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Under pressure: Locomotion and assessment in the COVID-19 pandemic

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ABSTRACT

The COVID-19 pandemic poses unique opportunities to explore how fundamental self-regulatory variables affect responses to the pandemic. We examine how two critical self-regulatory orientations, locomotion and assessment, relate to psychological distress and obeying public health guidelines using secondary data analysis. In the initial pandemic stages (April and May, 2020), North American participants ($N = 924$) completed measures of chronic locomotion and assessment, pandemic behaviors and feelings, and various individual-differences. Analyses revealed that assessment, but not locomotion, was indirectly associated with greater pandemic rule-breaking and psychological distress through the fear of missing out, difficulty engaging in activities, and engagement in negative activities. We discuss why the vulnerabilities of assessment, and not locomotion, may be particularly sensitive to pandemic-related constraints.

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The ravages of the COVID-19 pandemic brought significant challenges to people around the world, beginning in the early months of 2020 (Flaxman et al., 2020; Hsiang et al., 2020). Stressful situations such as this create an extraordinarily high-demand context wherein individuals' self-regulatory systems are taxed; such situations can be particularly revealing of how fundamental motivational orientations shape an individual's ways of coping (e.g., Caspi & Moffitt, 1993; Wright & Mischel, 1987). With current estimates of the probability of a pandemic similar to COVID-19 occurring in one's lifetime at approximately 38%, a figure that may double in the coming decades in part due to human-driven factors such as climate change (Marani et al., 2021), the far-reaching implications of COVID-19 underscore the need to learn as much as possible about the social and behavioral effects of this pandemic (Van Bavel et al., 2020). Specifically, exploring how fundamental motivational orientations relate to goal pursuit and well-being during the global COVID-19 pandemic is the goal of the current paper.

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 Supplemental data for this article can be accessed [here](#).

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The pandemic has fueled a plethora of research exploring its mental health outcomes, ranging from the differential effects of demographic factors (Hampshire et al., 2021) and personality characteristics (Proto & Zhang, 2021) to psychological resilience (Park et al., 2021). Additionally, the slow-burning nature of the pandemic has led to decreasing adherence to public health recommendations over time as “pandemic fatigue” set in (Petherick et al., 2021), pointing to difficulties in the need to maintain high levels of taxing self-regulatory behavior, lest the pandemic resurge. The onslaught of misinformation (e.g., Loomba et al., 2021; Roozenbeek et al., 2020), changing public health recommendations (New York Times, 2021), and conspiracy theories (e.g., Jolley & Paterson, 2020; Oleksy et al., 2021) have created a situation in which many individuals feel they have little control (Jolley & Paterson, 2020; Oleksy et al., 2021) and that they have no way to easily or fully evaluate what the *correct* courses of action are. Thus, public health officials have struggled to keep people on board with preventative behaviors.

When the data in the present study were collected (in the United States in late April and early May, 2020), the United States was still in the grip of the initial stages of the pandemic, and most individuals were facing some combination of significant personal, social, professional, and financial challenges (Holman et al., 2020). Further, when these data were collected and throughout the pandemic, ambiguity regarding what courses of action were correct added additional layers of uncertainty to a situation already rife with unpredictability and perceived lack of control. For example, in the early days of the pandemic, officials discouraged mask use due to supply shortages and unclear evidence for their effectiveness. Yet weeks later, the Center for Disease Control in the United States urged Americans to wear masks when outside their homes (New York Times, 2021). People faced conflicting messages about whether it was safe to gather outside, or whether they should thoroughly disinfect their groceries (e.g., CBC News, 2020). Indeed, at many points throughout the pandemic, people have been in a near constant state of ambiguity about what actions were right or acceptable.

Thus, the COVID-19 pandemic presents an opportunity to examine how people’s motivational tendencies to comprehensively evaluate options – i.e., to “assess” – and their tendencies to initiate and sustain movement – i.e., to “locomote” (Higgins et al., 2003; Kruglanski et al., 2000) – are related to how they navigate the pandemic. This pre-registered secondary data analysis of a large data set collected by Boylan et al. (2021) permits an examination of these relations. Specifically, we examined how these fundamental motivational orientations relate to important personal and societal outcomes: the experience of psychological distress during the pandemic and the following (or not) of public health guidelines (hereafter, “rule-breaking”).

Functions and fallibilities of locomotion and assessment

A long tradition of research in self-regulation identifies two critical aspects of effective goal pursuit: assessment and locomotion (Kruglanski et al., 2000). Assessment involves the evaluation, comparison, and deliberation about potential means and goals, whereas locomotion involves the initiation and sustaining of movement and action (i.e., from one’s current state to some different state). People can vary in the extent to which they are sensitive to and prioritize assessment versus locomotion concerns. An individual who

has strong chronic assessment concerns would rather do nothing than the wrong thing, whereas an individual who has strong chronic locomotion concerns would rather take action – any action – than do nothing (Higgins et al., 2003; Kruglanski et al., 2013).

Chronic assessment and locomotion motivations both contribute to successful goal pursuit, and often complement each other. For instance, students who are high in both locomotion and assessment orientations – as determined by responses to the chronic regulatory mode scale – have higher grade point averages. Likewise, participants in an elite military training program who were high in both locomotion and assessment (versus high in only one) were more likely to complete the rigorous program (Kruglanski et al., 2000) and individuals high in both locomotion and assessment are more likely to save for retirement (Kim et al., 2017). Teams comprised of both locomotion and assessment-oriented individuals outperform locomotion-only or assessment-only teams (Mauro et al., 2009). These findings reflect the critical functions of both regulatory mode orientations to successful goal pursuit.

However, while both locomotion and assessment play an important role in goal pursuit, each orientation – on its own – is associated with upsides and downsides. Assessment motivation can promote thoughtful action, but assessment-oriented individuals are more likely to experience decision paralysis (Chen et al., 2018; Hughes & Scholer, 2017), feel more regret and less forgiveness toward themselves and others (Pierro et al., 2008, 2021), and experience anxiety and depression (Hong et al., 2004; Kruglanski et al., 2000). In contrast, locomotion-oriented individuals are more likely to leap without looking, engaging in decisive and even impulsive action (Mauro et al., 2009); they prioritize expediency over ethical action (Kanze et al., 2021), and hold unjustifiably high self-evaluations (Komissarouk et al., 2019). While these locomotion tendencies can have real costs, a locomotion focus on action is associated with many upsides, including being more hopeful about the future (Di Santo et al., 2021), more willingness to resolve interpersonal conflicts (Webb et al., 2017), and a greater likelihood of pursuing autonomous goals (Bélanger et al., 2015; Pierro et al., 2006).

Regulatory mode in the COVID-19 pandemic

The particular strengths and vulnerabilities of locomotion and assessment orientations suggests divergence in how they may affect behaviors during the pandemic. On the one hand, the constraints of the pandemic (e.g., restrictions on movement, reduced opportunities) represent a real challenge for those with strong chronic locomotion concerns: Those who care about movement and action might be particularly likely to suffer and, consequently, break public health rules. Yet, research has shown that locomotion is negatively associated with boredom proneness (Mugon et al., 2018) and positively associated with the capacity to cope with organizational changes (Kruglanski et al., 2007), as well as hopeful thinking and positive affect (Kruglanski et al., 2000; Di Santo et al., 2021). This tendency to take change and challenging situations in stride suggests that a strong locomotion orientation may instead be related to effective management of this unprecedented situation, resulting in less distress and more public health compliance. Put differently, for locomotion-oriented individuals, taking action by incorporating readily accessible public health recommendations into one's daily routine may be preferable to wallowing in uncertainty.

In contrast, while a strong assessment orientation is, on the surface, likely to promote rule-following (given a concern with doing the “right” thing; Kruglanski et al., 2000), past research suggests that those with a strong assessment orientation may be more vulnerable to experiencing psychological distress (Hong et al., 2004; Kruglanski et al., 2000). Further, the tendency for assessment-oriented individuals to exhaustively evaluate available options may render them especially vulnerable to the onslaught of information in this simultaneous “infodemic” (Pennycook et al., 2020) and the ambiguities regarding what the right courses of action are. Indeed, those with strong assessment orientations are particularly vulnerable to feeling distressed due to heightened concerns with making suboptimal decisions (Chen et al., 2018). For assessment-oriented individuals, then, the particular nature of the COVID-19 pandemic – a situation characterized by high ambiguity and low perceived (and actual) control – may be especially likely to lead to decision paralysis and even rejection of public health recommendations. Finally, the intense social isolation experienced by many during the pandemic (Luchetti et al., 2020) may be particularly distressing for assessors because assessment is associated with greater need for social comparison (Kruglanski et al., 2000). Thus, assessment-oriented individuals may feel particularly adrift with reduced social contact and could be more inclined to maintain pre-pandemic social interactions (i.e., disobey public health recommendations). In other words, the vulnerabilities of a strong assessment orientation may be heightened during a pandemic. In addition to examining these direct associations between locomotion/assessment and these outcomes, we also examined whether locomotion and assessment orientations interacted to predict outcomes.

Our primary analysis focused on potential mediators of the relations between regulatory mode orientations, psychological distress, and rule-breaking. Specifically, we examined three mediators that may be related to the differential vulnerabilities of locomotion and assessment, thereby allowing us to investigate the processes by which regulatory mode is associated with these outcomes. One of these mediators, “activity difficulty” (how much difficulty individuals experienced engaging in activities during the pandemic), helps to differentially capture the decision paralysis faced by assessment-oriented individuals and the preference for locomotion-oriented individuals to “keep moving.” A second mediator, frequency of engaging in negative activities (e.g., activities that feel frustrating), examines the extent to which locomotion- and assessment-oriented individuals engage in potentially maladaptive behaviors in response to the pandemic. Finally, the third mediator, fear of missing out (FOMO; Przybylski et al., 2013), offers insight into the role of social comparison and missed opportunities. We pre-registered our analysis plan (Ledgerwood, 2018) for the present study on OSF (<https://osf.io/ezxak>) after the data had been collected, but before performing any statistical analyses.¹

Method

Participants

993 participants were recruited through Amazon’s Mechanical Turk between April 28th, 2020 and May 2nd, 2020 in exchange for U.S. \$7.25. Exactly mirroring Boylan et al. (2021), data from 69 participants (7% of the total sample) were excluded after being identified as non-serious responders. These were identified using reliability analyses with participants as sets of items; participants with item-total correlations less than .20 were identified as non-serious responders. Additional attention-check questions were used to verify data

Table 1. Participant characteristics.

Age (<i>Mdn, SD</i>)	37.00 (11.25)
Gender	
Female	386 (41.8%)
Male	530 (57.4%)
Trans	3 (0.3%)
Prefer to self-identify	5 (0.5%)
Ethnicity	
White	675 (73.1%)
Black/African American	78 (8.4%)
Other Asian	55 (6.0%)
Declined to answer	54 (5.8%)
Latin, Central, and South American	27 (2.9%)
East and Southeast Asian	11 (1.2%)
West Central Asian and Middle Eastern	11 (1.2%)
Prefer to self-identify (i.e., not listed)	4 (0.4%)
Oceania	3 (0.3%)
First Nations	2 (0.2%)
Caribbean	2 (0.2%)
South Asian	2 (0.2%)
Employment	
Unemployed or home on disability since before COVID-19	110 (11.9%)
Currently unemployed or laid off as a result of COVID-19	84 (9.1%)
Currently still employed but cannot work	51 (5.5%)
Currently still employed and working from home	514 (55.6%)
Employed and still going to work	144 (15.6%)
Declined to answer	21 (2.3%)
Income	
< \$10,000 to \$29,999	183 (19.8%)
\$30,000 to \$59,999	309 (33.5%)
\$60,000 to \$89,999	255 (27.5%)
\$90,000 to \$149,999	141 (15.3%)
> \$150,000	36 (3.9%)
Political orientation	
Economic issues (<i>M, SD</i>)	3.79 (1.93)
Social issues (<i>M, SD</i>)	3.44 (1.98)

Note: Participants could report multiple ethnicities, so totals may not sum to 100%. Only ethnicities that at least one participant reported identifying with are listed in the table. The income question was presented to participants in \$10,000 increments, which were combined into \$30,000 increments above for brevity. Political orientation was rated from 1 (*Very liberal*) to 7 (*Very conservative*).

integrity and flag potential non-serious responders. These included a short math question (indicating what 20% of 400 is equal to), entering a sentence (“bot not am I”) in reverse order, and answering a simple question (“Should government-issued ID be required to vote in elections?”). The final sample comprised 924 participants (see, [Table 1](#) for participant characteristics). With this sample size, the minimum effect size that can be detected with 80% power in a multiple regression with four predictors (i.e., locomotion or assessment, FOMO, activity difficulty, and negative activities) is $r = .01$ according to G*Power (Faul et al., 2007). The original study by Boylan et al. (2021) was approved by a research ethics committee at the University of Waterloo .

Procedure

Participants completed a large survey, of which we report only the subset germane to the current investigation.² Participants completed the Regulatory Mode Scale (Kruglanski et al., 2000) to measure chronic locomotion (e.g., “When I decide to do something, I can’t wait to

get started"; $\alpha = .85$) and assessment (e.g., "I like evaluating other people's plans"; $\alpha = .84$), the 21-item Depression Stress Anxiety Scale (DASS; $\alpha = .97$; Henry & Crawford, 2005; Lovibond & Lovibond, 1995) to measure general psychological distress over the previous week (e.g., "I found it difficult to relax"), the ten-item Fear of Missing Out Questionnaire (FOMO; e.g., "I fear my friends are experiencing more rewards than me"; $\alpha = .93$; Przybylski et al., 2013), the ten-item Rosenberg Self-Esteem Scale (e.g., "On the whole, I am satisfied with myself"; $\alpha = .94$; Rosenberg, 1965), the six-item Life Orientation Test-Revised ($\alpha = .92$; Scheier et al., 1994) to measure their level of general optimism (e.g., "I'm always optimistic about the future"), and the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) to assess the degree to which they experienced positive (e.g., "Interested"; $\alpha = .92$) and negative (e.g., "Scared"; $\alpha = .92$) emotions over the previous week.

Three items developed by Boylan et al. (2021) measured the degree of activity difficulty participants experienced since the start of the pandemic (e.g., "To what extent has it been difficult to find things or activities to do?") on a five-point scale (1 = *Very difficult*, 5 = *Very easy*; $\alpha = .81$); items were reverse-scored so higher scores indicate greater activity difficulty. Participants rated how frequently they engaged in 30 activities (e.g., educational activities, stressful activities, reading) over the preceding week on a five-point scale (1 = *Not at all*, 5 = *Constantly*); factor analyses identified negative (five items) and positive (seven items) activities (and a third caregiving factor not discussed here) with their scores extracted using the regression method. Additionally, participants rated their perceived social (one item; "Do you currently feel like you are getting enough social support?") and financial (one item; "Do you currently feel financially secure?") support on a five-point scale (1 = *Definitely yes*, 5 = *Definitely no*); items were reversed-scored so higher scores indicate greater perceived support. Additional details for each measure are available in the Supplementary Online Material (SOM).

Rule-breaking

To measure their level of rule-breaking, participants were asked nine questions concerning their behavior during the pandemic. These questions asked whether, and to what degree, participants disobeyed public health guidelines. A principal-components factor analysis of these questions yielded a single, seven-item factor that explained 54.99% of the variability in responses (Table 2). Individual scores for the rule-breaking component were extracted using the regression method – the same rule-breaking variable used in Boylan et al. (2021). Higher scores on this composite indicate greater rule-breaking behavior.

Results

Initial correlational analyses examined associations between each regulatory mode and other variables of interest (Table 3). These analyses revealed that locomotion was not significantly associated with rule-breaking, $r(920) = -.06$, $p = .066$, and significantly negatively associated with psychological distress, $r(922) = -.18$, $p < .001$. Assessment, in contrast, was significantly positively associated with rule-breaking, $r(920) = .15$, $p < .001$, and psychological distress, $r(922) = .41$, $p < .001$. Additionally, whereas locomotion was negatively correlated with activity difficulty, FOMO, engagement in negative activities, and negative emotions, assessment was positively correlated with all these variables.

Table 2. Rule-breaking questions.

Questions	Scale	Component loadings
To what extent are you practicing social distancing?	1–4 (<i>not at all to very much</i>)	–.60
On average, how many hours of the day are you spending in your household (including your garage or yard but not going into the neighborhood or other public spaces)?	1–24	–.59
How frequently have you gone out for in-person social visits?	1–5 (<i>not at all to constantly</i>)	.77
How frequently do you go out to shop in-person?	1–5 (<i>not at all to constantly</i>)	.72
How many times have you intentionally broken social distancing protocols? (best guess; not counting people who live with you in your household)	Free Numerical Entry	.86
How many people have come within 6 feet of you over the last week (best guess, other than people who live with you in your household)?	Free Numerical Entry	.80
In the past week, how many social gatherings have you had at your home (i.e., gatherings with people other than those with whom you live)?	Free Numerical Entry	.81
Not included in rule-breaking component		Correlation with component
How many days have you spent in isolation?	Free Numerical Entry	.39
To what extent are you washing your hands with soap and water in response to the COVID-19 pandemic?	1–4 (<i>not at all to very much</i>)	.11

Table 3. Bivariate correlations.

	1	2	3	4	5	6	7	8
1. Locomotion	–							
2. Assessment	.02	–						
3. Rule-breaking	–.06 [†]	.15***	–					
4. Psychological distress	–.18***	.41***	.60***	–				
5. Activity difficulty	–.17***	.19***	–.09**	.18***	–			
6. Fear of missing out	–.09**	.46***	.54***	.68***	.14***	–		
7. Negative activities	–.15***	.35***	.35***	.60***	.24***	.45***	–	
8. Negative emotions	–.06 [†]	.39***	.58***	.85***	.11***	.68***	.53***	–
9. Positive emotions	.48***	–.06*	.28***	–.03	–.31***	.11***	–.14***	.09**

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Locomotion was also significantly positively associated with perceived social and financial support, self-esteem, optimism, engagement in positive activities, and positive emotions. Assessment, in contrast, was significantly negatively associated with these variables and was not associated with engagement in positive activities. To further explore these associations and unpack why locomotion and assessment show opposing associations with rule-breaking and psychological distress, additional preregistered analyses were conducted.³

Per our pre-registered analysis plan, initial regression analyses included negative emotions in the model to alleviate potential concerns over shared method variance among negatively worded scale items accounting for the assessment effects. After controlling for negative emotions, locomotion was no longer associated with rule-breaking, $\beta = -.03$, 95% CI [–.08, .03], $t(918) = -0.94$, $p = .345$, and was negatively associated with psychological distress, $\beta = -.14$, 95% CI [–.17, –.10], $t(920) = -8.21$, $p < .001$. Assessment

was negatively associated with rule-breaking, $\beta = -.08$, 95% CI $[-.14, -.02]$, $t(918) = -2.69$, $p = .007$, and positively associated with psychological distress $\beta = .10$, 95% CI $[.06, .13]$, $t(920) = 5.46$, $p < .001$.

Our preregistered analysis plan indicated covarying only for negative emotions; however, after analyzing the data we also observed a significant correlation between positive emotions and rule-breaking, $r(920) = .28$, $p < .001$. Given this finding, all models were re-run to covary for both positive and negative emotions, with any discrepancies from the preregistered model noted in the main text (see SOM for full details of models covarying both positive and negative emotions). Indeed, after covarying for both negative and positive emotions, locomotion was negatively associated with rule-breaking, $\beta = -.18$, 95% CI $[-.24, -.12]$, $t(917) = -6.04$, $p < .001$, and remained negatively associated with psychological distress, $\beta = -.11$, 95% CI $[-.15, -.08]$, $t(919) = -5.98$, $p < .001$. Assessment, in contrast, was no longer associated with rule-breaking, $\beta = -.03$, 95% CI $[-.09, .02]$, $t(917) = -1.18$, $p = .237$, and remained positively associated with psychological distress, $\beta = .09$, 95% CI $[.06, .13]$, $t(919) = 5.05$, $p < .001$. Thus, when covarying for both positive and negative emotions, the relationships between regulatory mode orientations and psychological distress remained unchanged, while the relationships with rule-breaking differed as a function of the covariates included. Models examining potential interactions between assessment and locomotion revealed no significant effects, as detailed in the SOM. As discussed in detail below, the pre-registered mediation analyses shed further light on the relation between assessment, locomotion, and these outcomes.

Mediation analyses

Mediation analyses were conducted to examine potential mechanisms that explain the observed associations in Table 3. In other words, these models were conducted to examine why assessment is associated with greater, and locomotion with lower, rule-breaking and psychological distress. For example, assessment is positively correlated with both FOMO and rule-breaking, and FOMO and rule-breaking are also positively correlated with each other (Table 2); because both assessment and FOMO involve social evaluative concerns (Kruglanski et al., 2000; Przybylski et al., 2013), it is conceivable that assessors engage in rule-breaking because of greater fear of missing out on social opportunities.

As noted in the pre-registered analysis plan, multiple mediation models were performed to identify a model that best explained the observed patterns. Importantly, because different types of mediation models using the same variables all partition the same amount of variance, models only differ in *how* indirect paths are modeled (e.g., parallel and serial models with the same variables contain the same amount of information, but specific paths between variables are modeled differently). Thus, to compare models, the significance of the total indirect effect was examined, along with pairwise comparisons between indirect effects to determine whether indirect paths in more complicated models were significantly different from those in simpler models (Hayes, 2018). If a more complicated indirect path (e.g., three mediators in parallel) is significantly different from a simpler path (e.g., a single mediator), then the more complicated path may offer a better explanation of the observed phenomenon.

Mediation analyses were conducted using the SPSS macro PROCESS (Hayes, 2018) with 10,000 bootstrap samples to estimate indirect effects. A 95% confidence interval excluding zero indicates a significant indirect effect (Hayes, 2018). In the final model (PROCESS Model 80; Hayes, 2018), the independent variables (locomotion and assessment) were associated with the dependent variables (rule-breaking and psychological distress) through FOMO, activity difficulty, and engagement in negative activities; each regulatory mode was also indirectly associated with engagement in negative activities separately through FOMO and activity difficulty (Figure 1). All models controlled for frequency of negative emotions to alleviate potential concerns over shared method variance among negatively worded scale items.

Path estimates are listed in Table 4. The total indirect effect from locomotion to rule-breaking was not significant, $\beta = .01$, 95% CI $[-.01, .03]$. In contrast, the total indirect effect from assessment to rule-breaking was significant and positive, $\beta = .06$, 95% CI $[.04, .09]$, revealing that assessors experienced greater FOMO and activity difficulty, each of which independently led assessors to engage in more negative activities, which in turn led to greater rule-breaking. After covarying for negative and positive emotions, the total indirect effect from locomotion to rule-breaking was negative and significant, $\beta = -.03$, 95% CI $[-.05, -.006]$, but remained unchanged for assessment.

The total indirect path from locomotion to psychological distress was significant and negative, $\beta = -.03$, 95% CI $[-.05, -.02]$, such that locomotors experienced less activity difficulty and engaged in fewer negative activities, ultimately reducing psychological distress. For assessment, on the other hand, the total indirect effect was significant and positive, $\beta = .07$, 95% CI $[.05, .10]$, revealing that assessors experienced greater psychological distress through the mediating influence of greater FOMO and activity difficulty, leading to engagement in negative activities that culminated in greater psychological distress. Covarying for both negative and positive emotions did not result in any notable discrepancies in total indirect effects.

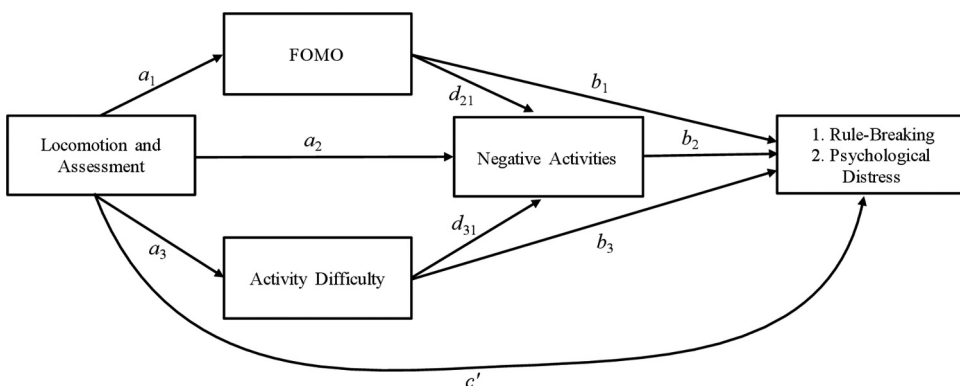


Figure 1. Visualization of the association between regulatory mode and dependent variables through fear of missing out (FOMO), activity difficulty, and negative activities. The model covaries for negative emotion frequency. Separate models were run for rule-breaking and psychological distress.

Table 4. Path estimates for mediation models.

Model paths	Rule-breaking		Psychological distress	
	Locomotion β [95% CI]	Assessment β [95% CI]	Locomotion β [95% CI]	Assessment β [95% CI]
a_1	-.05 [-.10, -.01]	.24 [.19, .28]	-.05 [-.10, -.004]	.24 [.19, .29]
a_2	-.09 [-.14, -.04]	.12 [.06, .18]	-.09 [-.15, -.04]	.12 [.06, .18]
a_3	-.16 [-.23, -.10]	.17 [.10, .24]	-.16 [-.23, -.10]	.17 [.10, .24]
b_1	.27 [.20, .34]	.32 [.25, .39]	.15 [.11, .19]	.15 [.10, .19]
b_2	.07 [.01, .13]	.09 [.03, .15]	.17 [.13, .20]	.18 [.14, .22]
b_3	-.19 [-.25, -.14]	-.17 [-.23, -.12]	.03 [.003, .07]	.05 [.01, .08]
d_{21}	.15 [.08, .22]	.11 [.04, .19]	.15 [.08, .22]	.11 [.04, .19]
d_{31}	.16 [.10, .21]	.15 [.10, .21]	.16 [.10, .21]	.16 [.10, .21]
c'	-.03 [-.09, .01]	-.14 [-.20, -.08]	-.10 [-.13, -.07]	.02 [-.02, .05]
Total c	-.03 [-.08, .02]	-.08 [-.14, -.02]	-.13 [-.17, -.10]	.09 [.06, .13]
Indirect paths				
Total	.01 [-.01, .03]	.06 [.04, .09]	-.03 [-.05, -.02]	.07 [.05, .10]
FOMO	-.01 [-.03, -.0005]	.08 [.05, .10]	-.008 [-.02, .0001]	.04 [.02, .05]
Activity difficulty	.03 [.02, .05]	-.03 [-.05, -.02]	-.006 [-.01, .000]	.008 [.002, .02]
Negative activities	-.01 [-.01, -.0003]	.01 [.003, .02]	-.02 [-.03, -.005]	.02 [.01, .03]
FOMO and negative activities	-.0005 [-.002, .000]	.002 [.0003, .006]	-.001 [-.003, .000]	.005 [.0007, .009]
Activity difficulty and negative activities	-.002 [-.004, -.0001]	.002 [.0006, .005]	-.004 [-.007, -.002]	.005 [.002, .008]

Note: All models covaried for degree of negative emotions participants felt over the preceding week. Bolded estimates indicate significant indirect paths where the 95% confidence interval excludes zero (Hayes, 2018).

Discussion

The self-regulatory challenges posed by the COVID-19 pandemic present a unique opportunity to examine how regulatory mode operates under pressure, revealing new insights into how these fundamental motivational orientations are related to different outcomes. Through secondary analysis of data collected by Boylan et al. (2021) at the initial height of the pandemic in the United States, the data used in this study provide an “on-the-ground” view of the psychological effects of COVID-19. Given the potentially opposing effects of locomotion and assessment in high-demand environments – locomotion-oriented individuals’ preference for “tacking action” and assessment-oriented individuals’ preference for comprehensive, critical evaluation – examining the effects of regulatory mode offers a novel perspective on how self-regulation affects psychological outcomes under the extreme stress of the pandemic.

In contrast to other approaches examining mental health impacts of the pandemic at a population-level (Pierce et al., 2020), or the differential effects of individual differences in mental health (Hampshire et al., 2021), our analysis permits an examination of how different fundamental ways of *self-regulating* affect mental health during an ongoing global crisis. Zero-order correlations revealed opposing patterns in which locomotion was negatively associated with psychological distress, whereas assessment was positively associated with psychological distress. Further, mediation models revealed that assessment-oriented individuals experienced greater FOMO and greater difficulty engaging in activities, which in turn was related to engagement in activities that feel frustrating, boring, and exhausting, which in turn was related to greater rule-breaking and to psychological distress. These indirect associations were

not observed for locomotion-oriented individuals – indeed, the total indirect path from locomotion to psychological distress was negative and opposite in sign to the assessment path.

Our analyses suggest that the constraints placed on behavior during the COVID-19 pandemic may lead assessment-oriented individuals to experience intense rumination and decision paralysis, as proxied by our measure of activity difficulty. Coupled with heightened FOMO and greater engagement in negative activities, this trifecta of vulnerabilities was linked to greater distress. Additionally, while other work has focused on the links between misinformation and (lack of) adherence to public health rules (Roozenbeek et al., 2020), or how factors such as perceived lack of control may lead one to espouse conspiratorial views (Oleksy et al., 2021), in the present study we were able to shed light on the potential vulnerabilities of different self-regulatory styles on adoption of preventative behaviors. Although speculative, it is possible that the greater rule-breaking associated with assessment was a maladaptive coping response to the heightened uncertainty and ambiguity of this pandemic; in other words, assessment-oriented individuals may not be breaking rules out of blatant disregard for health guidelines, but because desperate people may engage in desperate actions as a way to cope (Kashdan et al., 2006). Prior research suggests that assessment-oriented individuals are particularly concerned with making suboptimal decisions (Chen et al., 2019) and are especially sensitive to social norms (Higgins et al., 2003; Mannetti et al., 2012). Throughout the COVID-19 pandemic many jurisdictions suffered from confusing policies and contradictory enforcement of emergency orders, resulting in ambiguous situations where the “correct” course of action was unclear. For instance, stay-at-home-orders were juxtaposed with orders allowing non-essential businesses to remain open (Westoll, 2021). Prominent officials and leaders were caught flaunting public health guidelines they stridently urged citizens to follow (e.g., CBC News, 2021; Kosseff, 2020). Not only is this likely to increase the decision paralysis of assessment-oriented individuals (“what is the right thing to do?”), but it also creates situations with multiple salient subjective standards about what is and is not appropriate or risky. One interesting direction for future work would be to examine whether the psychological distress and behaviors of assessment-oriented individuals in areas with very distinct subjective norms (e.g., communities where public gatherings were encouraged versus discouraged) differed.

Locomotion motivation, in contrast, was not related to these same vulnerabilities. As noted in the introduction, it may seem strange on the surface that a motivational orientation primarily concerned with movement and action does not seem to be associated with greater distress during a time when people’s typical behaviors are restricted. Yet there are many ways to keep “moving” psychologically, and locomotion-oriented individuals seem to be well-positioned to manage change (Kruglanski et al., 2007), ward off boredom (Mugon et al., 2018), feel autonomous (Pierro et al., 2006), and maintain hope for the future (Di Santo et al., 2021). Further, as noted by Avnet and Higgins (2003), “the essential nature of locomotion as a regulatory orientation involves simply initiating movement away from a current state to a new state with no necessary ultimate destination, direction or place in mind” (p. 526). In other words, locomotion-oriented individuals may find it relatively easy to let go of prior goals and standards (Fitzsimons et al., 2009), and instead lean in to whatever

affordances the current situation offers for progress and movement (e.g., new pandemic hobbies, new ways to approach work). Interestingly, there were no significant interactions between locomotion and assessment. Prior work has often found that better performance in some domains results when people have high chronic levels of both locomotion and assessment (Kruglanski et al., 2000). The lack of significant interactions on psychological distress and rule-breaking suggest that high locomotion tendencies did not buffer the negative effects of assessment in this context.

Model comparisons and limitations of secondary data

The proposed mediation model presents paths by which each regulatory mode independently leads to FOMO and activity difficulty, both of which independently lead to engagement in negative activities that ultimately culminate in rule-breaking and psychological distress. This model provides a process-based account of *why* assessment-oriented individuals might be more likely to engage in rule-breaking and experience psychological distress. We did, however, also examine simpler models (see SOM). A simpler model, for instance, might be one in which each regulatory mode is associated with outcomes through the independent effects of each mediator. However, as detailed in the SOM, comparisons between the different models reveal a greater number of significant indirect effects for the proposed model presented here (e.g., all the indirect paths in the assessment to rule-breaking model are significant), and also indicate that the more complicated indirect paths in this model significantly differ from simpler paths. While not a perfect test (Hayes, 2018), the fact that these paths significantly differ suggests that the more complex model included in the main text paints a more complete picture of the observed associations.

Despite this, there are limitations to the present analysis. First, our analyses are correlational, and although we have tested a particular path by which regulatory mode orientations are related to psychological distress and rule breaking, we cannot draw causal conclusions on the basis of this data alone. While we performed data-driven tests derived from past work (e.g., assessment has been linked to procrastination and rumination in prior work, and our measure of activity difficulty can serve as a proxy for these constructs), the nature and constraints of secondary data analysis mean we were unable to test all possible variables. Although the full scope of the pandemic challenges cannot be replicated in the lab, future work could manipulate participants' regulatory mode orientations (e.g., Avnet & Higgins, 2003) and put people in demanding situations with changing or even contradictory guidelines (e.g., preparing for an impromptu public speech; Kirschbaum et al., 1993) to examine causal relations among at least some of these variables. Moreover, the unique nature of pandemics sets them apart from other situations involving extreme stress. An impromptu public speech, though a source of heightened stress, does not pose the same kind of existential threat as a pandemic (e.g., "How critical will the audience be?" vs. "What will happen to myself and my loved ones?"). Additional uncertainty around how long pandemics endure provides yet another unique source of stress that places them apart from other stressful events. An important job interview, for example, may be a source of extreme stress, but the situation itself has a relatively clear

endgame. These kinds of qualitative differences in challenging situations provide a fruitful area for future research to examine the potentially differential effects of regulatory mode in navigating high-demand, stressful environments.

Further, a given mediation model does not test all possible mechanisms (Fiedler et al., 2018), and researchers are constrained by what was measured in a given study. Indeed, other potential mediators might offer further insights into the observed effects (e.g., directly measuring rumination about pandemic-related decisions). However, by controlling for negative emotionality to account for potential shared method variance and comparing different types of mediation models, we are able to alleviate at least some of these concerns.

Additionally, on the basis of the current investigation one might conclude that there are no moderators that buffer the associations between assessment and psychological distress/rule-breaking. However, our secondary data analysis was again constrained by the available data; other moderators (and better measurement of the current moderators) should be explored. For example, assessment-oriented individuals who reside in areas with strong social norms of following public health guidelines (vs. weak or absent social norms) may have regular exposure to models of “desirable” behavior that can be emulated (Easterbrook-Smith, 2021). This may provide them with a relatively clear course of action that can alleviate the ongoing stressors of the pandemic (Brosowksy et al., *in press*). Beyond such moderators, additional unmeasured variables may also exert effects on the results observed here. For example, locomotion-oriented individuals’ propensity to “keep moving” psychologically and greater hopefulness (compared to assessment-oriented individuals; Di Santo et al., 2021) may provide a shield from the negative effects of the pandemic. Unfortunately, the unique circumstances of the current pandemic and the timely data collection required pose constraints on what is or is not measured, potentially limiting how the observed effects generalize to other stressful situations. Specifically, the dynamics we observed with assessment-individuals may arise only in situations that have similar features to those of the current pandemic – low perceived (and actual) control and high ambiguity regarding the correct course of action. Stressful situations not characterized by these features may reveal different dynamics. Despite this, our findings provide novel insights into the effects of self-regulation in response to COVID-19 and is in line with broader calls to understand the social and behavioral effects of the pandemic (Van Bavel et al., 2020).

Implications of these findings

Taken together, our findings extend prior work on the basic mechanisms of regulatory mode by revealing unique and potentially opposing effects of locomotion and assessment during the COVID-19 pandemic. Moreover, the vulnerabilities of assessment point to the importance of targeting these areas to alleviate the harmful consequences of maladaptive goal pursuit. Assessment-oriented individuals’ propensity toward rumination and indecision (Chen et al., 2018) suggests the need for clear, consistent messaging from authority figures and emergency government policies, as confusing guidelines and contradictory behaviors by elected officials and public figures may further exacerbate indecision in assessment-oriented individuals trying to determine the “right” course of action.

Additionally, policy makers may be able to promote more beneficial outcomes by highlighting low-risk, positive activities that can be safely engaged in to stave off FOMO and activity difficulties associated with assessment. For example, the general benefits to well-being conferred by spending time in nature (McMahan & Estes, 2015) offers policy makers the opportunity to promote low-risk ways for assessors, and people in general, to reduce psychological distress while allowing them to safely maintain public health guidelines. Further, because regulatory mode can be situationally induced (Avnet & Higgins, 2003; Mauro et al., 2009), it may be possible to create public health campaigns that induce locomotion motivation and capitalize on its strengths to help people to find more adaptive ways to manage very difficult circumstances. More broadly, this work provides greater awareness of the vulnerabilities and strengths associated with regulatory mode orientations in challenging circumstances, providing new insights into how to help people flourish when times are tough and allowing us to better prepare for the next global crisis.

Notes

1. Our pre-registered analysis plan also included investigation of potential moderators (perceived social support, perceived financial security, positive activity frequency, self-esteem, and optimism) of any regulatory mode effects on psychological distress and rule-breaking. Only two interactions emerged as significant and were not easily interpretable based on existing theory. We report all analyses and discussion of these moderators in the SOM.
2. For a complete list of measures, please refer to the SOM.
3. We also observed a small, positive correlation between positive and negative emotions, $r(922) = .09, p = .004$. This was unexpected and is not typically observed in prior work using the PANAS (Crawford & Henry, 2004); however, the reliability of both positive and negative emotions was high ($\alpha > .90$), and they correlated with other variables in ways we would expect. For example, positive and negative emotions were positively and negatively correlated, respectively, with perceived social and financial support, self-esteem, and optimism. These effects help to alleviate potential concerns over the small, positive correlation between positive and negative emotions.

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