

The integrative model of uncertainty tolerance (Hillen et al., 2017) stated that the perception of uncertainty begins with a *stimulus* (event, or situation) that is perceived as unknown. This perception leads to cognitive (e.g., appraisals of denial, vulnerability, doubt or threat), affective (emotions, such as worry, fear, disinterest, aversion or despair) or behavioral (e.g., avoidance, inaction, decision deferral, inattention) responses, which may co-occur temporally (Dugas et al., 2001). The model also stated that personality (trait or state) may buffer or intensify the response to the perceived uncertainty.

Appraisal theories of emotions are also a relevant theoretical framework that supports the relationship between uncertainty and negative emotions (see Moors et al., 2013). Negative emotions are affective states, processes, and functions regarded as valuable in

themselves and are recognized as causal entities in workplace behavior (Diener et al., 2020). Appraisal theories suggest that emotions are adaptive processes that reflect appraisals of events or situations, that are significant for the individual's goals and quality of life. It has been argued that appraisals can be conscious and rule-based processes, however appraisals seem to be, more often, automatic associations that match patterns in the environment to appraisals (Anderson et al., 2019). Examples of appraisals are goal relevance and congruence, coping potential, and agency. Moreover, diverse appraisal theorists have also proposed that uncertainty about goals and outcomes is another appraisal dimension (Moors et al., 2013). Therefore, the appraised uncertainty of a situation is fundamentally linked to the experience of negative affect.

The fear of the unknown theory (Carleton, 2012, 2016) is also a relevant framework to understand the direct relationship between uncertainty and negative affect. Accordingly, the fear of the unknown is a fundamental fear of human beings that appears to result in an emotion (for a review see Carleton, 2012).

Empirically, there are also evidences of the relationship between uncertainty and negative affect. For instance, Bottesi et al. (2018) showed that uncertainty was positively linked to negative affect, which in turn predicted emotional distress. Similarly, Bakioglu et al. (2020) demonstrated that uncertainty was positively linked to fear of COVID-19, depression, anxiety and stress.

Thus, based on integrative model of uncertainty tolerance and of the fear of the unknown theory, we argued that, this time of crisis has increased individuals' uncertainty which, in turn, resulted in, more frequent, experiences of negative affect and, as a consequence, has deteriorated their mental health.

Hypothesis 1. Daily negative affect mediates the relationship between daily uncertainty and daily mental health.

2.3. The moderating role of neuroticism

The world is not just rainbows and unicorns, but there are some people that tend to see the world always black. This tendency, to view the world to a black veil, has been defined as neuroticism. Neuroticism is characterized by this tendency, that is (1) a general view of a “black world” - the world as a threatening and dangerous place, accompanied by (2) beliefs of inability to deal with unexpected and challenging events, with (3) an intensification and inflated negative emotionality (Barlow et al., 2014). In short, neuroticism is the tendency to experience negative emotions, frequently and intensely, associated with a feeling of lack of control in response to stressful situations or environments.

In general, neuroticism has been linked to negative affectivity (a broad and pervasive predisposition to experience negative emotions - anxiety, anger, self-consciousness, irritability, and fear - that has also influences on cognition, self-concept, and world view; Watson & Clark, 1984) and worst responses to stressors, negative or unexpected events (Barrick et al., 2001; Borghuis et al., 2020). In addition, individuals high in neuroticism trait tend to become more vulnerable to adverse outcomes, when experience stressful experiences (Wrzus et al., 2021), are more anxious and insecure, in general (e.g., Hu et al., 2020), and more volatile to distress (Costa & McCrae, 1992). Moreover, individuals with higher levels of neuroticism tend to act more impulsively, when compared to those who score lower (Mitchell et al., 2021). In addition, who score higher in neuroticism experience worst mental health and well-being indicators, such as subjective well-being, depression, anxiety, mood and substance abuse disorders (Hakulinen, et al., 2015).

A wide range of empirical studies have demonstrated that neuroticism, in times of crisis, is associated to higher levels of stress, not only in response to the threat of the coronavirus, but also in reaction to all the social impositions of the government (Liu et al., 2021). Neurotic individuals have experienced more generalized anxiety, depression, worrying and negative daily affect, during COVID-19 crisis (Kroencke et al., 2020). On the other hand, they perceived work measures and

politic restrictions more limiting, than individuals with lower levels of neuroticism (Modersitzki et al., 2020), experienced more concerns about finances, unemployment and relationships, evidenced less optimism and hope about the future, as well as lower levels of happiness and subjective well-being (Aschwanden et al., 2021). Some studies also evidenced that neuroticism was negatively associated with the individuals mental health during COVID-19 pandemic crisis (Shokrkon & Nicoladis, 2021), which might be explained by the fact that these individuals are more obsessed with COVID-19 informations and consequences impairing their mental health (Khosravi, 2020). Thus, we argue that neuroticism will intensify the mediated relation between uncertainty and mental health, via negative affect.

Hypothesis 2. Neuroticism would moderate the indirect association between daily uncertainty and daily mental health via daily negative affect, such that the uncertainty-negative affect pathway would be stronger for higher levels of neuroticism (versus lower levels) (Fig. 1).

3. Method

3.1. Participants and procedure

This study was conducted during February and March of 2021 – in the second lockdown – which was one of the peak periods of COVID-19 because in that period the country presented the higher dead rates of Europe. Sixty-eight human resource managers took part in the study, from which 87% of the participants were female. The mean age was 24 years old ($SD = 6.65$).

We contacted human resources managers from our networks. The ones that agreed to participate in the study, received an email, explaining the goals of the study and clarifying that their participation was voluntarily, anonymous and confidential. After that, they signed an informed consent form, and received another email from the researchers' team explaining the daily data collection procedure. Then, each participant received a daily email, for five days, with the hyperlink for the daily survey. From the 80 emails sent, there were 68 valid responses (response rate = 85%). The overall number of observations was 320.

All methods were carried out in accordance with relevant guidelines and regulations, and all experimental protocols were approved by ISCTE-Lisbon University Institute. Moreover, we used the same daily survey across the five-days.

3.2. Measures

3.2.1. Daily negative affect

We used the 8-item Multi-Affect Indicator (Warr et al., 2014), to assess the frequency of daily negative affect experienced on that day (e.g., "sad"). Participants answered on a 5-point scale (1–never; 5–always). Multilevel reliability tests were good ($\alpha_{\text{between}} = 0.89$, $\omega_{\text{between}} = 0.89$; $\alpha_{\text{within}} = 0.87$, $\omega_{\text{within}} = 0.86$).

3.2.2. Daily uncertainty

To measure uncertainty, we used the three items from the Organizational Change Scale (Rafferty & Griffin, 2006), of which an example

item is: "Today, I was unsure about how to react to changes". All items were answered on five-point scale (1 = strongly disagree, 5 = strongly agree). Multilevel reliability indices were good ($\alpha_{\text{between}} = 0.63$, $\omega_{\text{between}} = 0.63$; $\alpha_{\text{within}} = 0.72$, $\omega_{\text{within}} = 0.72$).

3.2.3. Daily mental health

We used three items from the SF-36v2 Health Survey (Ware et al., 2007) to measure daily mental health: "Today, How much of the time have you felt calm and peaceful?". Items were rated on a 5-point scale ranging from 1 (none of the time) to 5 (all of the time). Multilevel reliability indices were good ($\alpha_{\text{between}} = 0.78$, $\omega_{\text{between}} = 0.79$; $\alpha_{\text{within}} = 0.84$, $\omega_{\text{within}} = 0.84$).

3.2.4. Neuroticism

To measure neuroticism, we used four items from the Mini-IPIP Scales (Donnellan et al., 2006; e.g., "I have frequent mood swings"). Participants answered on a five-point scale (1 = very inaccurate; 5 = very accurate) ($\alpha = 0.58$, $\omega = 0.56$).

3.2.5. Control variables

We used sex and time of data collection as control variables. Sex may account for differences in daily experienced affect (Dello Russo et al., 2020), and the time of data collection (Monday to Friday) was a daily-level control variable once it was found that it influences affective reactions and work-related behaviors (Fisher, 2003).

3.3. Data analysis

This study used multi-level analysis with nested data to examine the underlying model. First, we calculated the analysis of variance components. We found significant variance in daily uncertainty ($ICC = 0.72$), daily negative affect ($ICC = 0.87$), and daily mental health ($ICC = 0.84$). This evidences that these variables have significant variation both at within and between-person level. Thus, we could proceed with the multilevel analysis.

Both hypotheses were tested through the macro–Multilevel Mediation (MLMed), in SPSS (Rockwood, 2020). This macro appears to deliver similar results, in estimation of model parameters, to what other software alternatives do (e.g., Mplus). Plus, this macro appears to be particularly useful for models that include level-2 moderators (Rockwood, 2020). MLMed is, therefore, a suitable macro to test our 1-1-1 multilevel model, and for our moderated mediation model.

4. Results

4.1. Descriptive statistical analysis

The descriptive statistics and correlations are presented in Table 1.

4.2. Hypothesis testing

Hypothesis 1 tested the mediating role of negative affect on the relationship between uncertainty and mental health, at the daily level. Daily uncertainty positively correlated with daily negative affect ($\gamma =$

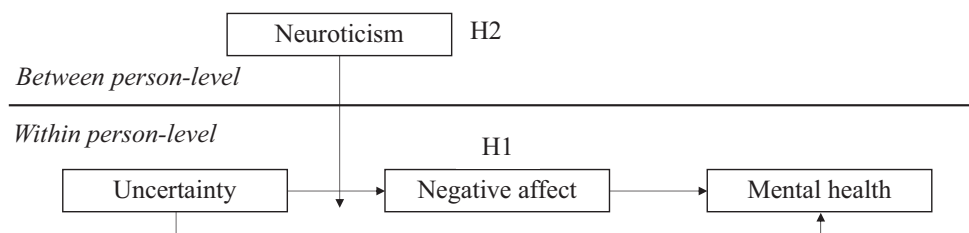


Fig. 1. The multilevel mediated moderation under analysis.

Table 1
Descriptive statistics.

Variables	<i>M</i> _{within}	<i>SD</i> _{within}	<i>M</i> _{between}	<i>SD</i> _{between}	1	2	3	4	5	6
1. Uncertainty	2.78	0.98	3.56	0.72	–	0.44***	0.02	0.22***	–0.17**	–0.21**
2. Negative affect	2.46	1.01	3.02	0.81	0.38***	–	–0.41***	0.35***	–0.09	–0.13*
3. Mental health	3.31	1.02	3.32	0.70	–0.14	0.59***	–	–0.45***	–0.05	0.10
4. Neuroticism	–	–	2.79	0.66	0.23*	0.58***	–0.68***	–	–	–0.01
5. Sex	–	–	1.12	0.32	–0.17**	–0.06	0.03	–0.10	–	–0.06
6. Day	3.05	1.56	–	–	0.05	0.05	–0.02	–0.02	–0.06	–

Note. Correlations below the diagonal are between-person level. Correlations above the diagonal are within-person level.

*** *p* < .001.
 ** *p* < .01.
 * *p* < .05.

0.26, *p* < .001). Daily negative affect negatively correlated with daily mental health ($\gamma = -0.40, p < .001$), with a significant indirect effect ($\gamma = -0.10, p < .001$) (95%CI [–0.16, –0.05]). Thus, **Hypothesis 1** was supported by the data (Table 2).

Hypothesis 2 stated that neuroticism would moderate the relationship between daily uncertainty, daily negative affect, and daily mental health. The results, in Table 3, show a significant conditional indirect effect of neuroticism ($\gamma = -0.06, CI\ 95\% [-0.13, -0.01]$), in particular, we found that the mediating effect of daily uncertainty on daily mental health, via daily negative affect is enhanced for individuals who scored higher on neuroticism. Thus, **Hypothesis 2** received supported (Fig. 2).

5. Discussion

Based on the integrative model of uncertainty tolerance, we used the diary research method to examine *how* and *when* uncertainty influences mental health. Hence, we explored *how* daily uncertainty affects individuals' mental health while also considering the effect of daily negative affect. Moreover, this study explores *when* this occurs, by testing the moderating effect of neuroticism on the relationship between individuals' daily uncertainty, daily negative affect, and daily mental health.

In sum, this study uses a diary method to reveal the dynamic mechanism of daily uncertainty on daily mental health. Cross-sectional designs do not capture the daily dynamics of life (i.e., negative affect; Zhang et al., 2017). Therefore, in response to the suggestions of Anderson et al. (2019), to examine daily and dynamically fluctuating uncertainty, this study shows that uncertainty exhibits daily dynamic fluctuations in an individual, and thus the use of a diary method leads to more robust conclusions (Ohly & Fritz, 2010).

5.1. Theoretical implications

The integrative model of uncertainty tolerance, through which we built our hypothesis, states that perceived uncertainty may trigger cognitive (e.g., appraisal of threat), affective (e.g., worry) or behavioral responses (e.g., avoidance). This study extends previous findings of this model (Hillen et al., 2017), as it shows the mediated relationship among uncertainty, negative affect and mental health, at the daily level. Despite the existing cross-sectional studies demonstrating the direct paths between uncertainty and negative affect (e.g., Anderson, et al., 2019), and between this one and mental health (e.g., Whitehead, 2021), daily studies testing this mediation, were to date largely unverified. Our findings evidence a mediation of negative affect on the link between uncertainty and mental health, in a daily basis, which is a more comprehensive approach. The uncertainty, as a lack of knowledge, tends to make people feel discomfort and anxiety when facing it (e.g., Bakioğlu et al., 2020). This tendency might be created by the *fear of the unknown* – the fundamental fear of the individuals (Carleton, 2012, 2016). Another perspective that supports this assertion is the *theory of personal uncertainty* (van den Bos, 2009) that proposes that uncertainty is an aversive feeling experienced when an individual is uncertain about something (e.g., events). This theory emphasizes that, in order to make life more understandable – and certain – individuals live it through a “sense-making” process. When something occurs, and triggers uncertainty, it challenges that “sense-making” process, and all the meaning that individuals perceive in their life, making them feel negative emotions. All these theoretical perspectives support the direct link between uncertainty and negative affect. There is also empirical evidence of the relationship between these variables. For instance, Bottesi et al. (2018) showed that uncertainty was positively linked to negative affect, which in turn affected emotional distress. Similarly, Satici et al. (2020) showed, that uncertainty was negatively associated to mental well-

Table 2
Parameter estimates for multilevel mediation model.

	Outcome						
	Daily negative affect			Daily mental health			
	Ý	SE	95% CI	Ý	SE	95% CI	
<i>Direct effect</i>							
Daily uncertainty	0.26***	0.06	(0.14–0.37)	0.24***	0.06	(0.12, 0.36)	
Daily negative affect	–	–	–	–0.40***	0.06	(–0.52, –0.27)	
Sex	0.17	0.25	(–0.33, 0.66)	–0.06	0.24	(–0.53, 0.42)	
Time	–0.07**	0.03	(–0.13, –0.02)	0.06*	0.03	(0.01, 0.11)	
<i>Indirect effect</i>							
Daily uncertainty (via DNA)	–	–	–	–0.10***	0.03	(–0.16, –0.05)	
-2LL	1460.42						
AIC	1468.48						
BIC	1486.07						

Note. DNA, daily negative affect.

* *p* < .05.
 ** *p* < .01.
 *** *p* < .001.

Table 3
Parameter estimates for multilevel moderated mediation model.

	Outcome					
	Daily negative affect			Daily mental health		
	Ŷ	SE	95% CI	Ŷ	SE	95% CI
Direct effect						
Daily uncertainty	-0.09	0.21	[-0.49,0.32]	0.20***	0.06	[0.09, 0.32]
Daily negative affect	-	-	-	-0.41***	0.06	[-0.53, -0.29]
Neuroticism	-0.16	0.51	[-1.18, 0.86]	-	-	-
Daily uncertainty * neuroticism	0.15*	0.07	[0.01, 0.29]	-	-	-
Sex	0.12	0.24	[-0.36, 0.61]	-0.06	0.24	(-0.53, 0.42)
Time	-0.07**	0.03	[-0.12, -0.02]	0.06*	0.03	(0.01, 0.11)
Conditional indirect effect				-0.06***		(-0.13, -0.01)
-2LL	1450.01					
AIC	1458.01					
BIC	1475.63					

* $p < .05$.
 ** $p < .01$.
 *** $p < .001$.

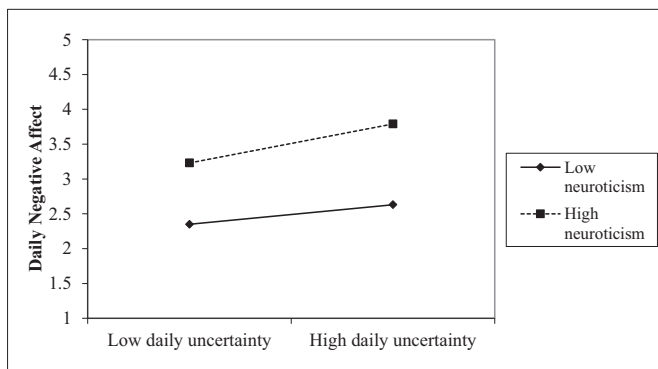


Fig. 2. The moderating effect of neuroticism on the uncertainty-negative affect pathway.

being. Thus, this study is, in part, consistent with such findings by demonstrating that higher levels of uncertainty may decrease workers' mental health because uncertainty triggers negative affective experiences.

A second contribution to the literature was exploring whether this mediational channel was conditional upon the levels of neuroticism. The psychological and clinical research have investigated the impact of contextual factors, as moderators of the relationship between uncertainty and affect (e.g., Anderson et al., 2019), however personality is one potential moderator that needs to be considered, as individual differences may interfere with the way individuals react to uncertainty. In this study, we sought to analyze the cross-level interaction between trait-neuroticism and daily uncertainty regarding daily negative affect. We argued that the mediational channel would be enhanced by the individuals' neuroticism, that is the indirect effect of uncertainty in mental health, via negative affect, would be conditional on the levels of neuroticism, such that the indirect effect would become stronger when individuals score high on neuroticism. This expectation was supported and might be understood in the light of the integrative model of uncertainty tolerance. Accordingly, the relationship between perceived uncertainty and affective responses might be moderated by individual characteristics, such as personality traits (Hillen et al., 2017). Hence, our findings suggest that uncertainty will trigger negative affect which will impair mental health, but people high in neuroticism will maximize this effect. Individuals who score high in neuroticism-trend tend to be emotional unstable, react more negatively to unexpected events or conditions, experience more frequently negative affect, are more vulnerable to psychological disturbances, such as anxiety, distress and

depression, and evidence poorer physical and mental health (e.g., Kroencke et al., 2020). Despite the evidence, the interaction between neuroticism and uncertainty has not been explored, in particular the cross-level interaction. Thus, our finding expands the literature by demonstrating that trait-neuroticism interacts with daily uncertainty, influencing negative affect. Neurotic individuals appear to be spoiled from the mediational path between uncertainty, negative affect and mental health. That is, when uncertainty is higher, negative affect increases, impairing mental health, in particular for neurotic individuals which are more volatile to this “black bias”.

5.2. Practical contributions

This study emphasizes the relevance of personal traits – neuroticism – for organizational theories and applied purposes, such as selection. The likelihood that a person will be less volatile to uncertain contexts (which are even more frequent, nowadays), and feel more enthusiastic and motivated at work, may be assessed, even in an indirect way, through for example, neuroticism.

Given the importance associated to daily negative affect, human resource managers can also benefit from acknowledging its relevance for their workers mental health, and in the long run, for performance. Thus, promoting conditions for workers experience less frequently uncertainty, and negative affect, for example, through creating specific (1) times for workers make breaks, (2) ways to regularly give feedback to them, and (3) a time and space for them to share it with each other.

Additionally, uncertainty is a negative experience that triggers negative affect due to doubt and ambiguity that characterizes the uncertain situation. The greater the need for stability, the decreased mental health during the crisis (Casale & Flett, 2020). The Conservation of Resources Theory (Hobfoll, 2001) argues that health is a resource, whereby healthy workers invest their personal resources to increase performance. Under stable situations, promoting self-efficacy and accomplishment may be resources that may act as coping strategies in reducing stressors. But for those that saw their mental health impaired, it may diminish these resources, improving absenteeism and withdrawal. To achieve efficiency as a driving force to overcome uncertainty, it is critical to create incentives and social-welfare policies providing disabled individuals with necessary treatment and support after the crisis. Permanent employment and stable income promotes mental health, therefore job certainty is one of the main pillars providing stability.

5.3. Limitations and future research

Despite the positive features of this study, such as being a diary

study, with a specific working sample (human resources managers), it has some limitations. First, we used self-reported measures, which might account for common method variance (Podsakoff et al., 2003). Thus, future studies could use other sources of information (e.g., colleagues, supervisors) regarding the mediator (daily negative affect) and the independent variable (daily uncertainty). Second, we only focused on daily negative affect, which left out other possibilities, such as the positive ones. While our concern in negative affect is justified by the existence of fewer studies exploring it, we recognize that positive affect is relevant for daily mental health (Junça-Silva et al., 2021). Third, the measures of uncertainty and neuroticism presented moderate reliability indices which might be due to using few items to assess it. Therefore, our results should be interpreted with caution.

These results open the way to future studies. First, the finding that an individual characteristic might be a moderator of the uncertainty-affect path, is relevant, as most moderators usually appear to be contextual (e.g., appraisals) (e.g., Hillen et al., 2017). Hence, future studies should test the model, with other moderators, such as psychological capital or mindfulness, as there are studies showing that both individual characteristics may be personal resources to deal with daily hassles (e.g., Junça-Silva et al., 2017). Thus, analyzing whether each characteristic may buffer the detrimental effect of negative affect on mental health should advance the scientific knowledge and help practitioners to create interventions to promote workers' mental health. Second, should be interesting to test the model with other criterion variables, for instance performance or physical health. To do this, future studies could use objective measures of health, such as heart rate or blood pressure.

6. Conclusion

This diary study demonstrates that uncertainty increases negative affect which, in turn, decreases mental health, in a daily basis. Moreover, neuroticism, the tendency to see the world through a black lens, when interacting with uncertain environments, triggers negative affect, harming mental health. Thus, the present research demonstrates that “living a life without unicorns or rainbows” may be a wrecking ball for mental health.

Compliance of ethical standard statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants involved in the study.

Data availability

The data is available only upon reasonable request to the authors.

CRedit authorship contribution statement

Ana Junça-Silva: Conceptualization, Methodology, Software, Writing – original draft, Supervision, Validation, Writing – review & editing. **Daniel Silva:** Data curation, Visualization, Investigation.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

References

- Anderson, M., Werner-Seidler, A., King, C., Gayed, A., Harvey, S. B., & O’Dea, B. (2019). Mental health training programs for secondary school teachers: a systematic review. *School Mental Health, 11*(3), 489–508. <https://doi.org/10.1007/s12310-018-9291-2>
- Aschwanden, D., Strickhouser, J. E., Sesker, A. A., Lee, J. H., Terracciano, A., ... (2021). Psychological and behavioural responses to coronavirus disease 2019: The role of personality. *European Journal of Personality, 35*(1), 51–66. <https://doi.org/10.1002/per.2281>
- Asmundson, G. J. G., & Taylor, S. (2020). How health anxiety influences responses to viral outbreaks like COVID-19: what all decision-makers, health authorities, and health care professionals need to know. *Journal of Anxiety Disorders, 71*. <https://doi.org/10.1016/j.janxdis.2020.102211>
- Bakıoğlu, F., Korkmaz, O., & Ercan, H. (2020). Fear of COVID-19 and positivity: mediating role of intolerance of uncertainty, depression, anxiety, and stress. *International journal of mental health and addiction, 1–14*. <https://doi.org/10.1007/s11469-020-00331-y>
- Barlow, D. H., Sauer-Zavala, S., Carl, J. R., Bullis, J. R., & Ellard, K. K. (2014). The nature, diagnosis, and treatment of neuroticism: Back to the future. *Clinical Psychological Science, 2*, 344–365. <https://doi.org/10.1177/2167702613505532>
- Barrick, M. R., Mount, M. K., & Judge, T. A. (2001). Personality and Performance at the Beginning of the New Millennium: What Do We Know and Where Do We Go Next? *International Journal of Selection and assessment, 9*(1–2), 9–30. <https://doi.org/10.1111/1468-2389.00160>
- Bennett, N., & Lemoine, G. J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons, 57*(3), 311–317. <https://doi.org/10.1016/j.bushor.2014.01.001>
- Borghuis, J., Bleidorn, W., Sijsma, K., Branje, S., Meeus, W. H. J., & Denissen, J. J. A. (2020). Longitudinal associations between trait neuroticism and negative daily experiences in adolescence. *Journal of Personality and Social Psychology, 118*(2), 348–363. <https://doi.org/10.1037/pspp0000233>
- Bottesi, G., Tesini, V., Cerea, S., & Ghisi, M. (2018). Are difficulties in emotion regulation and intolerance of uncertainty related to negative affect in borderline personality disorder? *Clinical Psychologist, 22*(2), 137–147. <https://doi.org/10.1016/j.addbeh.2020.106785>
- Carleton, R. N. (2012). The intolerance of uncertainty construct in the context of anxiety disorders: theoretical and practical perspectives. *Expert Review of Neurotherapeutics, 9*37–947. <https://doi.org/10.1586/ern.12.82>
- Carleton, R. N. (2016). Fear of the unknown: One fear to rule them all? *Journal of anxiety disorders, 41*, 5–21. <https://doi.org/10.1016/j.janxdis.2016.03.011>
- Caron, D. (2009). President at APSG Inc. It’s A VUCA World! CIPS CIO breakfast presentation March 5, 2009. Available at <https://www.slideshare.net/dcaron/its-a-vuca-world-cips-cio-march-5-2009-draft>.
- Casale, S., & Flett, G. L. (2020). Interpersonally-based fears during the COVID-19 pandemic: reflections on the fear of missing out and the fear of not mattering constructs. *Clinical Neuropsychiatry, 17*(2), 88–93. <https://doi.org/10.36131/CN20200211>
- Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment, 4*(1), 5.
- De Gucht, V., Fischler, B., & Heiser, W. (2004). Neuroticism, alexithymia, negative affect, and positive affect as determinants of medically unexplained symptoms. *Personality and Individual Differences, 36*(7), 1655–1667. <https://doi.org/10.1016/j.paid.2003.06.012>
- Dello Russo, S., Antino, M., Zaniboni, S., Caetano, A., & Truxillo, D. (2021). The effect of age on daily positive emotions and work behaviors. *Work, Aging and Retirement, 7*(1), 9–19. <https://doi.org/10.1093/workar/waz026>
- Diener, E., Thapa, S., & Tay, L. (2020). Positive emotions at work. *Annual Review of Organizational Psychology and Organizational Behavior, 7*, 451–477. <https://doi.org/10.1146/annurev-orgpsych-012119-044908>
- Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The mini-IPIP scales: tiny-yet-effective measures of the Big Five factors of personality. *Psychological assessment, 18*(2), 192–203. <https://doi.org/10.1037/1040-3590.18.2.192>
- Douglas, M., Katikireddi, S. V., Taulbut, M., McKee, M., & McCartney, G. (2020). Mitigating the wider health effects of covid-19 pandemic response. *Bmj, 369*, 1557. <https://doi.org/10.1136/bmj.m1557>
- Drucker, A. (2012). Improved direct product theorems for randomized query complexity. *Computational Complexity, 21*(2), 197–244. <https://doi.org/10.1007/s00037-012-0043-7>
- Dugas, M. J., Gosselin, P., & Ladouceur, R. (2001). Intolerance of uncertainty and worry: investigating specificity in a nonclinical sample. *Cogn. Ther. Res., 25*, 551–558. <https://doi.org/10.1023/A:1005553414688>
- Espinosa, A., & Rudenstine, S. (2020). The contribution of financial well-being, social support, and trait emotional intelligence on psychological distress. *British Journal of Clinical Psychology, 59*(2), 224–240. <https://doi.org/10.1111/bjc.12242>
- Fisher, C. D. (2003). Why do lay people believe that satisfaction and performance are correlated? Possible sources of a commonsense theory. *Journal of Organizational Behavior, 24*(6), 753–777. <https://doi.org/10.1002/job.219>
- Godinc, D., Obrenovic, B., & Khudaykulov, A. (2019). Effects of economic uncertainty on mental health in the COVID-19 pandemic context: social identity disturbance, job uncertainty and psychological well-being model. *International Journal of Innovation and Economic Development, 6*(1), 61–74. <https://doi.org/10.18775/ijied.1849-7551-7020.2015.61.2005>
- Hakulinen, C., Elovainio, M., Pulkki-Råback, L., Virtanen, M., Kivimäki, M., & Jokela, M. (2015). Personality and depressive symptoms: Individual participant meta-analysis of 10 cohort studies. *Depression and anxiety, 32*(7), 461–470. <https://doi.org/10.1002/da.22376>

- Han, P. K., Klein, W. M., & Arora, N. K. (2011). Varieties of uncertainty in health care: A conceptual taxonomy. *Medical Decision Making*, 31(6), 828–838. <https://doi.org/10.1177/0272989X10393976>
- Hillen, M. A., Guthheil, C. M., Strout, T. D., Smets, E. M., & Han, P. K. (2017). Tolerance of uncertainty: Conceptual analysis, integrative model, and implications for healthcare. *Social Science & Medicine*, 180, 62–75. <https://doi.org/10.1016/j.socscimed.2017.03.024>
- Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory. *Applied Psychology*, 50(3), 337–421. <https://doi.org/10.1111/1464-0597.00062>
- Hu, D., Kong, Y., Li, W., Han, Q., Zhang, X., Zhu, L. X., Zhu, J., et al. (2020). Frontline nurses' burnout, anxiety, depression, and fear statuses and their associated factors during the COVID-19 outbreak in Wuhan, China: A large-scale cross-sectional study. *EClinicalMedicine*, 24, 100424. <https://doi.org/10.1016/j.eclinm.2020.100424>
- Jonsson, J., Matilla-Santander, N., Kreshpaj, B., Johansson, G., Kjellberg, K., Burstrom, B., ... Bodin, T. (2020). Precarious employment and general, mental and physical health in Stockholm, Sweden: a cross-sectional study. 1-9. *Scandinavian Journal of Public Health*, 1–9. <https://doi.org/10.1177/1403494820956451>
- Junça-Silva, A., Caetano, A., & Lopes, R. R. (2017). Daily uplifts, well-being and performance in organizational settings: The differential mediating roles of affect and work engagement. *Journal of Happiness Studies*, 18(2), 591–606. <https://doi.org/10.1007/s10902-016-9740-2>
- Junça-Silva, A., Pombeira, C., & Caetano, A. (2021). Testing the affective events theory: the mediating role of affect and the moderating role of mindfulness. *Applied Cognitive Psychology*. <https://doi.org/10.1002/acp.3843>
- Khosravi, M. (2020). Neuroticism as a marker of vulnerability to COVID-19 infection. *Psychiatry Investigation*, 17(7), 710. <https://doi.org/10.30773/pi.2020.0199>
- Kroencke, L., Geukes, K., Utesch, T., Kuper, N., & Back, M. (2020). *Neuroticism and emotional risk during the COVID-19 pandemic*. PsyArXiv. <https://doi.org/10.31234/osf.io/8c6nh>
- Liu, S., Lithopoulos, A., Zhang, C. Q., Garcia-Barrera, M. A., & Rhodes, R. E. (2021). Personality and perceived stress during COVID-19 pandemic: Testing the mediating role of perceived threat and efficacy. *Personality and Individual Differences*, 168, Article 110351. <https://doi.org/10.1016/j.paid.2020.110351>
- Mitchell, L. L., Zmora, R., Finlay, J. M., Jutkowitz, E., & Gaugler, J. E. (2021). Do big five personality traits moderate the effects of stressful life events on health trajectories? Evidence from the health and retirement study. *The Journals of Gerontology: Series B*, 76(1), 44–55. <https://doi.org/10.1093/geronb/gbaa075>
- Modersitzki, N., Phan, L. V., Kuper, N., & Rauthmann, J. F. (2021). Who is impacted? Personality predicts individual differences in psychological consequences of the COVID-19 pandemic in Germany. *Social Psychological and Personality Science*, 12(6). <https://doi.org/10.1177/1948550620952576>
- Moors, A., Ellsworth, P. C., Scherer, K. R., & Frijda, N. H. (2013). Appraisal theories of emotion: State of the art and future development. *Emotion Review*, 5(2), 119–124. <https://doi.org/10.1177/1754073912468165>
- Murugan, S., Rajavel, S., Aggarwal, A. K., & Singh, A. (2020). Volatility, uncertainty, complexity and ambiguity (VUCA) in context of the COVID-19 pandemic: Challenges and way forward. *International Journal of Health Systems and Implementation Research*, 4(2), 10–16.
- Ohly, S., & Fritz, C. (2010). Work characteristics, challenge appraisal, creativity, and proactive behavior: A multi-level study. *Journal of Organizational Behavior*, 31(4), 543–565. <https://doi.org/10.1002/job.633>
- Peters, A., McEwen, B. S., & Friston, K. (2017). Uncertainty and stress: Why it causes diseases and how it is mastered by the brain. *Progress in neurobiology*, 156, 164–188. <https://doi.org/10.1016/j.pneurobio.2017.05.004>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology*, 88(5), 879–903.
- Rafferty, A. E., & Griffin, M. A. (2006). Perceptions of organizational change: A stress and coping perspective. *Journal of applied psychology*, 91(5), 1154–1162. <https://doi.org/10.1037/0021-9010.91.5.1154>
- Rockwood, N. J. (2020). Maximum likelihood estimation of multilevel structural equation models with random slopes for latent covariates. *Psychometrika*, 85(2), 275–300. <https://doi.org/10.1007/s11336-020-09702-9>
- Santini, Z. L., Koyanagi, A., Tyrovolas, S., Mason, C., & Haro, J. M. (2015). The association between social relationships and depression: a systematic review. *Journal of affective disorders*, 175, 53–65. <https://doi.org/10.1016/j.jad.2014.12.049>
- Satici, B., Saricali, M., Satici, S. A., & Griffiths, M. D. (2020). Intolerance of uncertainty and mental wellbeing: serial mediation by rumination and fear of COVID-19. 1. *International journal of mental health and addiction*, 15, 1–12. <https://doi.org/10.1007/s11469-020-00305-0>
- Shokrkon, A., & Nicoladis, E. (2021). How personality traits of neuroticism and extroversion predict the effects of the COVID-19 on the mental health of Canadians. *Plos one*, 16(5), Article e0251097. <https://doi.org/10.1371/journal.pone.0251097>
- Slavish, D. C., Sliwinski, M. J., Smyth, J. M., Almeida, D. M., Lipton, R. B., Katz, M. J., & Graham-Engeland, J. E. (2018). Neuroticism, rumination, negative affect, and sleep: Examining between-and within-person associations. *Personality and Individual Differences*, 123, 217–222. <https://doi.org/10.1016/j.paid.2017.11.023>
- Taylor, H. O., Taylor, R. J., Nguyen, A. W., & Chatters, L. (2018). Social isolation, depression, and psychological distress among older adults. *Journal of Aging and Health*, 30(2), 229–246. <https://doi.org/10.1177/0898264316673511>
- Taylor, S., Landry, C. A., Paluszek, M. M., & Asmundson, G. J. (2020). Reactions to COVID-19: Differential predictors of distress, avoidance, and disregard for social distancing. *Journal of Affective Disorders*, 277, 94–98. <https://doi.org/10.1016/j.jad.2020.08.002>
- van den Bos, K. (2009). Making sense of life: The existential self trying to deal with personal uncertainty. *Psychological Inquiry*, 20, 197–217. <https://doi.org/10.1080/10478400903333411>
- Ware, J. E. Jr., Kosinski, M., Bjorner, J. B., Turner-Bowker, D. M., Gandek, B., & Maruish, M. E. (2007). *User's manual for the SF-36v2TM health survey (2nd ed.)*. In J. E. Ware, et al. (Eds.), *User's manual for the SF-36v2TM health survey (2nd ed.)*. (2nd.). Lincoln: RI: QualityMetric Incorporated.
- Warr, P., Bindl, U. K., Parker, S. K., & Inceoglu, I. (2014). Four-quadrant investigation of job-related affects and behaviours. , 23(3), 342–363. <https://doi.org/10.1080/1359432X.2012.744449>
- Watson, D., & Clark, L. A. (1984). Negative affectivity: the disposition to experience aversive emotional states. *Psychological bulletin*, 96(3), 465–490. <https://doi.org/10.1037/0033-2909.96.3.465>
- Whitehead, B. R. (2021). COVID-19 as a stressor: Pandemic expectations, perceived stress, and negative affect in older adults. *The Journals of Gerontology: Series B*, 76(2), e59–e64. <https://doi.org/10.1093/geronb/gbaa153>
- World Health Organization. (2020). *Infection prevention and control during health care when COVID-19 is suspected* (Accessed 8 September 2021).
- Wrzus, C., Luong, G., Wagner, G. G., & Riediger, M. (2021). Longitudinal coupling of momentary stress reactivity and trait neuroticism: Specificity of states, traits, and age period. *Journal of personality and social psychology*, 121(3), 691–706. <https://doi.org/10.1037/pspp0000308>
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L., Gill, H., Phan, L., et al. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders*, 227, 55–64.
- Zhang, Y., Duffy, J. F., & de Castillero, E. R. (2017). Do sleep disturbances mediate the association between work-family conflict and depressive symptoms among nurses? A cross-sectional study. *Journal of psychiatric and mental health nursing*, 24, 620–628. <https://doi.org/10.1111/jpm.12409>