Study title: Effect of communication style on motivation to follow versus defy social distancing guidelines during the COVID 19 pandemic

Study background

To slow the transmission of COVID-19, governments around the world are asking their citizens to participate in social distancing, that is, to stay at home as much as possible. In most countries, individuals have some choice over whether or not they follow recommendations for social distancing. Thus, understanding how to best motivate social distancing has become a public health priority. In collaboration with the Psychological Science Accelerator, this study tests, in a confirmatory manner, whether communication styles can impact people's motivation to participate in social distancing in a large-scale cross-national experiment. Specifically, this research is informed by self-determination theory (SDT), which states that communication style affects motivation: messages that inspire reflective choices (*autonomy supportive*) will promote more sustainable motivation compared to those that are restrictive and forceful (*controlling*). We expect the autonomy-supportive message will a) increase internalization, or autonomous motivation, for social distancing, b) reduce feelings of defiance in response to those messages, and c) increase behavioral intentions to socially distance, relative to a controlling message that pressures people to change using shame, guilt, and demands. Further, we expect that the controlling message may backfire and a) lower internalization for social distancing, b) increase feelings of defiance and c) reduce behavioral intentions to socially distance, compared to those who receive no message. We also expect autonomous motivation to mediate the effect of condition on defiance and behavioral intentions. We will discuss the boundaries of this methodology in making inferences about *actual* social distancing behavior, but also outline how

public officials, health professionals, journalists, and others can communicate about solving this and future public health crises in ways that motivate people more effectively.

Confirmatory Hypotheses

Two overarching confirmatory hypotheses will be tested.

Hypothesis 1. Compared to the controlling message condition, those in the no-message condition and autonomy-supportive message condition will display

1a. Higher levels of internalization of, or autonomous motivation for, social distancing

1b. Lower feelings of defiance about social distancing

1c. Higher immediate (1 week) and delayed (6 month) behavioral intentions to socially distance

Hypotheses 2. Autonomous motivation for social distancing will mediate the effects of message condition on defiance and behavioral intentions. Specifically, the reason the autonomy-supportive message will lower feelings of defiance and lead to greater intentions to socially distance relative to the controlling message will be because it increases people's autonomous motivation for social distancing. We expect the opposite pattern for controlling messages relative to the neutral condition: autonomous motivation will be lower after reading the controlling message, which in turn will predict greater defiance and lower intentions to socially distance.

Methods

Participants and Statistical Power Considerations

The sample size will be determined in practice, by recruiting as many collaborators as possible around the world through the Psychological Science Accelerator (PSA) and through the

self-determination (SDT) listserv[1]. From the initial call for collaborators, the PSA has identified 194 interested labs from 55 countries, and from the SDT listserv 30 labs from 19 countries signed on, with labs agreeing to collect at least 75 participants. Together, these two groups include labs in 57 countries. The estimated total sample size from these labs is expected to be ~30,000. Of these, 4,050 participants will recruited through semi-representative paneling (based on sex, age, and sometimes ethinicity) from the following countries: Egypt, Kenya, Nigeria, South Africa, Mexico, United States, Austria, Romania, Russia, Sweden, Switzerland, United Kingdom, China, Japan, and South Korea (270 participants per region).

For .90 power to detect the small to medium effects observed in Legault and colleagues (2011), a sample would need 441 participants. The size of the entire sample should provide more than adequate power to detect similarly sized effects. Furthermore, our planned semi-representative samples will have adequate power to detect this effect size and many individual countries will likely have well-powered samples based on this power estimate. Analyses will not be conducted until data collection is complete (June 1, 2020).

Procedure

Participants will complete the study online. Our study will be bundled with one other study in the same questionnaire, and studies will be presented in a random order (order will be recorded to examine for possible carry-over effects). All study materials will be translated to the languages where the labs recruit their participants. The PSA has identified translators for every language represented in our pool of collaborators. The study materials will be forward and

[1] Labs from the SDT listserv were invited to expedite the start of data collection, as we expected more people to engage in social distancing and see the value of it (i.e., already have high "buy in") as time went on.

backward translated by two translators. Once the translators agree on a translation, the materials will be sent to the labs using that particular language for any further cultural adjustment to their local context (e.g., there may be differences between European and Brazillian Portugese).

All data collection teams followed the ethical guidelines of their institutions. Functionally, this meant that each team either 1) received ethical approval from their local Institutional Review Board (IRB), 2) gained approval through Ashland University's IRB (where the PSA is based) or Illinois Institute of Technology's IRB (for the SDT labs) or 3) did not require local IRB approval for data collection.

First, participants will answer pre-manipulation questions to report the extent to which they are currently following social distancing recommendations. Following this, participants will be randomized into one of the three conditions: autonomy-supportive messages, controlling messages, or no message, the latter which represents a neutral comparison. The two message conditions will receive comparable information about social distancing, including what it is, why it is important, and a few recommendations on what to do. However, the autonomy-supportive and controlling messages contain theory-based motivational elements shown in prior manipulations to impact motivation (Legault et al., 2011; Vansteenkiste et al., 2004). Namely, those in the autonomy-supportive message condition will read an article that provides: a) perspective taking (e.g., acknowledging how difficult it is to alter one's daily life), b) a meaningful rationale (e.g., explaining why social distancing is effective and important for slowing transmission), and c) a sense of choice over one's own behavior within the practical constraints of the situation. In comparison, those in the controlling message condition will read an article that pairs information with coercion, shame, and pressure, including the use of

demanding language like ‘should’ and ‘must’. Finally, those in the neutral condition will receive no message, which will function as a baseline with which we can make comparisons.

After reading the article, the participants will fill out a short questionnaire assessing their subsequent motivation and intentions to follow social distancing recommendations. Most participants will have been exposed to a high volume of messages related to social distancing before enrolling in our study. As such, it is reasonable to consider the possibility that that impact of each new message, including those messages participants are randomized to receive in this study, is likely diluted. To partially address this concern, subsequent motivation and intentions will be asked as a function of the assigned condition. Specifically, those reading autonomy-supportive and controlling messages will respond to outcomes in terms of “social distancing recommendations in this article”, and those in the neutral (no message) condition will respond to outcomes in terms of “social distancing recommendations” (not tied to an article).

Measures

Composite variables will be created for all multi-item measures (with items being reverse-scored when appropriate) by calculating the mean of items assuming the items reach an acceptable level of reliability ($\alpha < .70$). If items show less than acceptable reliability on any composite variable, we will accept all items in the scale with corrected item-total correlations > .3.

Pre-Manipulation Measures

Adherence to Social Distancing . Participants will respond to questions assessing the degree to which they are “currently following the recommendation to stay at home as much as possible”, and to avoid specific situations: “gatherings with friends”, “crowded areas”, and

"non-essential shopping trips". Participants will rate their responses on a 7-point scale (1 = *not at all*, 7 = *completely*). This will be used for quality check analyses.

Post-Manipulation Measures

Perceived Autonomy Support (Manipulation Check). Three items will assess the effectiveness of the manipulation to make participants feel a sense of autonomy, or choice over their behavior, versus feeling pressured or coerced. Those items were adapted from the Health Care Climate Questionnaire (Williams et al., 1999; Kasser & Ryan, 1999), which was used to assess the degree to which people perceive their healthcare provider is autonomy supportive. The participants will respond to the stem "I feel that social distancing recommendations [in this article (shown for those in the autonomy-supportive and controlling message conditions)]" with three items: "provided the readers some choices and options", "told people how to run their life", and "made an effort to acknowledge the readers' point of view before suggesting new ways to do things". These items will be presented after outcomes in order to make the manipulation less obvious to participants.

Autonomous Motivation (Mediator). Participants will respond to the stem "I plan to follow social distancing recommendations [in this article] because:" with four autonomous and four controlled reasons for doing so. Example items assessing controlled motivation are "because others would disapprove of me if I did not" and "I would feel guilty if I did not follow the recommendation", and example items assessing autonomous motivation include "the recommendations reflect my values" and "it is personally important to me to follow them". These items, paired with a scale from 1 = *strongly disagree* to 7 = *strongly agree,* were adapted from a previous measure of Perceived Locus of Causality (Ryan & Connell, 1989; Soenens et al.,

2009) so that the motivations are appropriate in the context of social distancing and the contents of the article. Controlled motivation items will be reverse-coded and mean aggregated with autonomous motivation items.

Defiance (Outcome). Feelings of defiance will be measured with four items from Vansteenkiste and colleagues (2014). Items measured feelings of defiance about "recommendations [in this article] on social distancing, or staying home as much as possible" rated on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*). The items are "make me feel like I want to do exactly the opposite", " feel aggravating", "feel like an intrusion", "make me want to resist attempts to influence me".

Behavioral Intentions (Outcome). Behavioral intentions items were adapted from McGarrity & Huebner (2014) to assess participants' short-term and long-term intentions to follow social distancing recommendations [in the article]. Specifically, we will measure short-term intentions within the next week and long-term intentions over the next 6 months (as experts have suggested the pandemic may endure that long or even longer; Kayyem, 2020; Yong, 2020).

Within the next week. Participants will be asked how likely they are to follow recommendations [in this article] to participate in social distancing, or staying at home as much as possible, in general. They will also be asked how likely they are to avoid gatherings with friends, going in crowded areas, or taking non-essential shopping trips. The response scale ranges from 1 = *extremely unlikely* to 7 = *extremely likely*.

Over the next 6 months. Participants will be asked, "assuming the guidelines [described in the article] last for 6 months, how long do you intend on avoiding the following in-person

places and activities" including restaurants, gatherings with friends, traveling, going in crowded areas, non-essential shopping trips, getting a haircut or going to the salon, and going to the gym or fitness classes. These items will be rated in one-week increments using a dropdown menu from 0 to 24 weeks. An average score will be calculated for the activities that show adequate internal consistency.

Country-Level Moderator: Social Distancing Laws

We will use the Stringency Index developed by the Oxford COVID-19 Government Response Tracker (Hale et al., 2020) to examine country-level social distancing laws. This index consists of publicly available data that codes for the stringency of a government's COVID-19 response ranging from 0 to 100. Specifically, it is made up of seven indicators, including school closing, workplace closing, canceling public events, closing public transport, public information campaigns, restrictions on internal movement, and international air travel controls (The calculation method of the index is available online here: https://www.bsg.ox.ac.uk/research/research-projects/oxford-covid-19-government-response-tracker)

Stringency scores are tracked daily. For each country, we will determine the date the first lab in that country starts data collection and the date the last lab in that country finishes data collection. Then, stringency scores on all dates between the start and the end date of data collection will be averaged to make up the country-level stringency score for a given country. For example, if the first lab in the United States starts collecting data on April 15th, 2020, and the last lab in the United States finishes collecting data on April 30th, all available stringency scores returned on the Oxford COVID-19 tracker for the US from April 15th to 30th will be

averaged to make up the stringency score for the US. Scores will only be calculated for countries that have more than three days of data available.

Quality checks

Two quality checks will be done to increase our confidence that the obtained results are able to provide a fair test of the stated hypothesis. First, the pre-manipulation items (i.e., current adherence of social distancing recommendations prior to manipulation) will be used to determine condition equivalence within each country. Determining condition equivalence will allow us to see whether random assignment was effective in balancing the three conditions (i.e., by verifying that conditions did not differ at the onset in terms of initial social distancing adherence). As per the analytic strategy below, we will examine condition effects on initial adherence using mixed-effects models, nested within country. If significant effects emerge for initial adherence (ps < .05), we will control for initial adherence in confirmatory analyses.

As this study will be bundled with one other experiment in the Psychological Science Accelerator COVID-19 project, we will also examine for potential carryover effects based on the order in which participants completed this study. We will create a dummy code based on whether our study was presented first (coded 0) or second (coded 1). This dummy code will be tested as a main effect, as well as an interaction with condition (to examine whether the order effect differentially impacts the effect of condition). Confirmatory models will be run with and without these carryover effects included in the model. If carryover effects are significant (p < .05), we will run analyses restricting the sample to only those who took this study first, and focus results on this sub-sample (though we will also present results for the full sample).

Analytic strategy

We anticipate collecting data from over 50 countries around the world. To account for the nested structure of the data, we will examine the condition effects using mixed-effects models. Specifically, we will construct a mixed-effects model predicting each outcome (autonomous motivation, defiance, short-term behavioral intentions and long-term behavioral intentions) from condition as a fixed effect (using dummy codes as specified below), as well as a random intercept and slope of condition, nested within country. If this model fails to converge, we will remove the random slope.

To test hypotheses, we will create two dummy variables, D1 and D2. where both the autonomy-supportive message and neutral (no message) conditions are coded 1, with the controlling message condition being the reference group (coded 0). By entering D1 and D2 simultaneously into the mixed-effects model, this will allow us to observe whether neutral and autonomy supportive conditions differ from the controlling condition, testing Hypothesis 1.

	D1	**D2**
Autonomy supportive message	0	1
Controlling message	0	0
Neutral (no message)	1	0

To test Hypothesis 2, in separate mixed-effect models, we will test indirect effects (Preacher et al., 2010) of autonomous motivation linking condition effects on our three outcome variables: defiance, short-term behavioral intentions, and long-term behavioral intentions. Specifically, in one set of analyses, we will examine indirect effects of D1 and D2, entered simultaneously, on each outcome with motivation entered as the mediator. This analysis will

allow us to investigate whether, relative to the reference group (the controlling message condition), the neutral and autonomy-supportive message conditions are linked to outcome variables through autonomous motivation.

Exploratory Analyses

To examine country-level social distancing laws, in separate mixed-effects models, country-level stringency scores will be added to interact with condition effects (dummy codes as specified above) on outcomes. Any interactions that reach a significance level of $p = 0.05$ will be further examined with simple slope analyses to identify slopes of condition at -1SD, mean level, and +1SD levels of country-level stringency scores.

References

Austin, P. C. & Brunner, L. J. (2003) Type I Error Inflation in the Presence of a Ceiling Effect, *The American Statistician, 57*(2), 97-104, DOI: 10.1198/0003130031450

Caria, Fetzer, Fiorin, Goetz, Gomez, Haushofer, Hensel, Ivchenko, Jachimowicz, Kraft-Todd, Reutskaja, Roth, Witte, Yoeli (2020). Measuring Worldwide COVID-19 Attitudes and Beliefs, http://www.covid19-survey.org

Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational research methods*, *4*(1), 62-83.

Chotiner, I. (2020, March 17). How to practice social distancing. *The New Yorker.* https://www.newyorker.com/news/q-and-a/the-vital-importance-of-isolation

Gagné, M. (2003). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion, 27*(3), 199-223.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis.* New York: Guilford Press.

Kasser, V. M., & Ryan, R. M. (1999). The relation of psychological needs for autonomy and relatedness to health, vitality, well-being and mortality in a nursing home. *Journal of Applied Social Psychology, 29,* 935-954.

Kayyem, J. (2020, March, 21). The Crisis Could Last 18 Months. Be Prepared. The Atlantic. https://www.theatlantic.com/ideas/archive/2020/03/there-isnt-going-be-all-clear-signal/608512/

Legault, L., Gutsell, J. N., & Inzlicht, M. (2011). Ironic effects of antiprejudice messages: How motivational interventions can reduce (but also increase) prejudice. *Psychological Science, 22,*1472–1477.

Levenson, M. (2020, March 25). Twitter Blocks The Federalist for Promoting Coronavirus Parties. The New York Times. https://www.nytimes.com/2020/03/25/us/chickenpox-parties-federalist-twitter.html

Ntoumanis, N., Ng, J. Y., Prestwich, A., Quested, E., Hancox, J. E., Thøgersen-Ntoumani, C., ... & Williams, G. C. (2020). A meta-analysis of self-determination theory-informed intervention

studies in the health domain: effects on motivation, health behavior, physical, and psychological health. *Health Psychology Review*, 1-31.

Nyhan, B., Reifler, J., Richey, S., & Freed, G. L. (2014). Effective messages in vaccine promotion: a randomized trial. *Pediatrics*, 133(4), e835-e842.

Pérez-Peña, R. (2020, March 19). Virus Hits Europe Harder Than China. Is That the Price of an Open Society? The New York Times. https://www.nytimes.com/2020/03/19/world/europe/europe-china-coronavirus.html

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, *57*, 749-761.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford.

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behavior change and its maintenance: Interventions based on self-determination theory. *European Health Psychologist*, 10(1), 2-5.

Soenens, B., Vansteenkiste, M., & Niemiec, C. P. (2009). Should parental prohibition of adolescents' peer relationships be prohibited?. *Personal Relationships, 16*(4), 507-530.

Weinstein, N., Legate, N., Graham, L., Zheng, Y., & Moller, A. C. (2020). The importance of autonomy support for motivating prejudice reduction (and avoiding backlash effects): A first study with police officers and staff. *Unpublished manuscript.*

Williams, G. C., Cox, E. M., Kouides, R., & Deci, E. L. (1999). Presenting the facts about smoking to adolescents: The effects of an autonomy supportive style. *Archives of Pediatrics and Adolescent Medicine, 153,* 959-964.

Williams, G. C., McGregor, H. A., Sharp, D., Levesque, C., Kouides, R. W., Ryan, R. M., & Deci, E. L. (2006). Testing a self-determination theory intervention for motivating tobacco cessation: supporting autonomy and competence in a clinical trial. *Health psychology*, *25*(1), 91.

Vansteenkiste, M., Soenens, B., Van Petegem, S., & Duriez, B. (2014). Longitudinal associations between adolescent perceived degree and style of parental prohibition and internalization and defiance. *Developmental psychology*, *50*(1), 229.

Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: the synergistic effects of intrinsic goal contents and autonomy-supportive contexts. *Journal of personality and social psychology*, *87*(2), 246.

Yong, E. (2020, March 25). How the Pandemic Will End. The Atlantic. https://www.theatlantic.com/health/archive/2020/03/how-will-coronavirus-end/608719/