

# COVID-19 Rumination Scale (C-19RS): Initial psychometric evidence in a sample of Dutch employees

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## Abstract

**Objectives:** Starting with the spring of 2020, COVID-19 pandemic has impacted nearly every aspect of our lives. Due to its threatening nature, along with the rapid rise in contamination and mortality figures, the spread of the virus has caused a considerable rise in individuals' anxieties. To enable the assessment of the COVID-19-triggered individual rumination, we developed and tested a COVID-19 Rumination Scale (C-19RS).

**Design and Methods:** Demographics (i.e., gender, age and education) and several items assessing the proximity of one's exposure to the virus (i.e., whether one's family and close friends are affected) were evaluated as antecedents of C-19RS that provided evidence for the criterion validity of the scale. A sample of 523 Dutch employees working in different companies and sectors completed the online survey in March 2020.

**Results:** Results showed that women, older individuals and workers with lower educational level ruminated considerably more about COVID-19. In keeping with prior theoretical and empirical work on stress and coping, we established that COVID-19 ruminative thoughts can unlock withdrawal coping reactions (i.e., self-handicapping) and drain individual's energy (i.e., causing emotional exhaustion), whereby providing evidence for the predictive validity of the new instrument. In addition, we examined how the COVID-19 rumination evolved during the nearly 3-week period of the data collection, a time-frame that

coincided with the introduction of the national restrictive measures in the Netherlands. Results showed a drop in the level of rumination, which might be indicative of potential habituation with the stressor.

**Conclusions:** The results supported the sound psychometric qualities of the scale.

**KEYWORDS**

COVID-19, coronavirus, rumination, scale validation, worrying

The recent outbreak of the coronavirus has quickly become the most pressing worldwide concern taking a high toll on individuals and society alike.<sup>1</sup> As contamination and mortality figures are rising, so are the worries among the general population of becoming ill or suffering the loss of a family member. Even though worrying is a common human response to a threatening and uncertain situation which is beyond the individuals' control,<sup>2</sup> pervasive worries or ruminative thoughts, especially when sustained across prolonged periods of time, can prevent individuals' recovery and tax their well-being.<sup>3</sup> The potential of rumination to cause a number of health-averse conditions such as sleep disorders, emotional exhaustion and depression has been well featured in occupational and health psychology literature.<sup>4-8</sup>

Given the unprecedented nature of COVID-19 pandemic, to date much is unknown about how it will affect different segments of the population, and the overall functioning of individuals and society. This situation presents scholars with the challenge to quickly, yet with the needed scientific rigour, investigate the impact of the spread of the coronavirus on individual's well-being and functioning. To this end, psychometrically sound instruments that enable the assessment of individuals' experiences of different aspects of the corona situation are currently in high demand. In response to this demand, our study presents a newly developed short scale for measuring individual's rumination with regard to the coronavirus (COVID-19). Drawing on the Transactional Model of Stress and Coping (TMSC),<sup>9</sup> we explain why a new and threatening situation, such as the COVID-19 pandemic, may cause a rise in individuals' worries about dealing with the threat at hand.

The items included in our new scale tap into the affective and detachment aspects of ruminative thoughts that occur when a stressful event (e.g., a virus pandemic) is perceived as overwhelming and overpowering. Existing scales about fear or anxiety of a health-threatening disease assess concerns about developing a disease or carrying on a hereditary disease to one's offspring.<sup>10</sup> Our scale differs from these types of scales, in that the impact of a pandemic is much broader than affecting only individual's own health, or the health of their offspring. Furthermore, because the individual's perceived control over a pandemic is likely to be nihil, a pandemic may trigger ruminative thoughts. Given that pandemics are generally rare, rumination triggered by the life-threatening, wide spreading COVID-19 is likely to have widespread repercussions. To enable research of the far-reaching consequences of the coronavirus, a new diagnostic tool is needed.

Providing scholars with an instrument that can help tap into individuals' worries about the corona spread has theoretical and practical implications. Gaining insights into the segments of the population and the extent to which corona-related worries preoccupy our daily life, is vital for further theory development regarding the individual's response to, and coping with, high-impact worldwide health threatening situations, such as presented by the corona pandemic. Also, by aiding future scholarly work in this area, we strive (indirectly/by extension) to help health professionals, policymakers and organisations to accurately predict individuals' reactions to highly impactful, widespread public-health stressors. Studying the effect of the different mental well-being-supportive initiatives that were undertaken over the past few weeks (e.g., online buddy support, virtual psychological support) is key. Extending

knowledge on the effectiveness of this type of measures may be imperative for policymakers and organisations who rely on empirical evidence when making decisions about financing and promoting such programs and initiatives.

## 1 | SITUATION-TRIGGERED RUMINATION: TMSC PERSPECTIVE

Studies from the occupational health and work psychology domain have consistently showed that situations marked by uncertainty (e.g., organisational changes, or life events) can unlock anxieties and negative emotions among the affected individuals and can cause ill-health.<sup>11–14</sup> To date, much of the existing work on individuals' stress and coping with uncertainty builds on the theoretical premises of the TMSC.<sup>9</sup> TMSC posits that individuals continuously monitor their environment for changes, and that they evaluate the potential of every new situation to cause loss of precious resources or to challenge their coping capacities (labelled 'primary appraisal'). In response to the situational stressor and based on the individual's primary appraisal, in a next step, one evaluates the needed resources for coping next to the resources one already possesses for dealing successfully with the situation at hand (labelled 'secondary appraisal'). When a stressor is appraised as harmful and exceeding the individual's resources to deal with it (i.e., a threat appraisal), it will trigger a stress response and strain symptoms. Sustained over time, high levels of strain can in turn impact the individual's appraisal, causing more negative evaluations of the source of strain (i.e., the strain-inducing situation) to arise.<sup>15,16</sup> When confronted with an uncertain situation that exceeds the individual's control, one is likely to experience increased anxieties and negative emotions.<sup>9</sup>

In keeping with TMSC,<sup>9</sup> we posit that events such as the wide spread of the COVID-19 virus, which are highly impactful and jeopardising public health, will be appraised as a threat. Job insecurity research has provided considerable evidence that macrolevel factors (e.g., national unemployment rate and the country's economic climate)<sup>17–19</sup> are viewed as a threat, because they are beyond the control of the individual. Stressors, in general, and the COVID-19 situation in particular, can be highly alarming because individuals perceive little or no control at all over it.<sup>14</sup> The combination of, on the one hand, the high importance and impact of the stressful event (i.e., one's own and his or her family members' lives are at stake), and on the other individuals' inability to control it, implies that psychological detachment from this stress stimulus (i.e., being able to 'switch off' worrying and disturbing thoughts about the virus) may be impaired. As a result, individuals are likely to remain preoccupied with persistent worries about theirs and their loved one's health, which in time can exhaust them.

## 2 | RUMINATION: DEFINITIONS AND CONCEPTUALISATIONS

In prior research,<sup>2</sup> rumination has often been featured as a coping mechanism that is characterised with negative moods and self-focused attention.<sup>20</sup>

To date the ample research on rumination streaming from various disciplines (e.g., clinical and neuropsychology, psychiatry and work and organisational psychology) has provided abundant, yet somewhat contradicting evidence on the outcomes of rumination. Some of these inconsistencies can be attributed to the different definitions and operationalisations of rumination used by scholars. Generally, studies on rumination carried out by clinical psychology and psychiatry researchers, tend to work with clinically inspired (i.e., rumination as a symptom of psychiatric disorder) definitions and conceptualisations of rumination.<sup>20,21</sup> This view spilt over into occupational health research on rumination, where scholars primarily discuss rumination as a 'nonadaptive' cognitive process and an inability to solve problems.<sup>2,22</sup>

Researchers sharing this negatively tinted view<sup>23,24</sup> presumed that rumination is a form of maladaptive coping and is psychologically debilitating because the individual fails to escape from the vicious cycle of overpowering

thoughts. However, other scholars<sup>25</sup> suggested that there is a positive side to rumination as well. For instance, Segerstrom et al.<sup>26</sup> proposed that ruminative thoughts can be positive and that a distinction should be made based on the purpose or focus of the thought (i.e., problem-solving vs. searching for meaning). Similarly, Pravettoni et al.<sup>22</sup> argued that besides the negative (i.e., 'repetitive' ruminative thoughts), rumination encompasses also positive cognitive aspects (i.e., 'creative' rumination). Furthermore, Cropley and Zijlstra<sup>27</sup> differentiated between two variants of rumination: a negatively emotionally loaded type, called 'affective rumination', and a more positive one, called 'problem-solving pondering'. The main difference being the type of emotional arousal. Finally, Querstret and Cropley<sup>25</sup> distinguished between three kinds of rumination—*affective rumination*, *problem-solving pondering* and *detachment*—where the *problem-solving pondering* reflects the creative thought process that is positive by nature and triggers positive outcomes.

In keeping with views from clinical psychology research, we argue that ruminative thoughts occur when a stressful event (e.g., coronavirus pandemic) is perceived as unsolvable and overpowering.<sup>22,28–30</sup> Consistent with this notion (i.e., the stressor exceeds one's capacity to overcome it), in our scale we incorporated items intended to tap into the affective and detachment aspects of rumination. For instance, three of the items in our scale evaluate individuals, arrested detachment from COVID-19 related thoughts: 'I find it hard to empty my head of thoughts about the coronavirus (COVID-19) during my work', 'Even when I am engaged in a recreational activity (e.g., hobby, sports), I think of the coronavirus (COVID-19)' and 'I notice that I think about the coronavirus (COVID-19) several times a day'. Items that tap into affective rumination are 'Thoughts about the coronavirus (COVID-19) disturb my sleep', 'I am afraid for infection by the coronavirus (COVID-19) of myself and my family' and 'I am worried about the coronavirus (COVID-19)'. However, we did not include any problem-solving aspects, because the trigger of the anxiety (i.e., the virus) is beyond an individual's ability to provide an effective solution to (e.g., fully preventing contamination, illness or death caused by the virus). It is unlikely that individuals can engage in any form of active problem-solving, as it is inherent to the nature of rumination that individuals find themselves trapped into a repetitive thought process fueled by negative emotions (e.g., fears) and cognitions (e.g., self-doubt).<sup>28–30</sup> Our scale incorporates affective and cognitive items alike. For instance, an item that taps into the emotional aspect of COVID-19 rumination is 'I am worried about the coronavirus (COVID-19)'; an example of an item that captures ruminative cognitions is 'I notice that I think about the coronavirus (COVID-19) several times a day'. Importantly, rumination drains the individual's energy because the arousal remains high during a substantial period of time (i.e., the period when one is trapped in a vicious affect-driven cognitive cycle<sup>27</sup>). This is the case because the repetitive thoughts are often driven by a discrepancy between the current state (e.g., living in fear of potential contamination) and the ideal state (e.g., the contamination threat does not exist) which the individual cannot overcome.<sup>31</sup>

## 3 | METHOD

### 3.1 | Data collection

Of the invited 1289, precisely 523 Dutch employees completed the online survey (response rate of 40.6%). The questionnaire was administered by a Dutch International Organisation for Standardisation certified research company on 23 March 2020. Only 7 days prior to the data collection, the restrictive measures for limiting the COVID-19 virus spread in the Netherlands were announced (i.e., all individuals, except those representing essential occupations such as medical and public care staff, were asked to remain home; schools were closed). Respondents could take part in the survey until 9 April 2020. During the entire period the data collection was carried on, the restrictive COVID-19 measures remained in place. From the onset of the outbreak in the Netherlands until the closing date of the survey, 20,549 individuals tested positively, 7735 needed hospitalisation and 2248 died from the coronavirus. The procedures used to collect data did not incur significant load on participants, and were not assumed to create distress or harm to participants as no new invasive procedures were used.

To ensure a sample that reflects the demographic distribution of the Dutch working population, the marketing company in charge of the data collection used a stratification procedure based on demographics of the general working population in the Netherlands as reflected in the annual reports of the Central Office for Statistics of the Netherlands (e.g., employees age, gender and education). Yet, some requirements posed by the researchers (i.e., include only participants who have colleagues and direct supervisor) might have caused for some deviation of what could constitute a nearly representative sample. These sampling restrictions were necessary because of other planned studies, for which data should include only the responses of employees who have colleagues and a direct supervisor. The youngest participant in the survey was 18 and the oldest was 67 years old ( $M = 45.29$  years;  $SD = 11.31$  years). The sample distribution with regard to employees' educational level was as follows: lower educational training (17.4%), high school (38.0%) and higher educational training (42.6%). Of the 523 surveyed employees, 43.6% were female. Precisely 88.5% were employed with a permanent contract.

### 3.2 | Item generation

The coronavirus pandemic and the rising need among researchers to measure individuals' persistent corona-related worries in a valid and reliable manner inspired us to develop the COVID-19 Rumination Scale (C-19RS). Because circulating lengthy surveys can fatigue participants, and can cost time and money to organisations, we chose to include a limited number of items. The six items incorporated in the scale were adapted from an earlier scale developed by one of the authors for measuring rumination. Three experts in the field of psychometry and well-being research were consulted on the content and wording of the items. In terms of their content, the items were formulated based on a thorough review of existing scales for measuring rumination. Before the data collection was set out, the authors of the study once again reflected on the theoretical relevance and wording of each item. All items tap into affective rumination or impaired detachment facets of rumination. We incorporated both cognitive and affective-worded items to emphasise the thought aspects and the anxiety aspects of rumination, respectively. We used the following sentence to instruct the respondents when answering the COVID-19 rumination questions: 'To what extent do you agree with the following statements?'. Responses could be given on a 5-point Likert scale ranging from 1 = 'totally disagree' to 5 = 'totally agree'.

### 3.3 | Measures

In addition to demographic characteristics, two constructs (i.e., emotional exhaustion and self-handicapping) were used to test the predictive validity of the C-19RS. Participants were able to select a response on a 5-point Likert scale, for emotional exhaustion ranging from 1 = 'never' to 5 = 'always', and for self-handicapping from 1 = 'totally disagree' to 5 = 'totally agree'. We evaluated emotional exhaustion using the 4-item Burnout Assessment Tool (BAT) developed by Schaufeli et al.<sup>32</sup> A sample item for BAT is: 'At work, I feel mentally exhausted' ( $\alpha = 0.86$ ). Self-handicapping was assessed with a 10-item instrument developed by Strube.<sup>33</sup> A sample item is 'I tend to put things off until the last moment' ( $\alpha = 0.73$ ).

## 4 | RESULTS

### 4.1 | Reliability and factor analyses

To investigate the factor structure of the scale we conducted a principal component analysis (PCA) without rotation. The results show that all items load on a single factor that has an eigenvalue of 3.62 and covers

more than 60% of variance in the scores. Table 1 presents the results of the PCA, item descriptives and the internal reliability scores.

Cronbach's  $\alpha$  for the scale is 0.85 supporting a good internal consistency of the items. As this scale is newly developed, we have used the procedure and macro presented by Hayes and Coutts<sup>34</sup> to compute the omega for this scale based on the results of the factor analysis. The scale's omega of 0.87 confirms a good internal consistency of the items. For subsequent analyses concerning the testing of the scale validity we use the average item score as well as the Bartlett dominant factor that is an accurate indicator of the true underlying dominant factor score of the scale.<sup>35</sup> Both the average item score and the dominant factor scores are presented in Table 2, showing the descriptive statistics and intercorrelations among the study variables.

## 4.2 | Antecedents of C-19RS

We have used several demographic variables as antecedents of corona-related worries and we have also adopted and adapted a procedure similar to the criterion group validation to further explore the scale's psychometric properties. The criterion group validation procedure contrasts the scores obtained using C-19RS for groups that are known to potentially differ with regard to the criterion that is being evaluated.<sup>36</sup> In the context of the COVID-19 pandemic, we expect that respondents who have family members or friends infected with corona would be naturally more worried concerning COVID-19 as compared to respondents whose family members and immediate social network are not impacted. We have used the following items to capture the extent to which respondents had people infected with COVID-19 in their close social network: 'Somebody in my close environment (family or friend) is (or was) infected with the coronavirus (COVID-19)', 'Somebody in my close environment (family or friend) is seriously ill at the moment because of the coronavirus (COVID-19)', 'Somebody in my close environment (family or friend) has died from infection with the coronavirus (COVID-19)', 'Nobody in my close environment (family or friend) is, or has been, infected with the coronavirus (COVID-19)'. Answers were recorded using a Yes/No format and the variables were entered in the regression analysis as dummy variables using as reference category the last statement that nobody in the personal network is affected by corona. Table 3 presents the results of the regression analysis.

Table 3 reports that women tend to worry more about COVID-19 than men ( $\beta = 0.14$ ,  $p = 0.002$ ), a pattern that is aligned with meta-analytic evidence<sup>37,38</sup> showing that women are more prone to rumination

TABLE 1 Results of the principal component analysis ( $N = 523$ )

	Dominant factor loadings	Cronbach's $\alpha$ if item is deleted	Item scale correlation	Mean item score (SD)
I am worried about the coronavirus (COVID-19)	0.776	0.834	0.590	3.83 (0.92)
I notice that I think about the coronavirus (COVID-19) several times a day	0.726	0.837	0.578	3.98 (0.93)
I find it hard to empty my head of thoughts about the coronavirus (COVID-19) during my work	0.834	0.786	0.764	2.77 (1.19)
Even when I am engaged in a recreational activity (e.g., hobby, sports) I think of the coronavirus (COVID-19)	0.848	0.782	0.778	2.53 (1.13)
Thoughts about the coronavirus (COVID-19) disturb my sleep	0.699	0.835	0.589	2.14 (1.05)
I am afraid of infection by the coronavirus (COVID-19) of myself and my family	0.771	0.834	0.590	3.38 (1.06)

TABLE 2 Mean, standard deviation and correlation among the study variables (N = 523)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Gender	1.44	0.50	1									
2. Age	45.29	11.31	-0.285**	1								
3. Education	6.09	3.04	0.088*	-0.438**	1							
4. Family/friend infected	0.18	0.38	0.009	-0.032	0.112*	1						
5. Family/friend seriously ill	0.05	0.23	-0.038	-0.025	-0.010	0.269**	1					
6. Family/friend died	0.03	0.18	-0.031	-0.011	-0.027	0.170**	0.196**	1				
7. None sick of COVID 19	0.73	0.45	0.046	-0.008	-0.040	-0.753**	-0.388**	-0.299**	1			
8. Exhaustion	1.64	0.70	0.009	-0.045	-0.003	0.031	0.082	0.006	-0.035	1		
9. Self-handicapping	2.61	0.55	0.015	-0.129**	0.031	0.008	-0.004	-0.051	-0.004	0.373**	1	
10. Average score C-19RS	3.11	0.81	0.091*	0.113**	-0.172**	0.020	0.126**	-0.028	-0.041	0.214**	0.181**	1
11. Bartlett dominant factor score C-19RS	0.00	1.00	0.092*	0.111*	-0.169**	0.019	0.126**	-0.029	-0.038	0.210**	0.180**	1.000**

Abbreviation: C-19RS, COVID-19 Rumination Scale.

\* $p < 0.05$ .\*\* $p < 0.01$ .\*\*\* $p < 0.001$ .

TABLE 3 Antecedents of C-19RS (N = 523)

	Average item score	Dominant factor score
Constant	2.84*** (0.26)	-0.33 (0.32)
Gender	0.22** (0.07)	0.28** (0.09)
Age	0.01 <sup>†</sup> (0.004)	0.01 <sup>†</sup> (0.004)
Education	-0.04** (0.01)	-0.04** (0.02)
Survey completion day	-0.02** (0.01)	-0.03** (0.01)
Family/friend infected	0.03 (0.10)	0.04 (0.12)
Family/friend seriously ill	0.48** (0.16)	0.59** (0.20)
Family/friend died of COVID-19	-0.22 (0.20)	-0.27 (0.25)
N	523	523
R <sup>2</sup>	0.08	0.08
F statistic	6.77***	6.73***

Abbreviations: Unstandardised regression coefficients are presented in the table with standard errors in between brackets.

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , <sup>†</sup> $p < 0.10$ .

than men. The alignment of the scores for the C-19RS with meta-analytic gender differences provides initial support for the criterion validity of the scale. Furthermore, age has a marginally significant positive association with C-19RS ( $\beta = 0.08$ ,  $p = 0.08$ ). This result aligns with public messages related to the pandemic, pointing to an increased vulnerability with age. COVID-19 worries are also negatively predicted by education ( $\beta = -0.13$ ,  $p = 0.006$ ), indicating that individuals with a higher educational level worry less about COVID-19. Also, the survey completion day has a negative and significant association with C-19RS ( $\beta = -0.13$ ,  $p = 0.002$ ). This result is somewhat surprising, as one would expect a positive association between the two variables. The survey was launched just after the initial COVID-19 measures were announced in the Netherlands, and it would be expected that as the pandemic evolved, the death toll increased and the public measures to combat the pandemic were tightened, the worries concerning the pandemic would increase as well. Our results show the opposite, namely respondents that answered at the beginning of the survey interval reported more COVID-19 related worries than the ones that completed the survey towards the end. A plausible explanation resides in the coping with stressors stages, in which rumination emerges as a first reaction at the confrontation with the stressor and it tends to decrease as it gives rise to either adaptation or depressive symptomatology. Finally, participants who reported having an infected family member were more likely than the others to ruminate about COVID-19 ( $\beta = 0.13$ ,  $p = 0.003$ ). This result is in line with our expectations and provides evidence for the criterion related validity of the scale.

### 4.3 | Consequences of C-19RS

Rumination as a cognitive tendency of excessively focussing on a stressor in an attempt to spur the cognitive-emotional processing, precedes more serious emotional disturbance and ultimately emotional disorders, such as anxiety and depression. Literature to date explored a variety of consequences of general rumination in relation to various stressors and the results converge towards the fact that rumination is an antecedent of self-handicapping strategies<sup>39</sup> and exhaustion.<sup>40,41</sup>



To test the predictive validity of the C-19RS, we used self-handicapping and exhaustion as dependent variables. Given that our data is cross-sectional and we cannot draw causal claims based on this data structure, we selected gender as an instrumental variable to clarify the mediation path between COVID-19 rumination, on the one hand, and self-handicapping and exhaustion, on the other hand. We expect that rumination mediates the association between gender and self-handicapping on the one hand and between gender and exhaustion on the other hand. To test these mediation claims, we have used a bootstrapping procedure and the macros described in Hayes.<sup>42</sup> The results show that the indirect association between gender and self-handicapping is fully mediated by COVID-19 rumination (effect = 0.03, SE = 0.01, 95% confidence interval CI: [0.01; 0.06]), and the direct effect of gender is not significant (effect = -0.06, SE = 0.05, 95% CI: [-0.15; 0.04]). When we tested the reversed mediation, the indirect association between gender and rumination is not mediated by self-handicapping (effect = -0.01, SE = 0.02, 95% CI [-0.04; 0.02]), while the direct effect remained significant (effect = 0.22, SE = 0.07, 95% CI: [0.08; 0.36]). As gender is unlikely to be influenced by any of the other variables included in the model, we could state that the COVID-19 ruminations are antecedents of self-handicapping and not the other way around. A similar analytic strategy was used for exhaustion. The results show that COVID-19 ruminations mediate the association between gender and exhaustion (effect = 0.04, SE = 0.02, 95% CI: [0.01; 0.08]) and the remaining direct effect of gender is not significant (effect = 0.05, SE = 0.06, 95% CI: [-0.18; 0.08]). The reversed mediation chain is not supported, as exhaustion does not mediate the association between gender and COVID-19 ruminations (effect = -0.002, SE = 0.02, 95% CI: [-0.04; 0.03]) and the remaining direct effect of gender is significant (effect = 0.22, SE = 0.07, 95% CI: [0.08; 0.36]). Therefore, we conclude that COVID-19 ruminations significantly predict exhaustion ( $B = 0.20$ ,  $SE = 0.04$ ,  $p < 0.001$ , 95% CI: [0.12; 0.27]) and self-handicapping ( $B = 0.14$ ,  $SE = 0.03$ ,  $p < 0.001$ , 95% CI: [0.08; 0.19]). These results support the predictive validity of the scale.

## 5 | DISCUSSION

Our main aim was to provide initial support for the reliability and validity of a novel scale that evaluates rumination in relation to COVID-19. We have shown that the C-19RS scale has a good internal consistency and a unitary factor structure, with all six items loading into a dominant factor score. In terms of antecedents for the COVID-19 rumination, gender is a significant predictor. In line with meta-analytic evidence for gender differences in rumination,<sup>37,38</sup> our results show that women report a higher tendency of ruminating about COVID-19 than men. Moreover, our results show that the tendency to ruminate about COVID-19 dilutes over time, a pattern associated with the stress reaction phases. Our survey started when the first protective public measures were taken in the Netherlands, therefore we could capture ruminations at the very beginning of this period as well as later on when the public concern was somehow attenuated. The scores of the C-19RS reflect a likely habituation with the stressor. Finally, in terms of predictors, our criterion group approach showed that individuals who report having close relatives seriously ill due to COVID-19 tend to report higher rumination in relation to the virus than respondents who did not report having such cases in their proximal social network. This result supports the sound psychometric properties of the scale, by showing that it discriminates between the groups that differ in their exposure to and proximity to the virus.

Our findings support the good predictive validity of C-19RS as it significantly predicted both emotional exhaustion and self-handicapping. These results corroborate prior findings and align with the key assumptions of TMS-C<sup>9</sup> about individuals' appraisal and coping with stressful situations. Rumination related to COVID-19, which is a primary appraisal of the COVID-19 pandemic, triggered a withdrawal response (i.e., self-handicapping) presumably because individuals tend to mentally distance themselves from situations over which they have little or no control (e.g., a coronavirus outbreak).<sup>9</sup> Self-handicapping may serve to help individuals justify or rationalise the situation of reduced personal ownership or control, whereby they can, to some extent, psychologically distance

themselves from the stressor. In these circumstances, self-handicapping represents a more proximal outcome of COVID-19 worries compared to the more distal emotional exhaustion. Also supporting the scale's predictive validity, we found that COVID-19 worries triggered emotional exhaustion; this result feeds back into the theoretical notion that a hindrance stressor, because it can spur feelings of helplessness (i.e., anticipated loss of resources that spans beyond one's control), can tax individual's energy level.<sup>14-43</sup>

## 5.1 | Limitations and recommendations for future research

Despite its theoretical and practical value, the current study has some limitations.

First, the nonprobabilistic sampling procedure used for the data collection prevents us from unconditionally extrapolating our findings to the general population. Only working individuals were included in our study, which excluded people younger than 18 and older than 67. Even though care was taken to preselect participants based on demographics, this preselection was aimed at representing as accurately as possible the working population in the Netherlands and not the general public as a whole; yet, the COVID-19 pandemic impacts everyone, including the nonworking individuals. Future studies may wish to test our instrument on samples including a broader range of age groups, which would allow generalisation of the results for nonworking individuals as well.

Second, an experimental study design could allow a more thorough exploration of the discriminant properties of our instrument. Testing the scale among individuals who are at immediate risk of being affected by the pandemic compared to individuals who are not (e.g., countries where the virus is spreading compared to countries that are not impacted yet) could allow a better understanding of the pre and during-outbreak effects. Given the nonexperimental design of the current study, future contributions may tackle this shortcoming by surveying individuals before, during and after a (corona)virus outbreak.

## ACKNOWLEDGEMENT

The authors thank the Open Universiteit for awarding the Wetenschapsprijs to one of the authors, which made this research possible.

## CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

## ETHICS STATEMENT

The study complies with the Declaration of Helsinki, and the data collection method has been GDPR approved by the Open Universiteit, The Netherlands.

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## REFERENCES

1. Khosravi M. Perceived risk of COVID-19 pandemic: the role of public worry and trust. *Electron J Gen Med.* 2020;17(4):203.
2. Treynor W, Gonzalez R, Nolen-Hoeksema S. Rumination reconsidered: a psychometric analysis. *Cognit Ther Res.* 2003;27(3):247-259.
3. Cropley M, Millward Purvis L. Job strain and rumination about work issues during leisure time: a diary study. *Eur J Work Organ Psychol.* 2003;12(3):195-207.
4. Berset M, Elfering A, Lüthy S, Lüthi S, Semmer NK. Work stressors and impaired sleep: rumination as a mediator. *Stress Health.* 2011;27(2):71-82.

5. Guastella AJ, Moulds ML. The impact of rumination on sleep quality following a stressful life event. *Personality Individ Differ*. 2007;42(6):1151-1162.
6. Lyubomirsky S, Caldwell ND, Nolen-Hoeksema S. Effects of ruminative and distracting responses to depressed mood on retrieval of autobiographical memories. *J Pers Soc Psychol*. 1998;75(1):166-177.
7. Mellings TMB, Alden LE. Cognitive processes in social anxiety: the effects of self-focus, rumination and anticipatory processing. *Behav Res Ther*. 2000;38(3):243-257.
8. Vahle-Hinz T, Bamberg E, Dettmers J, Friedrich N, Keller M. Effects of work stress on work-related rumination, restful sleep, and nocturnal heart rate variability experienced on workdays and weekends. *J Occup Health Psychol*. 2014;19(2):217.
9. Lazarus RS, Folkman S. *Stress, Appraisal, and Coping*. New York: Springer; 1984.
10. Custers JA, van den Berg SW, van Laarhoven HW, Bleiker EM, Gielissen MF, Prins JB. The Cancer Worry Scale: detecting fear of recurrence in breast cancer survivors. *Cancer Nurs*. 2014;37(1):44-50.
11. Allen J, Jimmieson NL, Bordia P, Irmer BE. Uncertainty during organizational change: managing perceptions through communication. *J Change Manage*. 2007;7(2):187-210.
12. Bordia P, Hobman E, Jones E, Gallois C, Callan VJ. Uncertainty during organizational change: types, consequences, and management strategies. *J Bus Psychol*. 2004;18(4):507-532.
13. Vander Elst T, Notelaers G, Skogstad A. The reciprocal relationship between job insecurity and depressive symptoms: a latent transition analysis. *J Organ Behav*. 2018;39(9):1197-1218.
14. Vander Elst T, Richter A, Sverke M, Näswall K, De Cuyper N, De Witte H. Threat of losing valued job features: the role of perceived control in mediating the effect of qualitative job insecurity on job strain and psychological withdrawal. *Work Stress*. 2014;28(2):143-164.
15. Podsakoff NP, LePine JA, LePine MA. Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: a meta-analysis. *J Appl Psychol*. 2007;92(2):438-454.
16. Webster JR, Beehr TA, Love K. Extending the challenge-hindrance model of occupational stress: the role of appraisal. *J Vocat Behav*. 2011;79(2):505-516.
17. Brochu P, Zhou L. Is job insecurity on the rise? Evidence from Canadian perception data. *Can J Econ*. 2009;42(4):1305-1325.
18. Vansteenkiste V, Lens W, Witte H, Feather NT. Understanding unemployed people's job search behaviour, unemployment experience and well-being: a comparison of expectancy-value theory and self-determination theory. *Br J Soc Psychol*. 2005;44(2):269-287.
19. Vander Elst T. *Towards an Explanation of the Job Insecurity-Outcome Relationship: The Role of Perceived Control*. Dissertation. Leuven: KU Leuven; 2013.
20. Lyubomirsky S, Nolen-Hoeksema S. Self-perpetuating properties of dysphoric rumination. *J Pers Soc Psychol*. 1993;65(2):339-349.
21. Brosschot JF, Gerin W, Thayer JF. The perseverative cognition hypothesis: a review of worry, prolonged stress-related physiological activation, and health. *J Psychosomatic Res*. 2006;60(2):113-124.
22. Pravettoni G, Cropley M, Leotta SN, Bagnara S. The differential role of mental rumination among industrial and knowledge workers. *Ergonomics*. 2007;50(11):1931-1940.
23. Nolen-Hoeksema S. The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *J Abnorm Psychol*. 2000;109(3):504-511.
24. Nolen-Hoeksema S, Parker LE, Larson J. Ruminative coping with depressed mood following loss. *J Pers Soc Psychol*. 1994;67(1):92.
25. Querstret D, Cropley M. Exploring the relationship between work-related rumination, sleep quality, and work-related fatigue. *J Occup Health Psychol*. 2012;17(3):341-353.
26. Segerstrom SC, Stanton AL, Alden LE, Shortridge BE. A multidimensional structure for repetitive thought: what's on your mind, and how, and how much?. *J Pers Soc Psychol*. 2003;85(5):909.
27. Cropley M, Zijlstra FR. *Work and Rumination. Handbook of Stress in the Occupations*; 2011.
28. Adams LS. Perceived self-efficacy and cognitive rumination. Dissertation Abstracts International: Section B. *Sci Eng*. 2003;64:1514.
29. Flett GL, Madorsky D, Hewitt PL, Heisel MJ. Perfectionism cognitions, rumination, and psychological distress. *J Ration Emot Cogn Behav Ther*. 2002;20:33-47.
30. Ingram RE. Self-focused attention in clinical disorders: review and a conceptual model. *Psychol Bull*. 1990;107:156-176.
31. Carver CS, Scheier MF. *Attention and Self-Regulation: A Control Theory Approach to Human Behavior*. New York: Springer-Verlag; 1981.

32. Schaufeli WB, De Witte H, Desart S. *Handleiding Burnout Assessment Tool (BAT)*. KU Leuven. België. <http://burnoutassessmenttool.be/wp-content/uploads/2019/10/Handleiding-BAT-versie-1.4.pdf>. Retrieved on April 11, 2020.
33. Strube MJ. An analysis of the self-handicapping scale. *Basic Appl Soc Psychol*. 1986;7(3):211-224.
34. Hayes AF, Coutts JJ. Use omega rather than Cronbach's alpha for estimating reliability. *But...* *Commun Methods Meas*. 2020;14:1-24.
35. DiStefano C, Zhu M, Mindrila D. Understanding and using factor scores: considerations for the applied researcher. *Pract Assess Res Eval*. 2009;14(20):1-11.
36. Messick S. Validity of psychological assessment: validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *Am Psychol*. 1995;50(9):741-749.
37. Johnson DP, Whisman MA. Gender differences in rumination: a meta-analysis. *Pers Individ Differ*. 2013;55(4):367-374.
38. Olatunji BO, Naragon-Gainey K, Wolitzky-Taylor KB. Specificity of rumination in anxiety and depression: a multi-modal meta-analysis. *Clin Psychol Sci Pract*. 2013;20(3):225-257.
39. Zuckerman M, Kieffer SC, Knee CR. Consequences of self-handicapping: effects on coping, academic performance, and adjustment. *J Pers Soc Psychol*. 1998;74(6):1619.
40. Boren JP. Co-rumination partially mediates the relationship between social support and emotional exhaustion among graduate students. *Commun Q*. 2013;61(3):253-267.
41. Donahue EG, Forest J, Vallerand RJ, Lemyre P-N, Crevier-Braud L, Bergeron É. Passion for work and emotional exhaustion: the mediating role of rumination and recovery. *Appl Psychol Health Well Being*. 2012;4(3):341-368.
42. Hayes AF. *PROCESS: A Versatile Computational Tool for Observed Variable Mediation, Moderation, and Conditional Process Modeling*; 2012.
43. Dekker SWA, Schaufeli WB. The effects of job insecurity on psychological health and withdrawal: a longitudinal study. *Aust Psychol*. 1995;30(1):57-63.

**How to cite this article:** Nikolova I, Caniëls MCJ, Curseu PL. COVID-19 Rumination Scale (C-19RS): Initial psychometric evidence in a sample of Dutch employees. *Int J Health Plann Mgmt*. 2021;36(4):1166-1177. <https://doi.org/10.1002/hpm.3165>