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Boredom in the COVID-19 pandemic: Trait boredom proneness, the desire to act, and rule-breaking

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ABSTRACT

The state of boredom presents a conundrum: When bored, we want to engage with an activity, but we don't want to engage with whatever is currently available. This conflict is exacerbated when external factors impose restrictions on the range of behaviors we can engage in, which is precisely the scenario we are currently facing, at a global level, during this period of social isolation in response to the COVID-19 pandemic. We collected data from 924 North American participants (530 Male, Mean age = 37.7 years) using the internet-based Mturk platform to examine the relation between self-reports of boredom proneness (using the Short Boredom-Proneness Scale) and individual responses to questions about compliance with social-distancing requirements during the COVID-19 pandemic. Our sample replicated recent findings in boredom research, including a negative correlation between boredom proneness and self-control. We also provide novel evidence that highly boredom prone people have been more likely to break the rules of social isolation in a variety of ways (e.g., fewer hours spent in social isolation, poor adherence to social distancing as evidenced by increased likelihood of holding a social gathering and coming into proximity with more people than recommended). We further demonstrated that boredom proneness substantially mediates the association between self-control and rule-breaking. These results indicate that boredom proneness is a critical factor to consider when encouraging adherence to social isolation.

1. Introduction

In-the-moment feelings of boredom (i.e., state boredom) present us with a conundrum: the state of boredom signals not only that we are not engaged with the world in some satisfying pursuit, but also that we do not *want* to engage in any of the currently available options for action (Danckert, 2019; Danckert et al., 2018; Eastwood et al., 2012). Boredom, in this light, functions as a self-regulatory signal indicative of rising opportunity costs (Danckert, 2019; Kurzban et al., 2013; Struk et al., 2020). The sense that whatever you are doing now is unsatisfying simultaneously highlights the fact that there could be other, potentially more rewarding activities you could be doing. It is the *failure to launch* into some alternative activity that makes boredom the uncomfortable experience that it is (Mugon et al., 2018).

Over the past few months, in response to the COVID-19 pandemic, we have all been asked to accept constraints on our normal behavior. Indeed, we have been asked to remain in our homes whenever possible and to maintain social-distancing rules when out in public. Our normal work activities have either been halted altogether or dramatically altered to accommodate these restrictions. Critically, the extent to which we adhere to these constraints has important public health consequences. However, as in our recent study (Struk et al., 2020), there is the real possibility that the constraints that have been placed on our lives in the midst of this pandemic may elicit feelings of boredom, which may in turn lead to "rule-breaking" behaviors that promote the spreading of COVID-19. Consistent with this possibility, people surveyed during the SARS outbreak of 2003 reported that boredom was the biggest disincentive for maintaining quarantine regulations (DiGiovanni et al., 2004).

More broadly, the opportunity-cost model of subjective effort predicts that the primary function of boredom is to signal rising costs in persistence towards our current course of action (Kurzban et al., 2013). The likelihood of people experiencing boredom during the COVID-19 pandemic should reflect, in part, high perceived costs of adhering to public-health rules in comparison to the perceived benefits of protecting the community from COVID-19. For example, it has been shown that willingness to believe COVID-19 misinformation and believe that the pandemic is a hoax can reduce adherence to social rules (Stanley et al., 2020).

In a recent study (Struk et al., 2020), we examined the influence of

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behavioral restrictions on boredom. Participants were asked to sit in a room and entertain themselves with only their thoughts. Whereas some participants sat in an empty room devoid of opportunities for action, others sat in a room replete with such opportunities for action (e.g., a half-completed puzzle, an unfinished Lego® model, a computer with an open browser), but were instructed to refrain from engaging with them (Struk et al., 2020). Results showed that, compared to the group that sat in a room with no available options for action, those who were surrounded by opportunities for action they were told to refrain from engaging with reported greater boredom (Struk et al., 2020). Interestingly, among the people tested in the room replete with opportunities for action, around one quarter chose to break the rules and engaged with the restricted objects anyway. For some, it seems the temptation to mitigate boredom is just too much.

Struk et al.' (2020) study suggests that in-the-moment feelings of boredom may contribute to rule-breaking behavior in our current circumstances. What is less clear is what influence individual differences in the propensity to experience boredom may have on such behaviors. For those who experience boredom more frequently and intensely—the so-called 'boredom prone' (Farmer & Sundberg, 1986)—the experience is associated with a long list of negative outcomes, including higher levels of depression and anxiety (Farmer & Sundberg, 1986; Goldberg et al., 2011; Vodanovich et al., 1991) and problems with alcohol, drugs, and gambling (Blaszczynski et al., 1990; Iso-Ahola & Crowley, 1991; Orcutt, 1984). Beyond these associations, research has consistently shown that highly boredom prone people have poor attentional control, particularly on tasks that require sustained attention or vigilance (Hunter & Eastwood, 2018; Kass et al., 2001; Malkovsky et al., 2012; Sawin & Scerbo, 1995). What each of these relations indicate is that individuals high in boredom proneness also exhibit poor affective and cognitive self-regulation (Isacescu et al., 2017; Mugon et al., 2018; Struk et al., 2016). Indeed, those high in boredom proneness also tend to exhibit lower levels of self-control (Isacescu et al., 2017; Isacescu & Danckert, 2018). It may be the case, then, that those high in boredom proneness (and low in self-control) are more likely to break the rule of social distancing. That is, the constraints of the pandemic *require* self-control in order to resist the urge to do things we normally could. For the boredom-prone who struggle with self-control, this challenge is exacerbated.

Beyond self-reported levels of self-control, research has shown that people high in boredom proneness tend to report higher levels of sensation-seeking and impulsivity (Dahlen et al., 2004; Kass et al., 2010; Watt & Vodanovich, 1992). In teens, boredom proneness has been associated with risky sexual behaviors (e.g., having sex without the protection of a condom, having sex with multiple partners; Miller et al., 2014). In addition, the presence of a traumatic brain injury (TBI, the sine qua non of which is impulsivity; Arciniegas & Wortzel, 2014) predicts higher levels of boredom proneness (Isacescu & Danckert, 2018). Clearly, boredom proneness presents a challenge for the effective regulation of thoughts, emotions, and behaviors.

Here, we explored whether trait boredom proneness and self-control represent determining factors in compliance with social-distancing requirements during the COVID-19 pandemic. Given the propensity for those scoring high on trait boredom proneness to have lower levels of self-control and higher levels of impulsivity/sensation-seeking, we hypothesized that those higher in boredom proneness would be more likely to break the rules.

2. Method

2.1. Participants

Participants were recruited to complete a Human Intelligence Task (HIT) via Amazon's Mechanical Turk (Mturk) platform. To be eligible for this cross-sectional study, participants had to have completed > 500 HITs with a 95% HIT acceptance rate. We decided, in advance, to collect data from roughly 1000 participants, with the final sample consisting of 993.[1] On review, data from 69 participants were removed as they were identified as non-serious responders (7% of total cases; see the "data preparation" section, below, for further details). The final sample consisted of 924 participants (386 female, 530 male, 8 responding as "other" gender). The mean age of the sample was 37.70 years (SD = 11.25) and reported the following ethnicities: 73.05% white, 8.44% Black/African American, 5.95% East and Southeast Asian origins (i.e., Chinese, Korean), 2.92% Latin, central, and south American origins, 1.19% African origins, 1.19% South Asian origins (i.e., Indian, Sri Lankan). Fifty-four participants chose not to report ethnicity, and the remainder of the sample (1.41%) reported "other ethnicities" (to ensure anonymity, participants from ethnic backgrounds with fewer than 10 participants in the study are not specified here). Our sample was primarily recruited from the United States (913 USA) and the data were collected between April 28th and May 2nd of 2020.

Participants were able to review a summary of the study and read a letter of information describing our study prior to providing consent to participate. The survey took approximately 45 min to complete. To minimize ethical concerns, we opted to compensate participants at the current US minimum wage of $7.25 per hour, which was deposited directly into their MTurk account. Participants were informed that the survey would involve personal and potentially upsetting questions regarding how they have been spending their time during the pandemic, including behaviors that may not be permitted under some social-distancing orders.

2.2. Data preparation

Reliability analyses were conducted with participants set as items, and participants with item-total correlations less than 0.20 removed as non-serious responders (overall participant reliability; Cronbach's α = 0.994). We used a number of attention checks to ensure the integrity of our data. We asked a short math question (what is 20% of 400), had participants enter the reverse order of the sentence "bot not am I," and asked participants to enter responses to a simple question (e.g., "Should government-issued ID be required to vote in elections?"). These were examined for nonsensical answers as a potential flag for non-serious responses (e.g., some non-serious flagged responses included "excellent", "very good" to these open-choice attention-check questions).

2.3. Surveys

Participants completed a large survey of which a subset of questions are reported here.[2] Participants completed the Shortened Boredom Proneness Scale (SBPS; Struk et al., 2017), which is an 8-item scale derived from Farmer and Sundberg's (1986) original 28-item scale. Example items include "I don't feel motivated by most things that I do," and "Much of the time, I just sit around doing nothing." Responses were measured on a 7-point Likert scale ranging from strongly agree to strongly disagree, with higher scores indicating higher levels of trait boredom proneness. Struk et al. (2017) report good construct validity and internal consistency (with a Cronbach's alpha of 0.88). Participants were asked to refer to typical experiences of boredom as experienced *prior to* the pandemic.

Previous research has demonstrated a number of consistent findings associated with trait boredom proneness. First, boredom proneness

[1] All analyses presented here were also conducted using the full sample of 993 – that is, including participants considered to be "non-serious responders". The pattern of results were unchanged.

[2] For the complete list of questions used in this survey please refer to the Supplementary Online Materials.

diminishes with age (Gana et al., 2019; Giambra et al., 1992; Isacescu et al., 2017). Second, boredom proneness is consistently higher in males than females (e.g., Isacescu et al., 2017). Finally, we have shown that higher levels of boredom proneness are associated with lower levels of self-control (Isacescu et al., 2017; Struk et al., 2016). Here, to ensure that our sample was representative of previous samples in the boredom literature we examined the influence of age, gender and self-control. For self-control we used the Brief Self-Control Scale (BSCS; Tangney et al., 2004) which is a 13-item scale that measures trait levels of self-control over thoughts, feelings, and actions. Examples items include "I am good at resisting temptation" and "I do certain things that are bad for me, if they are fun" (reverse coded). Responses are measured on a 5-point Likert scale with higher scores indicative of higher levels of self-control. Studies have demonstrated that internal consistency and test-retest reliability for the scale are good (Cronbach's alpha estimates of 0.83 and 0.85 across two studies; Tangney et al., 2004).

2.4. Rule-breaking questions

To assess compliance with social-distancing requirements during the COVID-19 pandemic, we asked participants a number of questions intended to measure the extent to which they adhered to established rules (Table 1). In responding to these questions, participants were asked to consider their behavior over the preceding week.

2.5. COVID-19 experiences

We asked participants if they have ever been sick with (contracted) COVID-19, if they have been formally tested for COVID-19 and, if they were tested, if they received a positive diagnosis. Participants were also asked whether they knew someone who had been sick with COVID-19 (a friend, family, or roommate), and the extent to which they thought that COVID-19 pandemic is a hoax (1: definitely not a hoax, to 4: definitely a hoax; Stanley et al., 2020). Asking whether participants believed COVID-19 to be a hoax was included as this may have acted as a moderator of rule-breaking behavior – that is, believing the pandemic to be a hoax may justify a participant's choice not to follow social distancing protocols. Responses to these questions were not included in the factor analysis of rule-breaking questions from Table 1.

2.6. Data reduction

A principal-components factor analysis of responses to the nine questions outlined in Table 1 indicated a single latent factor, which accounted for 54.99% of the variability in seven of the nine rule-breaking questions. The factor had high negative loadings on the extent to which individuals practiced social distancing, the number of hours spent at home, and high positive loadings on frequency of in-person social visits, shopping, intentionally breaking social-distancing rules, and on allowing more people outside of one's household to come within close proximity. As such, we labelled this factor "COVID-19 rule-breaking." Handwashing behaviors and the number of days spent in social isolation did not significantly load on this factor (Table 1). Factor loadings on the COVID-19 rule-breaking factor were saved using the regression method to create a composite score that could be used as a key outcome variable of interest, with higher scores indicating poor social-distancing and rule-compliance behaviors (i.e., high scores indicated higher rule-breaking behavior).

2.7. Data analysis

To examine the relations between boredom proneness and our questions concerning COVID-19 rule-breaking, we first examined bivariate correlations between all measures (Table 2). Next, to determine whether boredom proneness predicted different levels of non-compliance according to the rule-breaking composite variable, we conducted a hierarchical regression. Given that prior research has shown consistent relations between boredom proneness, age and gender (Gana et al., 2019; Giambra et al., 1992; Isacescu et al., 2017), these two factors (age and gender) were entered into the model first. We expected that age would negatively predict COVID-19 rule-breaking. That is, given that boredom proneness itself declines with age, it stands to reason that rule-breaking should decrease as boredom proneness diminishes. Similarly, we expected gender to positively predict COVID-19 rule-breaking such that females (who tend to be lower in boredom proneness) should better adhere to social distancing protocols than males (who tend to be higher in boredom proneness). Finally, we added boredom proneness as a predictor. We expected that boredom proneness would act as a significant positive predictor of failing to adhere to rule-breaking. Finally, we included self-control in the regression to determine whether this factor improved model fit.

3. Results

3.1. Descriptive statistics

Descriptive statistics for all primary measures are presented in Table 2. In our sample, 39 participants self-endorsed that they had contracted COVID-19 (4.2%), 170 indicated that they knew someone who had contracted COVID-19 (18.4%), and 57 indicated that they had been tested for COVID-19 (6.2%), with only 15 participants indicating that they received a positive diagnosis from a test (1.6%).

First, we wanted to ensure that our sample was representative of previous samples used in research on boredom proneness. Replicating

Table 1
Rule-breaking questions administered to participants. *Note*: participants were asked to answer these in terms of their behavior over the past week.

Rule-breaking questions	Scale	Factor loadings
To what extent are you practicing social distancing?	1–4 (not at all–very much)	−0.60
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	−0.59
How frequently have you gone out for in-person social visits?	1–5 (not at all to constantly)	0.77
How frequently do you go out to shop in-person?	1–5 (not at all to constantly)	0.77
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	0.86
How many people have come within 6 ft of you over the last week (best guess, other than people who live with you in your household)?	Free numerical entry	0.80
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	0.81
Not included in rule-breaking factor		Correlation with factor
How many days have you spent in isolation?	Free numerical entry	0.39
To what extent are you washing your hands with soap and water in response to the COVID-19 pandemic?	1–4 (not at all–very much)	0.11

Table 2
Descriptive statistics and bivariate correlations.

		M	SD	1	2	3	4	5	6	7	8	9	10	11
1	Covid-19 rule-breaking	–	–		0.53***	−0.35***	0.02	−0.29***	0.61***	−0.13***	0.47***	0.30***	0.53**	0.27*
2	Boredom proneness	2.88	1.43			−0.62***	−0.01	−0.25***	0.41***	−0.21***	0.27***	0.22***	0.30**	0.38**
3	Brief self-control scale	3.53	0.78				0.02	0.15***	−0.24***	0.18***	−0.17***	−0.14***	−0.22***	−0.38**
4	Days in social isolation	38.96	14.21					0.09*	0.04	0.07	0.05	0.01	0.05	0.03
5	Handwashing	3.64	0.68						−0.25***	0.04	−0.13***	−0.07*	−0.14***	−0.25
6	Hoax beliefs	1.43	0.83							−0.07*	0.26***	0.19***	0.32***	0.15
7	Age										−0.004	−0.05	−0.06	0.21
		N	%	1	2	3	4	5	6	7	8	9	10	11
8	Contracting COVID-19	39	4.2%									0.41***	0.51***	0.52***
9	Know someone with COVID-19	170	18.4%										0.32***	0.34**
10	Getting tested for COVID-19	57	6.2%											–
11	Positive COVID-19 test	15	1.6%											

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

previous findings, results showed that age was positively related to self-control and negatively to boredom proneness, and that boredom proneness was significantly negatively correlated with self-control (Table 2). With respect to gender, independent samples *t*-tests revealed that females had significantly lower boredom proneness ($t(913) = 4.57, p < .001$), higher self-control ($t(914) = 2.07, p < .05$), and engaged in fewer COVID-19 rule-breaking behaviors than did males ($t(910) = 5.06, p < .001$). Taken together, this suggests that our sample is sufficiently similar to samples obtained in previous research on boredom. Table 2 also highlights correlations with boredom proneness, self-control, the COVID-19 rule-breaking factor, and individual experiences of COVID-19 (e.g., contracting it or knowing someone who has).

As a first pass at testing our primary question of interest (whether boredom proneness is positively associated with COVID-19 rule-breaking) we examined correlations with trait boredom proneness, the COVID-19 rule-breaking factor and individual experiences of COVID-19. Consistent with our hypothesis, we found that boredom proneness was significantly, and rather strongly, positively associated with COVID-19 rule-breaking ($r(917) = 0.53, p < .001$; Table 2). In addition, boredom proneness was significantly negatively associated with handwashing ($r(917) = -0.25, p < .001$) and significantly positively associated with (a) the likelihood of contracting COVID-19 ($r(921) = 0.27, p < .001$), (b) knowing someone who had COVID-19 ($r(921) = 0.22, p < .001$), and (c) believing that COVID-19 is a hoax ($r(921) = 0.41, p < .001$; Table 2).

3.2. Hierarchical multiple regressions

Next, a hierarchal multiple regression was conducted to determine whether boredom proneness significantly predicted COVID-19 rule-breaking when controlling for age and gender (male or female).[3] At the first step, rule-breaking was significantly negatively predicted by age (rule-breaking was lower as age increased; Table 3). At the second step, COVID-19 rule-breaking was significantly negatively predicted both by age and gender (males were more likely to rule break). At the third step, gender continued to significantly negatively predict COVID-19 rule-breaking, although age was no longer a significant predictor. Additionally, boredom proneness significantly positively predicted COVID-19 rule-breaking. The final step of the model added self-control, with no improvement in the model fit ($R^2 = 0.29$, *F* change(1, 904) = 1.04, *ns*.).

[3] Participants self-identifying according to the "other" gender category ($n = 8$) were not included in this analysis.

Table 3
Hierarchical multiple regression analyses predicting COVID-19 rule-breaking with boredom proneness and self-control controlling for gender and age with unstandardized (*b*) and standardized (β) regression weights (β).

	b	S.E.	β	t	p	R^2_Δ	p_Δ
Step 1							
Intercept	0.44	0.12		3.78	< .001		
Age	−0.01	0.003	−0.13	−3.92	< .001		
						0.02	< 0.001
Step 2							
Intercept	0.46	0.11		4.03	< .001		
Age	−0.009	0.003	−0.10	−2.93	< .01		
Gender	−0.31	0.07	−0.15	−4.53	< .001		
						0.02	< 0.001
Step 3							
Intercept	−0.95	0.13		−7.55	< .001		
Age	$1.76e^{-4}$	0.003	−0.002	−0.07	ns		
Gender	−0.19	0.06	−0.09	−3.23	< .001		
Boredom proneness	0.36	0.02	0.52	17.95	< .001		
						0.25	< 0.001
Step 4							
Intercept	−0.74	0.24		−3.16	< .01		
Age	$2.26e^{-5}$	0.003	$2.55e^{-4}$	0.009	ns		
Gender	−0.19	0.06	−0.09	−3.28	< .001		
Boredom proneness	0.35	0.03	0.50	13.67	< .001		
Self-control	−0.047	0.05	−0.05	−1.02	ns		
						0.001	ns

3.3. Mediation model

Self-control was correlated with both COVID-19 rule-breaking and with boredom proneness. Boredom proneness was predictive of COVID-19 rule breaking (Table 3; Step 3), and the effect of self-control on COVID-19 rule-breaking was non-significant when controlling for boredom proneness (Table 3; Step 4). This pattern of results satisfies Kenny's 4-step process in establishing a mediation (for further discussion; see Baron & Kenny, 1986; Judd & Kenny, 1981; see also Preacher & Hayes, 2004 for more updated criteria that the pattern of results here also satisfy). As such, a statistical mediation of boredom proneness on the association between self-control and COVID-19 was further explored with a formal structural equation mediation model.

The mediation model was tested using the Lavaan package in R with default settings to investigate whether boredom proneness acted as a mediator of the association between self-control and the COVID-19 rule-breaking factor. The model revealed a complete mediation by

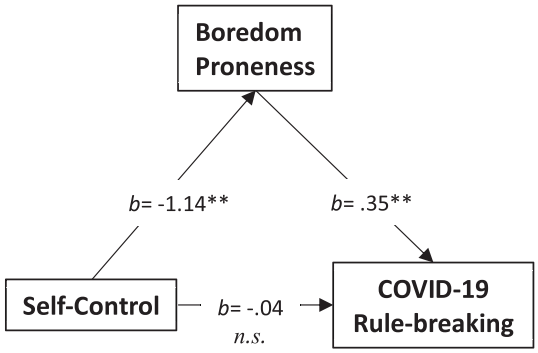

Fig. 1. Full mediation of boredom proneness on the association between self-control and COVID-19 rule-breaking. Note: Boredom proneness was measured by the SBPS, self-control via the BSCS and the COVID-19 Rule-breaking factor is a composite of responses made to several questions (see Method section). Parameter estimates (*b*) are unstandardized regression weights.

boredom proneness on the relationship between self-control and rule-breaking. There was a significant effect of self-control on boredom proneness (unstandardized $b = -1.14$, $SE = 0.05$ $z = 24.09$, $p < .001$), and a significant effect of boredom proneness on COVID-19 rule-breaking ($b = 0.35$, $SE = 0.03$; $z = 14.14$ $p < .001$). There was a significant overall indirect effect ($b = -0.40$, $SE = 0.03$; $z = 12.19$, $p < .001$), while the direct effect of self-control on COVID-19 rule-breaking was non-significant ($b = -0.04$, $SE = 0.05$; $z = 0.83$, n.s.; Fig. 1).[4] Importantly, this indicates that boredom proneness mediates the relation between different levels of self-control and rule-breaking during the pandemic. People with low levels of self-control tend to be more boredom prone, and those who are more boredom prone tend to be more likely to break the rules of social-isolation.

4. Discussion

Boredom proneness represents a strong risk factor for non-compliance with social-distancing protocols during the COVID-19 pandemic. Under the constraints imposed by social distancing, those highly prone to boredom tend to break the rules more frequently. Strikingly, this was evident even though those same boredom prone individuals were also more likely to become ill with COVID-19 or to know someone who had! The urge to act, when driven by boredom, seems to be so powerful that people are even willing to act against their own self-interest and the interests of others. Social-distancing rules have limited our ability to engage in meaningful activities. Our results suggest that the impact of these restrictions may have been particularly challenging for people who were already prone to experience boredom. People who are high in boredom proneness feel the push-to-action more intensely, and exhibit lower levels of self-control; both of which are factors that contributed to increased rule-breaking in our sample. In the context of opportunity costs (Kurzban et al., 2013), it seems that, for the highly boredom prone, the rise in opportunity costs brought about by social distancing rules in the pandemic are too hard to resist.

While some conceptions of boredom cast it in a positive light (or at least, not an entirely negative light) as a call to action (Bench & Lench, 2013; Elpidorou, 2014), the state signal of boredom is not always well responded to by those who experience it frequently and intensely. As we showed recently, this is compounded in circumstances wherein obvious opportunities for action are just out of reach (Struk et al., 2020). That is, when people see that there are viable options for engaging in action, but that they are prevented from doing so, boredom is elevated (Struk et al., 2020). Given that the boredom prone tend to experience the state more frequently, it may seem unsurprising that they will also exhibit a tendency towards breaking the rules of social distancing. That is, the constraints of social distancing are likely to increase the frequency with which people feel bored (Barari et al., 2020). What we have shown here is that the highly trait boredom prone respond to any potential rise in state boredom with maladaptive responses.

We would still claim that the state signal of boredom is neither good nor bad for us (Danckert et al., 2018). In a theoretical piece in which philosopher Andreas Elpidorou made a call for further research, he suggested that boredom could prompt us to lead what existential philosophers call an "authentic life" (Elpidorou, 2017). The authentic life is one led in accordance with our beliefs and desires. Responded to well, state boredom can prompt us to engage in activities that better serve our goals and desires (Danckert et al., 2018). Responded to poorly, as was clearly evident in the present study, boredom may lead to maladaptive responses. Interestingly, the highly boredom prone in this sample were also more likely to endorse believing that the COVID-19 pandemic was a hoax. It is not possible to determine whether they genuinely believe this to be true or alternatively, endorsed this belief as a justification for having broken social distancing protocols. In a recent study exploring the question of "What makes people endorse the view that the pandemic is a hoax?" it was found that those willing to engage in effortful and reflective thought processes were less likely to believe COVID-19 was a hoax and more likely to engage in social distancing and hand-washing (Stanley et al., under consideration). Put another way, the highly boredom prone people tested here may endorse the belief that COVID-19 is a hoax because they are unwilling to engage in the deeper thought processes needed to fully appreciate the current crisis.

What causes those high in boredom proneness to break the protocols of social distancing remains an open question. The obvious suggestion that low levels of self-control (Isacescu et al., 2017) drive the behaviors in question is unlikely given that our mediation analysis showed that boredom proneness fully mediated any influence of self-control on rule-breaking. Some recent research has suggested that boredom proneness in part explains the problematic use of smartphones (something akin to addictive behaviors; Elhai et al., 2018). Diefenbach and Borrmann (2019) characterize this as using the smartphone as a pacifier of boredom. It may be that the level of discomfort attendant on feelings of boredom are what prompt people to either seek a pacifier or break the rules they see as the cause of their boredom.

Finally, the current results suggest that boredom and boredom proneness need serious consideration when formulating policies that ultimately restrict our capacity to act. Given the notion that those who see the pandemic as a hoax are less likely to think deeply about the issue, it is imperative that we develop stronger and clearer public messaging highlighting the import of measures intended to restrict the spread of COVID-19. To date, public messaging has highlighted what people should not do, as opposed to encouraging actions that can be safely undertaken. This may have the inadvertent consequence of making the boredom prone feel even more constrained and hence, more likely to break the rules. Thus, policy makers and public health officials may want to highlight the range of actions that *are* feasible within the constraints of social isolation. This could help all of us, but perhaps especially the boredom prone, abide by social distancing protocols.

There are some limitations to our study that are worth noting. First, our study was cross-sectional, making use of self-reports, which are of course primarily correlational in nature. We are therefore limited in the extent to which we can establish strong causal arguments. Further experimental research is therefore recommended to test the implications of our results. For example, public initiatives to reduce boredom during lockdown should both improve rule-adherence and reduce demands on self-control. Second, it is important to note that the association between boredom proneness, self-control, and COVID-19 rule-breaking may

[4] We also ran the mediation model for male and female participants, separately. The pattern of results was the same for both sexes, and mirrored the results of the combined sample.

have changed over time given the ongoing course of the pandemic. A longitudinal replication and comparison of boredom related experiences based on COVID-19 outbreak severity among other factors (e.g., geographic location, political ideology) would thus provide further insight into the factors that promote rule-breaking in this challenging time.

CRediT authorship contribution statement

James Boylan: Conceptualization, Writing - original draft, Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - review & editing. **Paul Seli:** Conceptualization, Resources, Writing - review & editing. **Abigail A. Scholer:** Conceptualization, Resources, Writing - review & editing. **James Danckert:** Conceptualization, Resources, Writing - original draft, Writing - review & editing.

Declaration of competing interest

None.

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Appendix A. Supplementary data

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