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Self-Control and Beliefs Surrounding Others' Cooperation Predict Own Health-Protective Behaviors and Support for COVID-19 Government Regulations: Evidence From Two European Countries

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Supplementary Materials: Data, Materials [see Index of Supplementary Materials]

Abstract

In the current pandemic, both self-regulated health-protective behavior and government-imposed regulations are needed for successful outbreak mitigation. Going forward, researchers and decision-makers must therefore understand the factors contributing to individuals' engagement in health-protective behavior, and their support for government regulations. Integrating knowledge from the literatures on self-control and cooperation, we explore an informed selection of potential predictors of individuals' health-protective behaviors as well as their support for government regulations during the COVID-19 pandemic. Aiming for a conceptual replication in two European countries, we collected data in Switzerland ($N = 352$) and the UK before ($N = 212$) and during lockdown ($n = 132$) and conducted supervised machine learning for variable selection, followed by OLS regression, cross-sectionally and, in the UK sample, across time. Results showed that personal importance of outbreak mitigation and beliefs surrounding others' cooperation are associated with both health-protective behavior and support for government regulations. Further, Swiss participants high in trait self-control engaged in health-protective behavior more often. Interestingly, perceived risk, age, and political orientation consistently displayed nonsignificant weak to zero associations with both health-protective behavior and support. Together, these findings highlight the contribution of self-control theories in explaining COVID-19-relevant outcomes, and underscore the importance of contextualizing self-control within the cooperative social context.

Keywords

COVID-19, self-control, cooperation, health-protective behavior, policy support, machine learning, elastic net

Highlights

- Using machine learning and multiple regression analyses, we show that self-control and beliefs surrounding others' cooperation predict engagement in COVID-19 health-protective behaviors and support for government regulation, beyond previously identified predictors (i.e., perceived risk).
- These findings align with our conceptualization of the pandemic as a cooperative problem requiring self-control. At present, research on self-control in the service of collective goals remains scarce.
- For both theory and practice, our results underscore the importance of contextualizing self-control in the social environment and identifying components that contribute to successful self-control in the service of a collective society-level goal.

"What is true of all the evils in the world is true of plague as well.
It helps men to rise above themselves."
— Albert Camus, The Plague (1947)

The year 2020 has seen unprecedented changes to public and private life as the COVID-19 pandemic has taken hold of societies around the globe. Given the virus's infectiousness and the volatility of infection numbers following even isolated incidents (e.g., large gatherings), individual health-protective behaviors play a key role in slowing viral transmission. In the early stage of the pandemic, public health strategies therefore centered around recommending individual behavior change, such as frequent hand-washing and avoiding crowds. The success of such strategies, however, requires individuals to effortfully regulate their own behavior, overcoming competing needs and impulses (e.g., meeting friends, shaking hands) in service of the collective outbreak mitigation goal.
In response to the virus's lethality and unabated spread, these appeals to voluntary engagement in health-protective behaviors were supplemented by externally imposed regulations as the pandemic progressed. Accordingly, many countries around the world have entered "lockdown", which typically involves avoiding physical contact with others and not congregating in public or private spaces. These drastic measures were necessary to "flatten the curve," that is, to slow viral transmission, and have resulted in a steady decline in daily new COVID-19 cases (depending on country and lockdown status, see World Health Organization [WHO], 2020). However, such regulations constitute a severe

impingement upon citizens' freedom and have therefore not been without cost. Given that democratic freedoms are being curtailed, it is not surprising that many countries have experienced public backlash against official regulations, giving rise to concerns regarding COVID-denialism and protests against government regulations (e.g., BBC News, 2020). Indeed, this surge in public reactance mirrors the historical record (Slack, 1985; Snowden, 1995; as cited in Reicher & Stott, 2020) in showing that low support for far-reaching government measures, such as mandatory quarantine, can lead to extreme social division and political unrest (Hay, 2007).

According to the WHO, effective COVID-19 outbreak mitigation necessitates both individual health-protective behaviors and government-imposed regulations (Ryan, 2020). Therefore, it is necessary to understand factors contributing to self-regulated health-protective behaviors as well as individuals' support for government (vs. individual choice-based) regulation. While these two components likely correlate to some extent, it is unclear whether people's general support for government regulation fosters health-protective behaviors, or whether those who successfully engage in health-protective behaviors are also more accepting of regulations. We will therefore examine factors for both outcomes separately but also consider the respective other outcome as a factor in our analyses to test their relationship.

As in many other areas of life, effortful behavior for the sake of long-term pay-off requires self-control. That is, individuals must overcome short-term needs or impulses to act in line with recommended health-protective behaviors and government regulations. Notably, this self-control problem is further embedded into a societal context, such that effortful behavior regulation does not serve an individual-level goal, such as dieting or exercise, but instead benefits the collective. Taking a self-control perspective on COVID-19 outbreak mitigation as a cooperative problem, the aim of the present research was to investigate individual-level factors predicting health-protective behaviors and support for government regulations.

While self-control and cooperation models make well-established predictions in the individual goal-striving and collective cooperation contexts, respectively, the current project presents a novel integration of these two lines of research. This conceptualization of COVID-19 health-protective behavior and policy support as a cooperative problem requiring self-control has, to the best of our knowledge, not been empirically tested (for two peer-reviewed articles predicting health-protective behavior from self-control and cooperation variables, independently, see Wolff et al., 2020; Moussaoui et al., 2020). Given this lack of explicated theories tested in the COVID-context, we chose a data-driven (as opposed to confirmatory, hypothesis-testing) approach, exploring an informed selection of predictors from the literatures of self-control and cooperation, while controlling for variables found to associate with health-protective behaviors in extant COVID studies, as well as sociodemographic variables. To this end, we applied exploratory machine learning for variable selection and, in a second step, OLS regression analyses.

A Self-Control Perspective on Collective Goal-Striving

Implementing the recommended health-protective behaviors requires individuals to effect far-reaching behavior change. In order to change their behavior, individuals need to employ effortful self-control to overcome immediate needs (e.g., for belonging; Ryan & Deci, 2017) and habits (e.g., exercising; Wood, 2017). While fulfilling such needs may be immediately rewarding, these behaviors increase the risk of COVID-19 infection and transmission and are therefore ultimately costly both to the self and the collective.
To date, the self-control literature has focused on individual-level goal striving while neglecting empirical study of the social context into which self-control processes are embedded. This is surprising given that self-control is commonly defined as "the capacity for altering one's own responses, especially to bring them into line with standards such as ideals, values, morals, and *social expectations*, and to support the pursuit of long-term goals" (Baumeister et al., 2007, p. 351; emphasis added). Thus, despite its definition as a capacity that helps people to align their individual interest with that of others, self-control has mainly been investigated in the context of individual-level goals such as achievement or dieting (e.g., Duckworth et al., 2019). In these areas, self-control success or failure may have a distal impact on society, for instance, by burdening health insurance, but largely affects individual-level outcomes, like weight loss. In the context of the pandemic, however, individual self-control success is also relevant to other people: Failure to control one's immediate needs (e.g., for social contact) can endanger others by leading to new infections and deaths. In the same vein, other people's behavior is relevant to the individual. Therefore, outbreak mitigation success heavily depends upon others' cooperation, that is, the effortful alignment of each individual's interests with rules or regulations to support a society-level goal.

Taking a self-control perspective on outbreak mitigation, we draw upon integrative self-control theory (SCT; Kotabe & Hofmann, 2015) to inform our choice of predictor variables. SCT is a framework that describes the components of the self-control process as it unfolds when desires (e.g., to meet a friend) and higher-order goals (e.g., to comply with health-protective behavior recommendations) collide. In SCT, *desire-goal conflict* results from the concurrent activation of a *desire* for an immediate reward and a conflicting *higher-order goal.* This conflict activates *control motivation,* the aspiration to control the desire, which interacts with individuals' *control capacity* to result in varying amounts of *self-control effort.* Finally, *enactment constraints,* external barriers that limit the range of behavioral options, inhibit the enactment of either the desire or the self-control goal. In the current context, a very topical enactment constraint is reflected in government regulation of individual COVID-19-relevant behavior, for instance, via facemask-wearing mandates. Using SCT as a scaffold, we tested three components of the model as predictors of health-protective behavior and regulation support. First, we included *trait-self-control* as one of the most commonly employed indicators of habitual self-control capacity (Tangney et al., 2004). To measure *higher-order goal importance*, we assessed the extent to which individuals intentionally pursue a personal outbreak mitigation goal as indicative of an "endorsed end state that motivates instrumental psychological (cognitive, affective, and behavioral) activity" (Kotabe & Hofmann, 2015, p. 623). As an approximation of obstacles that people encounter in goal pursuit (*desires* in SCT), we included personal costs (such as inconvenience) incurred by engaging in the recommended health-protective behaviors.

Self-Control in the Context of Cooperation

While SCT has largely integrated research investigating self-control in individual-level goal striving, our conceptualization of engagement in COVID-19-relevant health-protective behavior as a cooperative self-control problem is consistent with accumulating research indicating that behavior for the benefit of the collective requires self-control (Feygina et al., 2010). For instance, (trait) self-control predicts pro-social behavior in dictator and public goods games (Kocher et al., 2017; Sheldon & Fishbach, 2011), and the same factors known to facilitate self-control choices in favor of personal long-term goals have also been found to enhance cooperative choices serving collective over individual interests (e.g., Pronin et al., 2008).

As a global health crisis, the COVID-19 pandemic necessitates cooperation (Nowak, 2006). Indeed, current theorizing conceptualizes outbreak mitigation as a social dilemma (Harring, Jagers, & Löfgren, 2021; Ling & Ho, 2020), arguing that immediate personal interests are at odds with the benefit of the collective. Therefore, self-control efforts to engage in health-protective behaviors are embedded in a social context in which people must exercise self-control in service of a collective goal (Feygina et al., 2010). Contrary to individual-level self-control problems, where one's own success in adhering to an exercise plan or diet is largely unaffected by others' actions – and vice versa –, the cooperation literature points to a *preference for reciprocity and equity* in cooperative scenarios (Falk et al., 2002; Gouldner, 1960). As Kopelman et al. (2002) put it: "If others are willing to exercise self-restraint, then so am I" (p. 145). This has also been demonstrated in the COVID-19-context, with those who cooperated in mask-wearing socially punishing uncooperative others (Betsch et al., 2020). Further, recently published work shows that social dilemma beliefs (e.g., justification of failure to engage in health-protective behaviors based on others' failure to do so) correlate with individuals' own behavior (Moussaoui et al., 2020). A host of lab and field studies substantiates this phenomenon, showing that individuals cooperate on the condition that others do as well (*conditional cooperation*; e.g., Fischbacher et al., 2001), and retaliate or attempt to coerce cooperation when they perceive others as selfish, even at a cost to themselves (Henrich et al., 2006). Thus, individuals are concerned with others' behavior both as informant to their own behavior, and as mechanisms of social enforcement in the service of collective cooperation. In the current pandemic, people's beliefs surrounding others' cooperation (i.e., their perception of others "doing their part") may therefore play a role in predicting their support for government regulations as a means of enforcing others' compliance with these measures. Therefore, we tested people's *concern for cooperation* as a construct describing concern with others' fair and equal contribution, and perception of *others' noncooperation* in outbreak mitigation as predictors of own health-protective behaviors and support for government regulations of the individual.

Building on Extant COVID-19 Research

Despite the quickly growing number of psychological COVID-19-studies, the role of self-control and cooperation in health-protective behaviors and support for government regulations is not yet well-understood. While integrative models combining self-control and cooperation have not been tested, isolated findings indicate that high trait self-control-individuals engage in health-protective behavior more frequently (Nivette et al., 2021; Wolff et al., 2020).

Contrastingly, a relatively large body of work addresses perceived threat, risk, and fear as relevant predictors of COVID-19 health-protective behaviors (e.g., general COVID-19 fear, Brouard et al., 2020; Harper et al., 2020; contamination fear, Knowles & Olatunji, 2021; risk perception, Dohle et al., 2020). Building on this work, we integrated several components of perceived threat into the present project, allowing us to speak to the impact of self-control and cooperation variables on our outcomes of interest, beyond that of the predictors established in previous work. We therefore controlled for participants' own *perceived risk* of contracting COVID-19, as well as that of close others, and their *anxiety* surrounding the outbreak as predictors of regulation support and health-protective behaviors. In addition to perceived risk and anxiety as subjective factors contributing to behavior and regulation support, we also included individuals' COVID-19 *risk group membership* as a more objective indicator of their risk status.

The Present Research

The aim of the present research was to elucidate the factors affecting two key outcomes of interest in the COVID-19 pandemic: health-protective behaviors and support for government regulation. We selected six central predictor variables based on the literatures of self-control (i.e., trait self-control, higher-order goal importance, perceived costs) and cooperation (i.e., others' noncooperation, concern for cooperation). Further, we controlled for four threat-related variables based on previous COVID-19 research (i.e., own perceived risk, close others' perceived risk, anxiety, risk group membership) as well as three sociodemographic variables (i.e., gender, age, political orientation). We tested their predictive power, first, via exploratory machine learning and, second, in OLS regression analyses to gauge effect sizes. To this end, we collected data from a Swiss sample (N = 352) during lockdown and data from a UK sample before (N = 212) and again during lockdown (n = 132). This allowed for a conceptual replication of our model across two

Western European countries and, in the UK sample, to examine change in health-protective behavior and support for government regulation as our predictors changed over time.

Analytic Approach

Though machine learning analyses are not yet widely employed in social psychology, which has focused on hypothesis testing, we join IJzerman et al. (2018) in highlighting exploratory approaches as important building blocks of scientific discovery. Indeed, as these authors explain, overfitting, that is, mistaking random noise for real effects by specifying a model that closely represents the data but does not generalize (i.e., high variance, low bias), creates false positive findings and thereby directly contributes to the replication crisis in psychology. Separating exploratory (i.e., hypothesis-generating) and confirmatory (i.e., hypothesis-testing) research is therefore a key part of the scientific process (IJzerman et al., 2018). In order to identify important variables predicting support for regulation of COVID-19-relevant individual behavior and engagement in health-protective behaviors, we therefore employed a data-driven supervised machine learning approach for variable selection (elastic net regression) in combination with an OLS regression approach, as has previously been done in studies examining large numbers of predictor variables (e.g., Bernecker et al., 2019; Zickfeld et al., 2020).

Method

Participants

In order to strengthen our results, we conducted a conceptual replication by recruiting samples from two Western European countries shortly after they had moved into lockdown, Switzerland (sampling period: March 16-19, 2020) and the UK (sampling period: April 7-14, 2020, see Figure S1 in the Supplementary Materials for a visualisation of the sampling periods in the timeline of events surrounding COVID-19). An additional sampling point before the lockdown in the UK (March 18-22, 2020) allowed us to examine correlated change in predictors and outcomes.

Regarding our choice of samples, lockdown status was an important criterion, as it allowed for change analyses through the inclusion of a second measurement point (many other Western European countries, such as Austria, France, and Germany had already moved into lockdown in mid-March). Within Western Europe, a choice of region that allowed for some comparability of political landscapes between samples, the UK's late entry into lockdown and simultaneous accessibility via online sampling made it a suitable candidate for a conceptual replication. All surveys were carried out in accordance with institutional ethics standards, and informed consent was obtained before data collection. Data and materials are openly accessible via the Open Science Framework (see Supplementary Materials).

Sample A: Switzerland

For sample A, we recruited $N = 352$ participants residing in Switzerland (83% female, $M_{age} = 26.59$ years, $SD_{age} = 9.25$ years, range = 18–77 years) via social media, flyers, online forums, mailing lists, and word-of-mouth. Participants enrolled in an undergraduate psychology degree (49%) were offered course credit as compensation. The remaining 51% were either enrolled in another undergraduate or graduate program at a university (21%), employed (16%), in technical training (1%), none of these (5%), or did not provide employment information (8%). 7% of participants indicated being risk group members as defined by the Swiss government. We excluded $n = 4$ participants who failed a one-item attention check.

Sample B: United Kingdom

Sample B was comprised of $N = 212$ Amazon M-Turk participants residing in the United Kingdom (43% female, $M_{age} = 31.31$ years, $SD_{age} = 10.40$ years, range = 18–67 years; 19% university students at T1). Out of the initial sample, 21% of participants indicated being risk group members as defined by the UK government, and $n = 132$ participants (65%) completed the survey at T2 (42% female, $M_{age} = 34.04$ years, $SD_{age} = 10.87$ years, range = 18-67 years; 18% university students). M-Turk was chosen due to the speed and accessibility of data collection, which was vital given the time-sensitive nature of changes in the pandemic context, as well as the availability of qualification filters to improve data quality. We restricted participation to workers with an approval rating over 90% (high-reputation workers have been shown to fail attention checks rarely, Peer et al., 2014) who had indicated being UK residents when creating their worker account. The study was only visible to workers fulfilling these criteria. Before running our analyses, we excluded $n = 10$ participants who failed the same one-item attention check employed in the Swiss sample. Participants were paid USD 2.50 for completing the questionnaire at T1 and USD 3.00 for T2 to reduce dropout.

Measures and Procedure

Study procedure was identical for both samples and across all time points except where indicated otherwise. Participants completed a 15-minute online questionnaire hosted on the German survey platform SoSci Survey. Measures were adapted slightly between the Swiss and UK versions of the study to accommodate differences in the COVID-19 outbreak situation between countries at the time of measurement, and to make slight improvements to the questionnaires where necessary. All changes made in the UK version are indicated in the text below. If not noted otherwise, all measures reported were developed for this study. Scales were administered in German to the Swiss sample and in English to the UK sample.

Dependent Measures

Dependent variables were assessed in the following order:

Support for Government Regulation — Participants filled in a ten-item (UK: 12-item) scale (e.g., “I support government regulation of individual behaviour to tackle the current coronavirus outbreak”; “In the current situation, it is necessary for the government to regulate behaviour that is normally up to the individual”) ranging from 1 (*do not agree at all*) to 5 (*completely agree*), with five reverse-scored items. See Table 1 for reliability information for all scales. Higher scores indicate greater support for government (vs. individual choice-based) regulation of individual health-protective behavior.

Health-Protective Behaviors — Participants indicated how often they had engaged in each of a list of behaviors despite contrary recommendations (e.g., “Despite contrary recommendations, I have: ...left the house while experiencing symptoms such as coughing and sneezing; ...attended gatherings with groups of people”) on a scale ranging from 1 (*never*) to 5 (*very often*). Though campaigns informing citizens of official behavior recommendations were highly visible, it is conceivable that not everyone was aware of all recommendations. For each behavior, participants therefore had the option of indicating that they “had been unaware,” and these responses were excluded from the analyses. This resulted in the exclusion of n = 0 observations from the Swiss data set, n = 10 observations from seven participants at T1 in the UK data set and n = 2 observations from two participants from the UK data set at T2.

As the official Swiss and UK COVID-19 public campaigns targeted somewhat different health-protective behaviors, items were slightly adapted between samples to reflect these country-specific idiosyncrasies, and item pools differed somewhat to reflect these differences. The Swiss item pool was reduced from originally 11 to six final items to create comparable scales. Items were mean-aggregated into one scale, which we reverse-scored to improve interpretability, such that higher scores indicate more frequent health-protective behavior

Self-Control Related Predictors

Trait Self-Control — Participants completed the (German) short version of the Trait Self-Control Scale (Bertrams & Dickhäuser, 2009; Tangney et al., 2004) ranging from 1 (*not at all*) to 5 (*very much*). The scale consists of 13 items, e.g. “I am good at resisting temptations”.

Higher-Order Goal Importance — To assess COVID-19 outbreak mitigation importance, we asked participants to indicate the extent of their agreement with each of five items on a scale ranging from 1 (*do not agree at all*) to 5 (*completely agree*), e.g., "It is important to me to do my part in delaying the spread of the coronavirus outbreak."

Subjective Cost — In the Swiss sample, subjective cost was measured using one item only due to survey length constraints; "To what extent do you feel restricted (e.g., in terms of financial costs, change in lifestyle, other inconvenience) by the current measures to contain the COVID-19 outbreak?" In the UK sample, participants indicated subjective costs for each of ten current behavioral constraints, such as "keeping social contact to a minimum." In both samples, participants responded on a scale ranging from 1 (*not at all*) to 10 (*very much*).

Beliefs Surrounding Others' Cooperation

Others' Noncooperation — In order to measure participants' perception of others' lack of cooperation in COVID-19 outbreak mitigation, we administered a three-item scale (e.g., "I believe that many people still disregard the current behavior recommendations.") ranging from 1 (*not at all*) to 5 (*very much*). Higher scores indicate lower perceived cooperation with others.

Concern With Cooperation — In order to assess concern with cooperation in outbreak mitigation, we administered a three-item scale (e.g., "I think it is unfair when other people do not stick to the recommendations.") ranging from 1 (*do not agree at all*) to 5 (*completely agree*).

Control Variables

Risk Group Membership — Participants were asked to indicate whether they were at increased risk of contracting a severe case of COVID-19 (1 = *no*, 2 = *yes*), based on a short description of the Swiss and UK governments' criteria.

Perceived Risk for Self and Close Others — Participants were asked how likely they believed it was that they themselves or a loved one would contract COVID-19 (1 = *very unlikely* to 6 = *very likely*). The two items were included as separate predictors, as previous research has shown that people appraise risk differently for themselves and close others (Ghassemi et al., 2020).

Anxiety — To measure anxiety concerning COVID-19, we administered a seven-item scale (e.g., "How preoccupied are you with thoughts about the current coronavirus outbreak?") ranging from 1 (*not at all*) to 6 (*very much*). The UK version includes some changes in item wording to improve the scale's internal consistency and focus on affective components (as opposed to cognitive evaluations of risk).

Gender — Participants chose the gender they identified with (1 = *female*, 2 = *male*, 3 = *non-binary*, 4 = *other*). As only one individual per sample identified as non-binary and none as "other," we excluded these response options from the analyses.

Age — Participants indicated their age in years.

Political Orientation — We measured generalized political orientation using the left-right self-placement scale (Breyer, 2015). Participants were given a short description of the terms "left" and "right" and asked to place their own political views on a scale ranging from 1 (*left*) to 11 (*right*).

Results

Analyses

We implemented a set of six structurally identical models in the Swiss sample, as well as in the UK sample at T1 (pre-lockdown) and T2 (during lockdown). Based on our assumption that health-protective behavior and regulation support would correlate to some extent, we controlled for one when predicting the other. In two additional models using the UK data, we tested associations between change in the predictor variables and change in either support for government regulation or engagement in health-protective behaviors from T1 to T2.

In a two-step procedure similar to that described in IJzerman et al. (2018) and Zickfeld et al. (2020), we first applied five-fold cross-validated elastic net regression (Zou & Hastie, 2005) to identify the most important predictors. Elastic net is a regression method that creates parsimonious, high-performance models from large numbers of correlated predictors through a technique called regularization. Regularization yields more reliable models than OLS regression does by pushing coefficient estimates toward zero, thereby reducing overfitting. As such, elastic net is particularly useful for models that might otherwise encounter multicollinearity issues due to large numbers of correlated predictors. As a combination technique derived from Lasso and Ridge regression, elastic net combines Lasso and Ridge penalty terms into one hyperparameter, α, which determines the amount of mixing between the two, and λ, which is the regularization parameter and thus determines the amount of shrinkage toward zero in the model coefficients. Coefficients which are "selected out" of the model by the elastic net algorithm are referred to as regularized coefficients in Table 2 and Table 3.

Given that the smallest sample (UK T2) included n = 132 observations, we did not split the data into training and test data sets, but instead ran five-fold cross-validation on the full dataset to ensure sufficient power. For each model, the final hyperparameters α and λ are specified in Table 2 and Table 3. In a second step, we ran multiple linear regression models on twenty-fold imputed data sets (to replace missing values) using the predictors selected by elastic net. We report the pooled estimates of these linear models. Given that MICE requires data to be MCAR or MAR, we employed Little's MCAR test for the Swiss data, which failed to reject the null hypothesis that data are missing completely at random, $\chi^2(7, 352) = 5.241$, $p = .631$. For the UK data, Wilcoxon-Mann-Whitney tests indicated a significant age difference between completers ($M = 35.04$) and dropouts ($M = 26.82$), $U = 7530$, $p < .001$. Results for all other variable comparisons are not significant. However, there were no missing age values for MICE to impute, allowing us to employ multiple imputation.

For our analyses, we employed R version 4.0.1 (R Core Team, 2020) and the following packages: *tidyverse* (Wickham et al., 2019) for data cleaning, *glmnet* (Friedman et al., 2010) and *caret* (Kuhn, 2020) for the machine learning analyses, and *mice* (van Buuren & Groothuis-Oudshoorn, 2011) for multiple imputation. All predictor and outcome variables were *z*-standardized to make effect sizes (βs) comparable across samples and outcomes.

Power and Sample Size

To avoid major changes in COVID-19-related government regulations during data collection, we defined the maximum sample size in Switzerland and in the UK at T1 as that which we would manage to collect within a time frame of four days. In the UK, this did not include an additional first data collection day to screen for technical problems and sufficient speed of data collection. At T2 in the UK, we aimed to recruit as many of our T1 participants as possible within the span of a week. The smallest effect size of interest can be difficult to define for exploratory research such as the current project. However, correlations have been found to approximate stability around $N = 160$ (Schönbrodt & Perugini, 2013) and elastic net regression generally requires fewer participants than OLS regression does (Zou & Hastie, 2005), increasing our confidence that the current study is sufficiently powered to detect extant effects. Please note that we set the alpha level to .05 in all of our analyses.

Table 1

Summary of Bivariate Correlations, Reliabilities, Means and Standard Deviations for All Variables in the Swiss and UK Samples

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	α_{UK1}	M_{UK1}	SD_{UK1}
1. Support		.37	.21	.52	-.25	.35	.43	.04	.12	.11	.20	.15	-.03	.88	**3.87**	0.69
2. Health-protective behaviors	.24		.19	.36	-.42	.18	.27	-.09	.12	.03	.05	.29	-.12	.78	4.08	0.75
3. Trait-SC[a]	-.02	.25		.11	-.19	.01	.09	.05	-.11	-.12	-.10	.13	.21	.84	3.16	0.70
4. Importance	.64	.35	.11		-.22	.29	.41	.01	.23	.14	.43	.21	-.26	0.81	**4.11**	0.75
5. Cost	-.22	-.18	-.11	-.25		-.10	-.08	.10	.07	.16	.14	-.17	.07	0.88	4.91	2.23
6. Others' noncooperation	.48	.11	-.05	.31	-.10		.45	.00	.19	.24	.21	-.04	-.12	0.73	**3.82**	0.82
7. Concern with cooperation	.46	.27	.10	.49	-.10	.47		.11	.12	.01	.26	.09	-.10	.70	**4.17**	0.77
8. Risk group	.08	-.02	.09	.11	.01	.08	.13		.03	.00	.23	.23	.06	–[b]	**1.21**	0.41
9. Risk self	.12	-.02	-.04	.18	.01	.16	.06	.01		.70	.32	.11	-.16	–[b]	3.69	1.48
10. Risk other	.13	.02	-.04	.23	.03	.07	.08	.01	.64		.26	-.01	-.20	–[b]	4.29	1.47
11. Anxiety	.26	.07	-.10	.40	.09	.25	.30	.23	.26	.22		.13	-.13	0.90	**4.14**	1.15
12. Age	.11	.13	.07	.21	-.04	-.06	.06	.21	-.12	-.09	.15		.06	–[b]	**31.31**	10.40
13. Political orient.	-.08	-.01	.06	-.12	-.08	-.01	.03	-.04	-.08	-.10	-.04	-.03		–[b]	**5.01**	2.49
α_{CH}	.85	.63	.83	.85	–[b]	.81	.78	–[b]	–[b]	–[b]	.71	–[b]	–[b]			
M_{CH}	3.51	**4.02**	**3.31**	3.80	**6.68**	3.60	3.95	1.07	3.76	4.29	3.18	26.58	3.73			
SD_{CH}	0.74	0.61	0.61	0.82	2.09	0.91	0.94	0.26	1.26	1.16	0.77	9.24	1.83			
Theoretical range	1-5	1-5	1-5	1-5	1-10	1-5	1-5	1; 2	1-6	1-6	1-6	1-10				

[a]SC = self-control. [b]one-item measure.

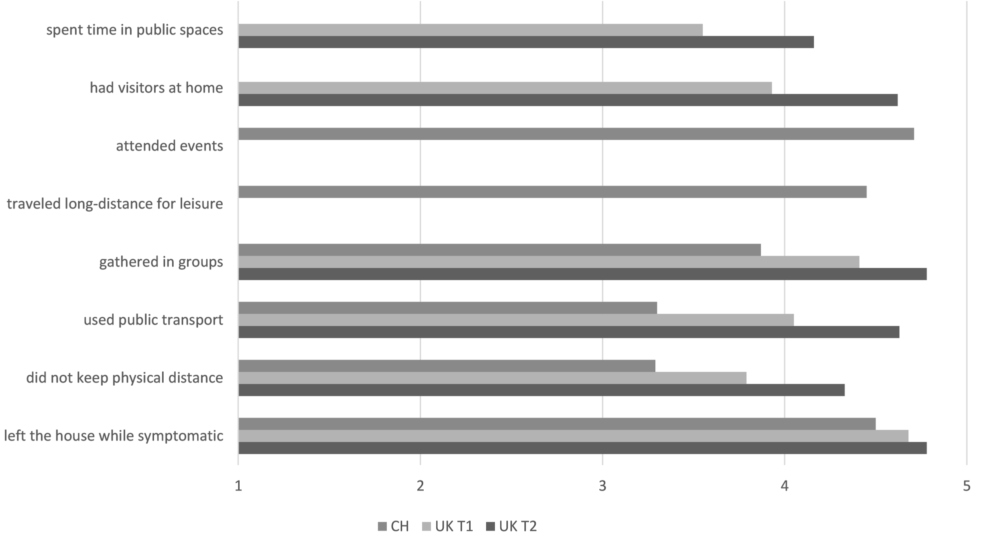
Note. Bivariate correlations for the UK sample at T1 (n = 212) are presented above, those for the Swiss sample (n = 352) below the diagonal. CH = Switzerland; UK1 = UK pre-lockdown. The theoretical range for both samples is indicated in the horizontal column. Non-significant correlations (p > .05) have been faded. Mean differences were tested using independent t-tests for normally distributed variables and Wilcoxon rank sum tests for non-normally distributed variables. If means significantly differ, the higher mean is bolded.

Descriptive Statistics

Table 1 summarizes descriptive statistics and zero-order correlations for the main study variables in both samples. Average support for government regulation was relatively high in both samples (M_{CH} = 3.51, SD_{CH} = 0.74; M_{UK1} = 3.87, SD_{UK} = 0.69). Frequency of health-protective behaviors was moderate to high in both samples (M_{CH} = 4.02, SD_{CH} = 0.61; M_{UK} = 4.08, SD_{UK} = 0.75), and is summarized by health-protective behavior type in Figure 1.

Figure 1

Mean Engagement in Health-Protective Behaviors by Type



Note. 1 = very often; 5 = never. Higher scores indicate more frequent health-protective behavior. Behaviors are shown by behavior type and sample. CH = Switzerland; UK T1 = UK pre-lockdown; UK T2 = UK during lockdown.

Zero-Order Correlations

Engagement in health-protective behaviors was more frequently reported by those perceiving the target behaviors to be less personally costly. Participants reporting greater personal importance of COVID-19 outbreak mitigation, higher trait self-control, and higher concern with cooperation, as well as older participants, also reported more frequent health-protective behaviors. Associations with perceived threat (risk group membership, own and close others' risk, anxiety) were small and non-significant.

In both samples, support for government regulation was positively associated with own engagement in health-protective behaviors, importance of the higher-order mitigation goal, perception of others as noncooperative, concern with cooperation, and anxiety regarding the outbreak. Conversely, those who perceived health-protective behaviors to be more personally costly were less supportive of government regulation. UK but not Swiss participants higher in trait self-control were more supportive of government regulation. Notably, political orientation was not significantly associated with support for government regulation.

Predicting Health-Protective Behaviors

Cross-Sectional Analyses

First, we tested whether self-control variables and beliefs surrounding others' cooperation should be included in the best model predicting health-protective behaviors, controlling for threat-related and sociodemographic variables. In order to tune the model's hyperparameters, we again applied 5-fold cross-validated elastic net regression to our list of variables (see Table 2 for hyperparameter values and results). Results of elastic net analyses indicate that across samples and time points, health-protective behavior is predicted by support for government regulation, importance, subjective costs, and concern with cooperation. In the Swiss sample and in the UK sample at T1, trait self-control additionally contributed predictive value. Finally, control variables were inconsistently selected across samples. These models accounted for 22 to 33% of the variance.

We then ran linear regression analyses using the predictors identified by elastic net. In the Swiss sample and the UK sample at T2, health-protective behavior was positively and significantly associated with importance of COVID-19 outbreak mitigation and concern with cooperation. Those scoring relatively higher on trait self-control reported more frequent health-protective behavior, though this association only reached significance in the Swiss sample. Interestingly, perceived personal cost of engaging in health-protective behaviors was only predictive of health-protective behavior in the UK sample, and returned a small non-significant effect in the Swiss sample. Regarding perceived threat components, risk group membership significantly predicted health-protective behavior in the UK pre-lockdown, and own perceived risk was significantly associated with health-protective behaviors in the Swiss sample.

Table 2

Linear Regression Models Predicting Engagement in Health-Protective Behaviors Cross-Sectionally and Across Time in Switzerland and the UK

	Switzerland				UK T1				UK T2				UK Change[a]			
Variable	**βen**	**βlm**	**95% CI**	***p***	**βen**	**βlm**	**95% CI**	***p***	**βen**	**βlm**	**95% CI**	***p***	**βen**	**βlm**	**95% CI**	***p***
Intercept	0.00	-0.01	[-0.12, 0.09]	.795	-0.18	**-0.30**	[-0.58, -0.03]	.031	0.13	**0.10**	[0.01, 0.20]	.040	0.00	0.00	[-0.09, 0.09]	1.00
Support	0.06	0.05	[-0.09, 0.19]	.473	0.16	**0.18**	[0.04, 0.33]	.015	0.03	0.08	[-0.06, 0.22]	.251	0.11	0.11	[-0.05, 0.27]	.177
Self-control																
Trait SC[b]	0.16	**0.21**	[0.11, 0.31]	.000	0.01	0.05	[-0.08, 0.17]	.451				.				
Importance	0.24	**0.23**	[0.10, 0.37]	.001	0.10	0.10	[-0.05, 0.25]	.207	0.13	**0.14**	[0.02, 0.26]	.021	0.18	**0.20**	[0.05, 0.34]	.008
Cost	-0.04	-0.07	[-0.18, 0.03]	.161	-0.24	**-0.26**	[-0.39, -0.13]	.000	-0.07	**-0.11**	[-0.22, -0.01]	.043	-0.06	-0.07	[-0.18, 0.04]	.231
Beliefs surrounding others' cooperation																
Others' noncooperation			.				.				.				.	
Concern with cooperation	0.10	0.11	[-0.01, 0.22]	.070	0.07	0.11	[-0.03, 0.24]	.133	0.14	**0.19**	[0.06, 0.31]	.004	0.13	**0.14**	[0.02, 0.26]	.029
Perceived threat																
Risk group[c]			.		0.27	**0.42**	[-0.72, -0.11]	.009			.				.	
Perceived risk self	-0.04	-0.07	[-0.17, 0.03]	.186			.				.				.	
Perceived risk other			.				.		0.03	0.06	[-0.05, 0.16]	.285			.	
Anxiety			.				.				.				.	
Demographics																
Gender[d]	0.03	0.17	[-0.09, 0.43]	.202			.				.				.	
Age			.		0.06	0.11	[-0.01, 0.24]	.078			.				.	
Political orientation					-0.03	-0.08	[-0.20, 0.05]	.243								
R^2			.22				.29				.33				.20	
λ			.071				.074				.054				.073	
α			.55				.55				1.00				.10	

[a]Change model predicts change in noncompliance from change in predictor variables from T1 to T2. The model includes only those predictors which were not regularized in either the T1 or the T2 model and excludes trait variables. [b]SC = self-control. [c]1 = no; 2 = yes. [d]1 = female, 2 = male.

Note. Bolded regression coefficients are significant at $p < .05$. Regularized coefficients are denoted as ".". βen = Standardized regression coefficients of 5-fold cross-validated multiple regression model using elastic net regression. Blm = Standardized regression coefficients of linear multiple regression model. CI = confidence interval.

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Change Analyses

In a last step, we employed elastic net to identify the predictors that independently account for variance in change in health-protective behavior in the UK sample from T1 to T2. According to elastic net, the best model at the lowest cross-validated error includes change in support, change in importance, change in subjective costs, and change in concern with cooperation. The model accounted for 20% of the variance in change in health-protective behaviors. A linear regression model containing the variables chosen by elastic net indicated that those who came to view outbreak mitigation as more important and those who came to be more concerned with others' cooperation also reported an increase in health-protective behaviors from T1 to T2.

In sum, these results suggest that individuals are more likely to engage in health-protective behaviors when they report high trait self-control (only significant in Switzerland), consider COVID-19 outbreak mitigation relatively more important, and are concerned with cooperation. Notably, prediction of health-protective behaviors in the UK changed from T1 (pre-lockdown) to T2 (during lockdown): Before lockdown was instigated, support for government regulations, personal cost of the behaviors, and risk group membership were most predictive of how frequently individuals engaged in health-protective behaviors. With lockdown in place, the predictive model more closely resembled the Swiss model, such that goal importance and beliefs surrounding others' cooperation accounted for the largest proportion of the variance in individuals' own health-protective behaviors.

Predicting Support for Government Regulation

Cross-Sectional Analyses

Results of elastic net and linear regression models predicting support for government regulation are summarized in Table 3. Based on elastic net, the following predictors contributed to the prediction of support for government regulation across samples and measurement points: engagement in health-protective behaviors, trait self-control, higher-order goal importance, subjective costs associated with the behavior, perception of others' noncooperation, concern with cooperation, own perceived risk of contracting COVID-19, and age. In the Swiss sample and in the UK sample at T1, anxiety, gender, and political orientation also contributed predictive value. Additionally, close others' perceived risk of COVID-19 was identified as a predictor in the UK sample at T1. Overall, the Swiss and UK models explained between 41% and 49% of the variance.

Table 3

Linear Regression Models Predicting Support for Government Regulation Cross-Sectionally and Across Time in Switzerland and the UK

	Switzerland				UK T1				UK T2				UK Change[a]			
Variable	**βen**	**βlm**	**95% CI**	***p***	**βen**	**βlm**	**95% CI**	***p***	**βen**	**βlm**	**95% CI**	***p***	**βen**	**βlm**	**95% CI**	***p***
Intercept	0.04	0.05	[-0.03, 0.14]	.204	0.27	**0.35**	[0.05, 0.66]	.025	0.04	0.07	[-0.20, 0.34]	.620	0.00	0.00	[-0.10, 0.10]	1.000
Health-protective behavior	0.04	0.04	[-0.04, 0.13]	.349	0.17	**0.18**	[0.04, 0.32]	.013	0.09	0.08	[-0.18, 0.35]	.540	0.11	0.12	[-0.07, 0.30]	.227
Self-control																
Trait SC[b]	-0.08	**-0.09**	[-0.17, -0.01]	.023	0.13	**0.13**	[0.01, 0.26]	.034	0.10	0.13	[0.00, 0.27]	.061				
Importance	0.48	**0.49**	[0.38, 0.59]	.000	0.32	**0.38**	[0.22, 0.53]	.000	0.22	**0.27**	[0.12, 0.43]	.001	0.23	**0.25**	[0.09, 0.40]	.002
Cost	-0.06	-0.06	[-0.14, 0.02]	.157	-0.05	-0.05	[-0.18, 0.09]	.515	-0.09	-0.10	[-0.24, 0.04]	.180	-0.09	-0.10	[-0.22, 0.01]	.087
Beliefs surrounding others' cooperation																
Others' noncooperation	0.29	**0.30**	[0.21, 0.39]	.000	0.15	**0.15**	[0.002, 0.28]	.048	0.09	**0.14**	[0.01, 0.27]	.041	0.06	0.06	[-0.05, 0.18]	.273
Concern with cooperation	0.05	0.06	[-0.03, 0.16]	.186	0.14	0.14	[0.00, 0.29]	.054	0.26	**0.28**	[0.12, 0.44]	.001	0.18	**0.19**	[0.06, 0.32]	.004
Perceived threat																
Risk group[c]			.		0.15	0.20	[-0.11, 0.51]	.201	0.00	0.08	[-0.22, 0.38]	.605				
Perceived risk self	0.02	0.04	[-0.04, 0.12]	.186	-0.05	-0.13	[-0.31, 0.05]	.159	-0.01	-0.05	[-0.18, 0.08]	.445	-0.11	**-0.13**	[-0.24, -0.01}	.028
Perceived risk other			.		0.08	0.16	[-0.02, 0.34]	.077			.					
Anxiety	-0.07	**-0.11**	[-0.20, -0.02]	.020	-0.01	-0.06	[-0.20, 0.09]	.445			.					
Demographics																
Gender[d]	-0.26	**-0.32**	[-0.52, -0.11]	.003	-0.24	**-0.30**	[-0.55, -0.06]	.017			.				.	
Age	0.04	0.06	[-0.02, 0.14]	.130	0.01	0.01	[-0.12, 0.14]	.883	0.04	0.06	[-0.07, 0.19]	.358				
Political orientation	-0.01	-0.02	[-0.10, 0.05]	.551	0.06	0.10	[-0.03, 0.22]	.123			.				.	
R^2			.49				.42				.41				.29	
λ			.011				.100				.090				.073	
α			1				.10				.55				.55	

[a]Change model predicts change in support for government regulation from change in predictor variables from T1 to T2. The model includes only those predictors which were not regularized in either the T1 or the T2 model and excludes trait variables. [b]SC = self-control. [c]1 = no, 2 = yes. [d]1 = female, 2 = male.

Note. Bolded regression coefficients are significant at $p < .05$. Regularized coefficients are denoted as ".". βen = Standardized regression coefficients of 5-fold cross-validated multiple regression model using elastic net regression. βlm=Standardized regression coefficients of multiple regression model using predictors selected by elastic net. CI = confidence interval.

We then continued to run linear regression models with the variables identified by elastic net. In both samples and across survey waves, results show that those who report greater importance of COVID-19 outbreak mitigation and who perceive greater noncooperation with others are also more supportive of government regulation. Interestingly, individuals' perceived costs of the targeted behaviors, perceived risk (of self and close others), age, as well as political orientation consistently did not emerge as strong predictors of support for government regulation. Finally, the effect of gender is not consistent: Men are on average less supportive of government regulation than women in Switzerland and in the UK at T1 only.

Change Analyses

In order to tap processes of change, we also calculated associations between changes in predictor variables from T1 to T2 and change in support for government regulation in the UK sample. Change in support was best predicted by change in health-protective behaviors, change in goal importance, change in subjective costs, perception of others' noncooperation, change in concern with cooperation, and change in own perceived risk of contracting COVID-19. The best model at the lowest cross-validated error chosen by elastic net accounted for 29% of the variance in change in support for government regulation.

Again, we ran a linear regression model using the variables identified by elastic net. Results show that those who experienced an increase in goal importance, who became more concerned with cooperation, and who came to see themselves as less likely to contract COVID-19 also reported increased support for government regulation from T1 to T2.

In sum, these results suggest that components of self-control account for a relatively large part of the variance in the extent to which individuals support government regulation. These findings were mostly consistent across samples. Particularly, personal importance of COVID-19 outbreak mitigation and beliefs surrounding others' cooperation seem to matter, both in terms of perceiving others as not doing their part (low cooperation) and being concerned with equal cooperation in everyone.

Discussion

Which factors relate to people's health-protective behaviors and their support for government regulation of individuals' COVID-relevant behaviors? Using a combination of exploratory machine learning and OLS regression analyses, the present research found evidence for a role of self-control components and beliefs surrounding others' cooperation in health-protective behavior engagement and regulation support. This aligns with our conceptualization of the current pandemic as a cooperative problem requiring self-control, as well as with extant findings from the cooperation literature (e.g., Falk et al., 2002; Gouldner, 1960). At present, research at the intersection of these two streams of literature is scarce – SCT (Kotabe & Hofmann, 2015), for instance, does not include a cooperative component. For both theory and practice, our results underscore the importance of contextualizing self-control in the social environment and integrating cooperative components that intervene in self-control processes in service of a collective society-level goal. In the Swiss sample, we replicate extant work (Nivette et al., 2021; Wolff et al., 2020) showing that those higher in trait self-control are more likely to engage in health-protective behaviors (with one study identifying boredom proneness as a mediator, see Boylan et al., 2021). However, these findings do not replicate in the UK sample despite relatively similar means and standard deviations. Additionally, results for government support were mixed (i.e., positive predictor in Switzerland and a negative association in the UK). Our findings, therefore, cannot speak to the role of trait self-control in support for external regulation.

As we discuss these findings, we would like to highlight two patterns of results in particular. First, our data identify personal importance of COVID-19 outbreak mitigation as the largest predictor of both health-protective behavior and government regulation support across samples and time points. Classical motivation research conceptualizes commitment, which shares facets with our measure of importance, as the necessary first stage of the goal striving process (Brunstein, 1993; see also Rubicon model of action phases, Gollwitzer, 1990). Crossing the “Rubicon” of goal setting then instigates volitional processes requiring self-control effort for goal attainment. According to SCT, higher-order goal importance is a key component driving control motivation and aligning behavior with the targeted goal state (self-control success). This is also reflected in our findings, which show that higher-order goal importance appears to be a strong predictor of behavior in line with a society-level goal (health-protective behavior) and support for external regulations of goal-directed behavior.

Second, concern with cooperation (but not perception of others’ cooperation) was positively related to people’s own health-protective behaviors. That is, own self-control success in contributing to outbreak mitigation relates to a greater need for others to do their part as well. Further, beliefs surrounding others’ cooperation (both perceiving others as uncooperative and higher concern with cooperation) were related to greater support for government regulation. Based on this concern with others’ behavior, individuals may leverage government regulation as a behavioral *enactment constraint* to increase cooperation with others and, as a result, improve the odds of successful outbreak mitigation. Given that both of these variables reflect individuals’ *beliefs* surrounding others’ behavior (but not necessarily others’ actual behavior), our data suggest that accurately informing the public and avoiding possible misperceptions of others’ engagement in health-protective behaviors may play a part in shaping citizens’ support for government regulations. This points toward an interesting social component in collective goal pursuit, highlighting that those who are successful in self-control expect the same from others and are also more supportive of external, government-imposed regulations of relevant individual behavior.

Beyond these findings, we would like to emphasize that the effects of self-control and cooperation emerged above and beyond the effects of variables such as personal cost of engaging in health-protective behaviors, perceived risk and anxiety, and political orientation. If future work replicates these findings, one might cautiously conclude that, in a time of crisis, people – including decision-makers – are indeed able to "rise above themselves" and lay aside political differences and personal costs for collective goal attainment.

Strengths, Limitations, and Implications

This research took place as the COVID-19 outbreak was unfolding, at a time when uncertainty was high and lockdown measures were just being introduced, speaking to the ecological validity of our study and increasing our confidence in the reliability of these results. We were also able to provide evidence that the strongest predictors presented here conceptually replicate across two countries, despite some contextual differences between Switzerland and the UK (e.g., economic situation, political landscape, outbreak stage). This speaks to the generalizability of our findings, though of course future research – based on Western *and* non-WEIRD populations (Henrich et al., 2010) – is needed to substantiate these first results. While this study aimed to investigate general predictors of health-protective behavior and regulation support and not to delineate differences between countries, such comparisons may be the objective of future research. Our analytic approach represents another strength of the current study. We employed a machine learning approach for variable selection, which – unlike OLS regression – allows us to isolate those variables that *independently* contribute predictive value, above and beyond the effects of previously identified predictors, such as perceived risk and anxiety.

Naturally, there are limitations to this research that we would like to address. First, the reported studies use correlational data and therefore do not allow us to draw conclusions regarding causal processes, despite some indication of parallel change across time in the UK data. Ideally, this research would be based on a set of validated scales. Unfortunately, such scales had not been published at the onset of data collection, and we therefore developed our own scales for many of the predictor variables, which generally show good internal reliability across samples. There were also slight differences in the operationalization of constructs between samples to accommodate differences in how public health strategies were communicated, and some changes in scale items between surveys, both to accommodate idiosyncrasies between countries and for scale improvements. It is possible that these differences, in particular regarding associations with anxiety, may underlie some of the differential results between samples. However, differences in country coefficients do not seem to systematically coincide with differences in scales.

It is also conceivable that UK participants had been exposed to transnational institutions' announcements regarding COVID-19 before their own government issued behavioral recommendations, and we did not specify a timeframe for health-protective behaviors to be reported on. While instructions asked participants to specifically refer to behavior in line with recommendations by their government's public health agency, it is conceivable that participants reported on some behaviors outside of this timeframe.

Avenues for Practical Implementation

At the time of writing, COVID-19 has claimed over 1.5 million lives (WHO, 2020) and many more livelihoods. Given the urgency of the situation, we would like to outline a few possible routes for intervention based on the findings presented in this article, though, of course, these are preliminary and pend substantiation. First, our research highlights the importance of individuals' personal appraisal of the outbreak. Personal higher-order goal importance was the largest predictor of both individual and government-imposed regulation of COVID-19-relevant behavior, beyond subjective cost associated with the recommended behaviors. This is for further research to substantiate, although we suspect that targeting subjective importance may be a promising route for intervention. SCT includes higher-order goal importance as a main prerequisite for self-control effort to initiate – if someone does not strive to resist the temptation to meet with a group of friends or take public transport, the self-control process does not unfold and the desire is simply enacted. This theoretical framework highlights possible paths for intervention, two of which we will briefly outline here. First, outbreak mitigation has to appear important for individuals to commit to action. Campaigns should therefore focus on the importance of individual behavior, highlighting that each person's health-protective behavior constitutes a necessary piece of the puzzle. Second, campaign developers might consider integrating self-control strategies which have been successful in a variety of applied contexts, such as planning (e.g., implementation intentions), automatization (e.g., counteractive control), cognitive change (e.g., construal level), and effortful inhibition (see Moskowitz & Grant, 2009, for more detail on goal psychology, and Nielsen, 2017, for an overview of self-control strategies in the applied context).

Further, we found that beliefs surrounding others' cooperation inform people's own attitudes and actions. People who are more anxious regarding outbreak mitigation as more important, and those who more frequently engage in health-protective behaviors themselves express a higher concern for cooperation with others, which may for instance be communicated to social partners. We therefore consider it especially promising for future research and interventions to target social networks in an effort to improve public support for government regulation and increase engagement in health-protective behaviors. As suggested by Van Bavel et al. (2020), well-connected "key" individuals may be particularly effective at spreading desirable attitudes and behaviors throughout their social networks, initiating a trickle-down effect of support for regulation and engagement in health-protective behaviors. Of course, the pattern of results presented in this article, as well as possible generalization across contexts, remain to be systematically tested by future work. We therefore extend an invitation for replication of these findings, especially across different samples, testing hypotheses based on the set of predictors identified here.

Implications for Self-Control Research

To date, the self-control literature has largely focused on individual-level goal striving (e.g., dieting) while neglecting the social context into which self-control can be embedded. While SCT (Kotabe & Hofmann, 2015) does include enactment constraints as one such contextual influence, associated theorizing and empirical work are comparatively less well-developed. The current work aimed to extend self-control research by examining individuals' efforts to behave in line with a collective rather than individual goal, namely the goal to mitigate the further spread of COVID-19. Through the employed machine learning variable selection technique, the current project has provided the basis for the extension of existing theories by identifying additional self-control components to be included in the case of goals that can only be achieved through collective efforts. Of SCT's components, higher-order goal importance transferred most strongly to the pursuit of a collective goal, and beliefs surrounding others' cooperation emerged as novel predictors. The significance of goal-opposing desires (here: perceived cost) and habitual self-control capacity (here: trait self-control) is less clear and should be tested by future work, along with some of the model components, such as cognitive control capacity and control motivation, which we did not include here due to feasibility constraints.

Given the exploratory nature of this work and to avoid overfitting, we treated predictors as additive effects rather than speculating on functional connections between predictors. It is now for future confirmatory experimental work to test causal connections and temporal sequences between predictor variables. In contrast to SCT's depiction of self-control processes over the course of a single situation, the present project operated on a relatively high level of abstraction. Future research might therefore employ intensive longitudinal methods, such as experience sampling, to capture intra-individual self-control processes that play a role in the pursuit of collective goals. Research focusing on the specific aspects of collective goal pursuit may bring about valuable insights for the current pandemic, as well as other important collective goals, such as climate change mitigation.

Conclusion

Extending previous work, this research provides support for an important role of self-control and beliefs surrounding others' cooperation in shaping engagement in health-protective behaviors and support for government regulation, beyond previously identified predictors. Besides higher-order goal importance, others' perceived noncooperation and individuals' concern for others' cooperation were predictors of health-protective behavior and government regulation support in both Switzerland and the UK. We therefore suggest that it may be worthwhile to expand current models of self-control, integrating the cooperative social context in which it unfolds. Future experimental and intensive longitudinal work may build on the current research to identify functional associations between model components. Beyond COVID-19, our findings may be relevant to future research on domains such as climate change, which similarly require collective action for successful implementation.

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Data Availability: For this article, a dataset is freely available (Kukowski, Bernecker, & Brandstätter, 2020).

Supplementary Materials

The Supplementary Materials contain the data, study materials (i.e., the questionnaires used in the study) and code for this study (for access see Index of Supplementary Materials below).

Index of Supplementary Materials

Kukowski, C., Bernecker, K., & Brandstätter, V. (2020). *Supplementary materials to "Self-control and beliefs surrounding others' cooperation predict own health-protective behaviors and support for COVID-19 government regulations: Evidence from two European countries"* [Data, materials, and code]. OSF. https://osf.io/gkcn3

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