



Fear, learning, or self-control? Predictors of Russian citizens' compliance with mandatory and voluntary Covid-19 prevention measures

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Abstract

In this article, we examine citizens' willingness to comply with Covid-19 prevention strategies of mandatory mask-wearing and recommended social distance/contact limitation measures from competing theoretical perspectives. These include self-control, deterrence, learning, social control theories, and fear of the infection. Data for the study come from 508 respondents from St. Petersburg—Russia's second largest city—in May 2020, when the Covid-19 regional legislation that mandated citizens to wear masks in public went into effect. Overall, our findings suggest mixed support for various theoretical perspectives. Among the variables included in the analysis, fear of the infection is positively related to compliance with both mandated and recommended measures. Fear of Covid-19 infection, fear of punishment, and fear of disapproval on behalf of significant others that would follow non-compliance appear to be strong predictors of law-abiding behavior. Learning and self-control theories explain compliance with non-mandatory measures, but not with mask-wearing, which carried a penalty for violating the mandate.

Keywords

Compliance, Covid-19, deterrence, learning theory, Russia, self-control theory

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Introduction

The Covid-19 pandemic, declared by the World Health Organization (WHO) on 11 March 2020, is a global health emergency that has resulted in more than 250 million infections worldwide (as of November 2021) and claimed over 5 million lives (WHO, 2021). Since the Covid-19 outbreak began, countries have instituted various preventive measures such as isolation, self-quarantine, lockdowns, and curfews. Chief among the WHO's recommendations were stay-at-home orders, wearing a facial mask when in public, and maintaining a social distance of 6 feet (2 m) to minimize contact and spread of the virus. Countries, however, have differed widely in their response to handling the crisis. Some enacted strict legal mandates with penalties for non-compliance, while others have merely publicized preventive strategies in the form of recommendations (International Monetary Fund (IMF), 2021).

Citizens' compliance with the laws and governmental regulations is a desired goal of good governance and an indicator of its efficacy. Compliance with Covid-19 regulations necessitated limitations on citizens' freedoms, bringing to the forefront a fundamental question: What motivates citizens to comply with rules and laws? Compliance depends on the capacity to obey the rules, opportunities to disobey, and self-control (Van Rooij et al., 2020). In criminology, competing perspectives explain factors associated with individuals' motivation and attitudes toward compliance or non-conformity regarding norms, rules, and laws. Some (Miguel et al., 2021) argue that antisocial attitudes lead to non-compliance, while others (Nivette et al., 2021) stress the importance of one's legal cynicism, low self-control, and prior engagement in antisocial behavior as non-compliance predictors. Yet others have noted that compliance with the Covid-19 regulations could be attributed to procedural justice and concerns about rights (McCarthy et al., 2021), attitudes toward the usefulness of protective measures and health concerns (Clark et al., 2020), trust and social cohesion (Bargain and Aminjonov, 2020), fears and perceptions related to the nature of the new infection (Burruss et al., 2021; Murphy et al., 2020), and conservative political ideology and faith in conspiracy theories (Plohl and Musil, 2021). Studies have also explored how citizens neutralize their non-compliance with regulatory provisions (Harris, 2022; Meers et al., 2021).

This article aims to extend the existing literature in a couple of ways. First, by examining the explanatory power of several criminological frameworks as they relate to compliance with Covid-19 protective measures. These theories have been employed widely over several decades to test citizen compliance and non-conformity. These frameworks include self-control, deterrence, learning, and social control theories (Cooper et al., 2010). Additionally, we look at fear of the infection and demographic characteristics as additional explanatory factors. It is important to understand how these predictors of compliance work in two different situations: when rules are merely recommended and voluntary, and when compliance is mandated by law.

Second, though research has tested some of these perspectives on citizen compliance with Covid-19 protective measures in many parts of the world (Noone et al., 2021), the Russian Federation—one of the countries which experienced high rates of infections—was not among them. Thus, we expand the geographical focus of Covid-19 mitigation measures and compliance studies. Russia's second largest city, St. Petersburg, offers a

unique opportunity to examine this question and evaluate the validity of the deterrence/rational choice approach for explaining compliance and non-compliance during the early months of the pandemic. Of the three Covid-19 preventive strategies used by the St. Petersburg governor's office during the study period, one measure (wearing a facial mask) was mandated for citizens when they were in public, and two other measures (practicing social distancing while in public and limiting social contact whenever possible) remained state-recommended but voluntary.

Explaining why people comply with the law

Fear of infection and compliance

A common assumption of fear-arousal theories is that fear messages heighten anxiety, which in turn may motivate individuals to take control of the danger. Grounded in the fear appeals theory, researchers suggest that fear messages change citizens' behavior to achieve an advocated position. Fear-as-a-drive perspective (Dollard and Miller, 1950) is drawn from learning theories where messaging (seen in advertisements, television programs, etc.) provides cues suggesting negative consequences for certain actions to arouse an appropriate (compliant) behavior (Dillard, 1994).

Research on risk perceptions of driver safety and compliant behavior among auto drivers assumes that the fear of death and bodily harm evoke fear-arousal. This fear makes drivers compliant with road rules (Witte and Allen, 2000) and seat belt usage to avoid injury and death to self or others (Şimşekoğlu and Lajunen, 2008), thereby eliminating the unpleasant experience of fear (Leventhal, 1970). Examples of campaigns against drug use, high-risk sex practices, and cigarette smoking follow similar patterns of inciting a fear-arousal reaction to foster compliance. In the case of Covid-19 mitigation measures, the messaging for the use of masks, maintaining social distance, and limiting social contacts is frequently framed as a means of minimizing the possibility of spreading a deadly infection to self, family, and community. In recent research, fear of Covid-19 was found to be a strong motivator for compliance with virus-mitigating behaviors (Burruss et al., 2021; Murphy et al., 2020; Plohl and Musil, 2021).

Self-control and compliance

Gottfredson and Hirschi (1990: 41) proposed a self-control theory positing that individuals pursue crime and deviance because they are forms of "immediate, easy, and short-term pleasure." Fundamentally, they argue that low self-control manifests as impulsiveness, self-centeredness, a preference for easy and simple tasks, and a propensity for risk-seeking behaviors. When faced with an opportunity, those with low self-control who think in the "here and now" are more likely to engage in crime. While low self-control is associated with law breaking, this trait also applies to "analogous behaviors" such as engaging in antisocial, unconventional, or high-risk behaviors that include consumption of drugs and alcohol, unprotected sex, and not wearing a seatbelt, among others.

Self-control theory has generated many studies to test its efficacy in explaining crime and delinquency (Grasmick et al., 1993; Paternoster and Brame, 1998) and is arguably a general theory in that it explains a wide variety of offenses including white-collar crime (Langton et al., 2006), cybercrime (Burruss et al., 2013; Hinduja and Ingram, 2008), sex-offending (Ha and Beauregard, 2016), and drinking and driving (Piquero and Tibbetts, 1996). In addition, two meta-analyses have revealed that low self-control is a strong predictor of crime (Pratt and Cullen, 2000) and other public health concerns (Black et al., 2009). Unsurprisingly, low self-control and related traits have also been found to be strong predictors of compliance with Covid-19 mitigation efforts. For instance, Miguel et al. (2021) found that those with lower levels of empathy and higher levels of callousness, deceitfulness, and risk-taking were less likely to comply with virus-mitigating measures in Brazil. Van Rooij et al. (2020) similarly found that self-control was positively associated with COVID-19 mitigation efforts in the United States.

Deterrence and compliance

Deterrence theory assumes that decision-making is motivated by a self-interested cost-benefit analysis that weighs the anticipated pleasures from an act with the potential pains (Beccaria, 1972 [1764]; Bentham, 1970). Beccaria (1972 [1764]) observed that certainty of punishment, even when compared to severity, is a strong motivator for compliance. The threat and fear of punishment, in other words, shapes human action. The precepts of this instrumental perspective suggest that people obey laws because they are deterred by the fear of punishment (Murphy et al., 2016), and most notably, the certainty of punishment (Paternoster, 1987). Threats of formal consequences can range from a mild sanction to significant financial loss and deprivation of liberty. In addition, this theory is perceptual in that it is not objective levels of punishment (the reality), but rather subjective perceptions of sanction levels (an individual's beliefs) that should impact behavior (Geerken and Gove, 1975).

Evidence supports that the perceived certainty and severity of sanctioning can indeed deter individuals from engaging in crime (Grasmick and Bursik, 1990; Piquero and Pogarsky, 2002). Certainty of punishment was also a key finding in research on compliance with traffic laws, drunk driving infractions, and seatbelt compliance (Chaudhary et al., 2004). To date, only one known study has tested the deterrence perspective within the context of COVID-19 mitigation efforts and compliance. Specifically, Van Rooij et al. (2020) found that the perceived certainty and severity of apprehension for a legal order violation was not associated with compliance within the United States.

Social control and compliance

Hirschi (1969) argued that juveniles' beliefs in the rightfulness of laws and rule compliance mostly come from a close attachment and bonds with their parents. Social bonds or lack thereof explain their participation or nonparticipation in law-violating and deviant behaviors. Sampson and Laub (1993) then later extended this theory to focus on bonds with adult social institutions, such as one's spouse, across the life course. Drawing from this perspective, researchers suggest that parental attachments and bonds to the family

(Cardwell et al., 2020) and fear of disappointing family members (Murphy and Helmer, 2013) are strong predictors of antisocial behavior and compliance. The family's informal social control exerts a substantial impact on developing values regarding law-abiding and conformity. Anderson et al. (1977) noted that informal social control such as the fear of shame and embarrassment generated by family members or significant others for code violations matters for some people, and these fears are tied to developing law compliance behaviors (Anderson et al., 1983). In other words, disapproval from parents and other role models and fear of invoking shame and embarrassment are strongly tied to informal social control and conforming behaviors (Akers, 1990).

This theory has also been widely applied within the field of public health. Umberson et al. (2010: 147) underscored that “social control is widely considered to be central to the link between social ties and health behavior” in that relationships with friends and family can influence adherence with risk-mitigating health behaviors. To our knowledge, only one study has directly assessed the impact of social control on COVID-19 mitigation efforts, finding that participants who perceived more support from their family were more likely to comply with stay-at-home recommendations in Iran (Paykani et al., 2020). However, the study also found that support from friends was not similarly protective.

Social learning and compliance

Gabriel Tarde's laws of imitation, developed in the late 19th century (Wilson, 1954), underlie the basic assumption that all behavior, including criminal behavior, is learned by imitation and communication (Sutherland, 1947). Drawing from this earlier work, Bandura's (1971) social learning theory suggested that individuals learn from both direct experiences and by observing others through a combination of modeling and imitation in social settings, emphasizing conditioning effects of the environment. Akers (1977) reformulated this perspective further and proposed four elements—differential association, imitation, definitions, and differential reinforcement—to explain his social learning theory. According to this perspective, behavior is learned from interactions with individuals and groups with whom they identify by imitating and modeling behavior, developing attitudes and beliefs, and weighing rewards and punishments (Akers, 1977; Bandura, 1977).

Extensive prior research has established strong support for social learning theory (Hoeben and Thomas, 2019). Within criminology, it has been employed to test a wide range of illegal behaviors such as domestic violence and interpersonal violence (Sellers et al., 2005), software piracy (Burruss et al., 2019), and stalking (Fox et al., 2011), as well as less severe forms of crime such as alcohol and intoxication expectations (Wall et al., 2003), and statutory violations such as juvenile smoking (Akers and Lee, 1996). Social learning, however, is not only applied to explain crime. It has also been widely used to explain compliance with health guidelines and low-risk behaviors. For example, interventions based on social learning theory have effectively improved one's diet and physical activity (WHO, 2009), and practices associated with the theory have been promoted within general health education for decades (Parcel et al., 1987). Public health scholars also suggested “through an imitating social learning process, individual-level behavioral change on taking infection prevention actions have the potentials to

significant reduce the COVID-19 outbreak” early-on in the pandemic (Zhao et al., 2020: 1). More recently, this was supported by Van Rooij et al. (2020) who found that perceptions of others’ compliance impacted respondents’ own compliance within the United States.

Present study

Context

The first official case of Covid-19 was registered in Russia on 15 February 2020, and the first death on 19 March 2020 (Åslund, 2020). At the end of March, the President of the Russian Federation declared non-working days (in fact, a complete shutdown except for essential workers) from 30 March 2020 onwards. On the same day, all the Russian international borders were closed. Federal non-working days lasted for 6 weeks ending on 10 May. Despite these measures, by 7 May, Russia was the fifth largest infected among countries, with more than 177,160 positive-tested cases and 1625 deaths (Yakushova, 2020).

From the beginning of the pandemic federal authorities transferred most of their powers for handling the crisis to regional authorities. Each of the 85 units of the Russian Federation had to adopt their own laws and regulations imposing anti-epidemic restrictions on citizens and businesses. Those measures included closing regional borders, requiring citizens to wear protection equipment (masks, gloves), closing public places, and introducing tracking applications and QR codes to control citizens’ movements.

Although the restrictions were regulated by the governors’ offices and not by federal criminal law, they were preceded by the amendments in the Criminal Code enacted on 1 April 2020. Article 236 specified that violating sanitary and epidemiological rules that inadvertently caused mass illness or poisoning or created a threat of such consequences was punished with up to 2 years in prison. If the violation inadvertently caused death, the penalty could reach 5 years in prison. The law did not specify violations of particular sanitary and epidemiological rules that may lead to criminal prosecution. This left the question of whether not wearing a mask or not meeting other Covid-19 mitigation regulations may constitute a criminal offense.

The city of St. Petersburg is a separate regional unit in the North-Western part of Russia with a population of over 5 million people, which makes it the second largest city in Russia. It is a central transport hub, and a city that hosts migrants and national and international tourists. St. Petersburg’s government issued the first anti-Covid-19 Decree on 13 March 2020. It introduced a high-readiness regimen for *preventing and liquidating* emergencies (Government of St. Petersburg, 2020). The measures included prohibiting mass events and recommendations for governmental agencies and business companies to prevent the infection from spreading. This document was amended daily, imposing new restrictions and recommendations, and canceling those that were no longer necessary. On 9 May 2020, a new amendment came into force mandating citizens from 12 May 2020, to use personal protective equipment in public places, including retail facilities and public transport. The first violation of this mandate could have resulted in a warning or the imposition of an administrative fine of 1000 to 30,000 rubles (up to \$430). Subsequent

violations could have resulted in a fine of 15,000–50,000 rubles (up to \$715). All citizens were recommended to keep a distance of at least 1.5 m from other citizens in public places, stay at home, and limit social contacts whenever possible. However, regional regulations prescribed no penalties for non-compliance with social distancing/contact limitation recommendations. It is impossible to say whether citizens were familiar with the regulations or aware of the consequences of non-compliance. Although we assured the respondents about the confidentiality and anonymity of the data collection process, we deliberately avoided asking them questions about their knowledge regarding penalties associated with breaking the laws. We wanted to ensure that their responses about compliance are not tainted by the fear of admitting to non-adherence to mandatory regulations that may result in holding them accountable.

At the time of data collection (20–27 May), the number of official daily registered cases of Covid-19 ranged from 363 to 455, marking the first week of the downward trend of cases in the pandemic's first wave. By 22 May, the overall number of registered cases in St. Petersburg was 12,592 and 107 deaths (Yandex Coronavirus Statistics, 2020).¹ Given the time frame—1 week after new regulations went into effect—our unfunded project had a short window to develop a survey and collect data. We were interested in gathering information in the early stages of rule implementation and compliance.

Our present study examines Russian citizens' attitudes regarding compliance with Covid-19 recommendations and mandates since the imposition of the St. Petersburg Government Decree on 9 May 2020. More importantly, we concurrently test the validity of various (and often competing) theoretical assumptions on two recommendations to prevent and minimize the spread of Covid-19 infection. One was mandated beginning on 12 May 2020 (wearing a facial mask), while the second remained voluntary (maintaining social distance/contact limitation). Based on the discussion outlined above, we test the following hypotheses: Those with greater fear of Covid-19 infection (Hypothesis 1), who have more self-control (Hypothesis 2), who view the certainty of punishment as more likely (Hypothesis 3), who have stronger attachments to their family (Hypothesis 4), and who watch or interact with law-violating friends or family members (Hypothesis 5) are more likely to wear masks in public spaces and maintain social distance/contact limitation.

Method

Sample

The survey was designed using the online system IKA.si which is similar to Qualtrics. After the survey was created, it was posted online in St. Petersburg district communities' groups on the most prominent Russian social network Vkontakte.ru. There are a total of 15 districts in St. Petersburg, with a population ranging from 43,000 to 470,000. We identified the largest online communities for each of the 15 districts. Each of these communities brings together from 9100 to 47,000 active users. We placed a commercial order with the marketing company to post a link to the survey in each community for 1 day. In addition, we posted the survey link in the three large online residential communities in the North, Center, and the South of the city. These communities were selected

based on the researchers' contacts with residents of these three communities. This allowed access to a network of residents for survey distribution without additional fees. To ensure anonymity, we did not solicit information on the identification of the residents' neighborhoods. Therefore, we are unable to ascertain the number of respondents from each community. Data collection took 1 week, from 20 May to 27 May. A total of 886 people responded to the survey. After removing empty surveys, surveys with more than 20% of missing cases, and surveys where respondents indicated that they were younger than 18 years old, we had 508 usable surveys.

Measurement of variables

Dependent variables. The key question in this research was to assess factors that predict respondents' compliance with Covid-19 regulations relating to the use of face masks and maintaining social distance/contact limitation. For the first dependent variable, we asked how frequently the respondent wore a face mask after 12 May, the date when the Covid-19 regulations were made mandatory, which was a follow-up to an initial question that enquired about wearing a mask in public spaces. Responses were coded on a 5-point Likert-type scale from 1 (never) to 5 (all the time). The mean score of this question was 3.89. The second dependent variable, social distance/contact limitation, consisted of three questions: "I maintained social distance/limited contacts with people in public places (shops, metro, etc.);"; "I met with friends/family members I do not reside with for leisure purposes (reverse coded)"; and "I left the apartment/drove to parks with members of my family that I reside with (reverse coded)." Responses were coded on a 5-point Likert-type scale from 1 (never) to 5 (all the time) (Mean=12.33), with a higher mean score representing a higher level of compliance with Covid-19 regulations.

Independent variables. The first independent variable represents the fear of infection. Drawing from the fear appeal perspective (Williams, 2012; Witte and Allen, 2000), fear of Covid-19 infection consisted of a summative index of three questions that tap into the fear of getting infected if rules are violated. They are as follows: If I do not follow the rules, (a) I might get infected, (b) my family member can get infected, and (c) I might infect someone I do not know. Responses were coded on a 5-point Likert-type scale from 1 (never) to 5 (all the time). We conducted exploratory factor analysis with varimax rotation resulting in a single component. The factor loadings for the three questions ranged between 0.87 and 0.89 (Mean=8.42; Cronbach's α = .85).

The second independent variable of self-control consisted of four questions drawn from Grasmick et al. (1993) and Arneklev et al. (1998). These questions were as follows: "I often act on the spur of the moment without stopping to think," "Sometimes I will take a risk just for the fun of it," "Excitement and adventure are more important to me than security," and "If things I do upset people, it is their problem, not mine." The responses ranged from 1 (absolutely not like me) to 4 (absolutely like me). Two of the items had factor loadings of .85, while the others had loadings of .46 and .53 but met the acceptable threshold of .40 levels (DeVellis, 2016). Since the mean scores were high and clustered around other serious behaviors, we included them in the scale (Mean=8.08; Cronbach's α = .66).

We measured *certainty* of punishment for not wearing a mask with one question “If I do not wear a mask, I may be fined by the police on the spot.” Responses were coded on a 4-point Likert-type scale of 1 (extremely unlikely) to 4 (almost certain), with a mean of 2.72. Two questions measured certainty for being punished for not maintaining social distance or staying away from social contacts. They were as follows: “If I do not follow social distancing regulations, I may be fined by the police on the spot,” and “If I go outside for non-essential purposes (to throw away garbage or buy medicines/groceries), I may be fined by the police.” Responses were likewise coded with a Likert-type scale of 1 (extremely unlikely) to 4 (almost certain). The factor loadings for each of the two questions was 0.88 (Mean = 3.97; Cronbach’s $\alpha = .70$).

Drawing from Hirschi’s (1969) social control theory that emphasizes individuals’ concerns about not wanting to disappoint family members, *social control* for wearing a mask and social distance/contact limitation was measured with one question each. They were “If I do not take precautions like wearing a mask, my family will be very upset with me,” and “If I meet with my friends that I do not reside with, my family will be very disappointed with me.” Responses were coded on a 4-point Likert-type scale of 1 (extremely unlikely) to 4 (almost certain). The mean scores for both questions were 2.34 and 2.09, respectively.

Finally, drawing from Tarde’s laws of imitation (Wilson, 1954) and Bandura (1971) and prior research (Akers and Lee, 1996; Fox et al., 2011), our variable for *social learning* for wearing a mask consisted of one question: “I saw people not wearing masks when they go out.” Responses were coded on a 5-point Likert-type scale of 1 (never) to 5 (all the time). The mean score for this item was 4.32. The social learning variable for social distancing and contact limitation consisted of three questions: “I saw people going for a walk and taking kids to common playgrounds,” “My friends were getting together and going for picnics or to summer homes together,” and “My family members/close friends were violating the Covid-19 regulations.” Responses were coded on a 5-point Likert-type scale of 1 (never) to 5 (all the time). The factor loadings for the three questions ranged between 0.67 and 0.93 (Mean = 8.08; Cronbach’s $\alpha = .70$). Finally, we included two control variables: age and gender.

Results

Table 1 presents the study’s demographic characteristics. The distribution of respondents’ ages ranged from 18 to 79 years, with a mean age of 37.4 years. Females represented 75% of the sample.² Table 1 also displays details on the study’s dependent and the predictor variables.

Preliminary analysis

We explored the bivariate relationship between our various independent variables and two dependent variables. The results are presented in Table 2. The correlation coefficients (Pearson’s r) for each independent variable on the two dependent variables suggest a statistically significant relationship. The term “statistical significance” means there is a small likelihood (in the case of $p < .05$, a less than 5% chance) that we would

Table 1. Summary statistics for variables used in the analyses ($N=508$).

Variable	Description	N	%	Mean	SD	Min.	Max.
Demographic characteristics							
Age				37.40	12.39	18	79
Gender							
	1 = Female	381	75				
	2 = Male	127	25				
Dependent variables							
Compliance: mask	1 item			3.89	1.34	1	5
Compliance: social distance/ contact limitation	3 items			12.33	2.64	3	15
Predictor variables							
Self-control	4 items* $\alpha = .66$			8.08	1.98	4	16
Fear of infection	3 items* $\alpha = .85$			7.67	2.16	3	12
Certainty: mask	1 item			2.72	0.76	1	4
Certainty: social distance/contact limitation	2 items* $\alpha = .70$			3.97	1.35	2	8
Social control: mask	1 item			2.34	1.0	1	4
Social control: social distance/ contact limitation	1 item			2.10	1.0	1	4
Social learning: mask	1 item			4.32	0.77	1	5
Social learning: social distance/contact limitation	3 items* $\alpha = .58$			8.08	1.98	3	15

SD: standard deviation.

*Summative index.

have found our results if there was no relationship between the independent and dependent variables. Because the probability is so low, we can conclude that there is actually a relationship. Since gender was a dichotomous variable, we ran a t -test (not displayed in the table) which showed a statistically significant relationship ($t = -2.78$, $p < .01$) only for the face mask such that males were less likely to wear masks.

Multivariate analysis

Ordinary least squares (OLS) regression analysis was then employed to assess the relationship between the various predictor variables representing competing theoretical frameworks of fear, self-control, deterrence, social control, and social learning on respondents' compliance with the two Covid-19 mitigation measures. This analysis allows for estimating the effects of each of the predictor variables on the dependent variable holding all other variables constant.

Our dependent and some of the independent variables are based on Likert-type scale responses. Whether using such variables in OLS is appropriate or better suited for logistic or ordinal regression analysis has been debated (Cohen et al., 2014). In a review of articles dating back to the 1930s, Norman (2010) argued that parametric statistics could

Table 2. Correlation matrix.

Age (1)	1	2	3	4	5	6	7	8	9	10	11
Compliance: mask (2)	-.003										
Compliance: social distance/ contact limitation (3)	.181**	.536**									
Self-control (4)	-.177**	-.177**	-.264**								
Fear of infection (5)	.062	.491**	.513**	-.250**							
Certainty: mask (6)	-.007	.235**	.194**	-.004	.165**						
Certainty: social distance/contact limitation (7)	.147**	.235**	.256**	-.086	.270**	.486**					
Social control: mask (8)	.138**	.457**	.450**	-.132**	.517**	.181**	.326**				
Social control: social distance/ contact limitation (9)	.222**	.312**	.428**	-.138**	.506**	.102*	.251**	.636**			
Social learning: mask (10)	-.146**	-.115**	-.137**	0.072	-.126**	-0.075	-.193**	-.168**	-0.084		
Social learning: social distance/ contact-limitation (11)	-.248**	-.295**	-.491**	.212**	-.275**	-0.037	-.169**	-.314**	-.235**	.643**	

* $p < .05$, ** $p < .01$.

Table 3. OLS—ordinary least squares regression of predictor variables on compliance with Covid-19 regulations ($N=508$).

Variable	Model 1		Model 2	
	Wore mask ($N=456$)		Social distance/contact limitation ($N=456$)	
	<i>b</i> /SE	β	<i>b</i> /SE	β
Age	-0.01/0.00	-0.07+	0.00/0.01	0.01
Gender-male	-0.14/0.12	-0.04	0.18/0.22	0.03
Fear of Covid-19 infection (mask and social distancing/contact limitation)	0.19/0.03	0.31***	0.35/0.05	0.29***
Self-control (mask and social distancing/contact limitation)	-0.04/0.03	-0.07	-0.10/0.05	-0.08*
Certainty of punishment: mask	0.22/0.07	0.13**	—	—
Certainty of punishment: social distance/contact limitation	—	—	0.16/0.07	0.08*
Social control: mask	0.36/0.06	0.27***	—	—
Social control: social distance/contact limitation	—	—	0.41/0.11	0.16***
Social learning: mask	-0.04/0.07	-0.02	—	—
Social learning: social distance/contact limitation	—	—	-0.40/0.04	-0.39***
Adj R^2	.32		.45	
<i>F</i>	30.89***		54.59***	

+ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

be used with Likert-type data. Kromrey and Rendina-Gobioff (2002) also observed that the use of OLS is appropriate even for variables represented by individual Likert-type items. Together, these studies support the application of OLS with our Likert-type scale outcomes. Variance inflation factors (VIFs) were also examined to assess the presence of multicollinearity. All of the VIFs were well below 10 (in this study, all the values ranged from 1 and 2.5), which is a generally acceptable limit (Neter et al., 1996).

Unstandardized and standardized coefficients, standard errors, and significance levels for the coefficients on each of the dependent variables are shown in Table 3. Model 1 displays findings explaining compliance with wearing a mask, and Model 2 explains compliance with social distance/contact limitation. In Model 1, the independent variables explain 32% of the variance in compliance with wearing a mask. The demographic variables, *age* and *gender*, did not explain compliance with wearing a mask.

Among the key independent variables, *fear* of Covid-19 infection was a significant predictor of citizens' compliance with wearing a mask ($b = .19$, $p < .001$), where those who were more fearful of infection were more likely to comply with mask wearing. Of the four competing theoretical perspectives only *certainty of punishment* ($b = .22$, $p < .01$) and *social control* ($b = .36$, $p < .001$) had significant relationships with compliance wearing masks. That is, those who perceived a higher certainty of punishment or had greater

concerns with disappointing family if they did not comply were more likely to wear masks. The magnitude of the effect of a variable can be ranked based on the absolute value of the standardized regression coefficient (β). Among the significant variables, *fear* of contracting Covid-19 had the largest sized effect ($\beta = .31$), followed by *social control* ($\beta = .27$), which had the second largest sized effect. Finally, *certainty of punishment* ($\beta = .13$) had nearly half of the effect of each of the other two variables.

In Model 2, the independent variables explain 45% of the variance in compliance maintaining social distance/contact limitation. The demographic variables of *age* and *gender* did not explain this form of compliance.

Among the key independent variables, *fear* of Covid-19 infection was a significant predictor of compliance with maintaining social distance/contact limitation ($b = .35$, $p < .001$), such that those who were more fearful of infection were also more likely to maintain social distance/limit contact. All four competing theoretical perspectives had statistically significant relationships with compliance for maintaining social distance/contact limitation. Those who had more *self-control* were less likely to violate social distance/contact limitation mandates ($b = -0.10$, $p < .05$). *Certainty of punishment* ($b = .16$, $p < .05$), *social control* ($b = .41$, $p < .001$), and *social learning* ($b = -.40$, $p < .001$) all had statistically significant relationships with compliance social distance/contact limitation mandates. That is, more self-control, a greater certainty of sanctioning (deterrence), and stronger social bonds all increased citizens' willingness to comply with social distance/contact limitation mandates. Whereas having friends and family who did not comply was associated with less compliance with distance/contact mandates, consistent with learning theory.

Among the significant variables, *social learning* ($\beta = .31$) and *fear* of contracting the Covid-19 infection had the largest sized effect ($\beta = .29$), followed by *social control* ($\beta = .16$). *Certainty of punishment* ($\beta = .08$) and low *self-control* ($\beta = -.08$) had the lowest effect sizes on explaining compliance with social distancing/contact limitation. The relative strengths of the predictors' effect sizes are largely consistent between both forms of COVID-19 compliance.

Discussion

Drawing from the fear of victimization literature and competing criminological theories of self-control, deterrence, social control, and learning theories, we sought to explain why people comply with protective measures surrounding Covid-19, specifically focusing on wearing masks and maintaining social distance/contact limitation. Overall, we found mixed support for our various hypotheses for mask-wearing, which carried with it a penalty (fine) for violating the mandate. However, all the key variables were related to compliance with social distance/contact limitation mitigating measures for which no such punishment was prescribed for violation.

Among our theoretical predictors, *fear* of the infection is perhaps one of the strongest predictors of compliance with Covid-19 legislation in Russia, supporting Hypothesis 1. This suggests that those who fear infection are more likely to comply with both mask-wearing and maintaining social distance/contact limitation. As we noted earlier, fear appeal evokes fear-arousal (Witte and Allen, 2000), prompting individuals to take safety

measures for themselves and family members. This finding is similar to fear of injury or death among auto drivers in the context of road rules and safety belt usage (Şimşekoğlu and Lajunen, 2008). Although the true nature and after effects of Covid-19 infection on one's health and life remain somewhat fuzzy, citizens' risk perceptions of getting infected with the virus for themselves or others strongly influences their compliance with the Covid-19 regulations of mask-wearing and social distance/contact limitation. This finding adds further support to an emerging literature that suggests that fear of Covid-19 infection is a strong motivator for compliance with mitigating behaviors (Burruss et al., 2021; Murphy et al., 2020; Plohl and Musil, 2021). Accurately conveying the dangers of the virus to invoke an appropriate fear arousal is thus a supported policy implication for promoting compliance.

The relationship between self-control and compliance (Hypothesis 2) offers mixed yet interesting results. Self-control does not predict compliance for mask-wearing. In contrast, however, *self-control* explains compliance for social distance/contact limitation. But this finding is like the finding by Van Rooij et al. (2020) who established that self-control is negatively related to compliance. One explanation that we can suggest for our mixed results is that the fear of formal punishment may serve as a better deterrent than self-control. In the absence of this fear, those who are impulsive and risk-taking would be more likely to neglect the recommendations of the government authorities. However, we did not test whether fear of punishment moderates the relationship between compliance and self-control. This is a key direction for future research.

Certainty of punishment (Hypothesis 3), which measures the deterrence perspective, is a strong predictor of compliance for wearing a mask as well as for social distance/contact limitation mandates. This finding is comparable to other research employed to explain citizen compliance to rules (Mungan, 2019). There are two points worth noting here. First, while the relationship to compliance is statistically significant, the effect is smaller in explaining its influence on the dependent variables relative to the measures representing other theoretical perspectives. Second, theoretically, deterrence includes three key dimensions: certainty, severity, and celerity of sanctions (Nagin, 2013). Research has established that *certainty* is a strong motivator for legal compliance (Mungan, 2019). However, our result contrasts findings from prior research, which found that self-control was associated with Covid-19 mitigation practices within the United States. The difference in findings could be due to differences in sampling between studies (the US relative to Russia, or differences in demographic compositions of samples). Also, in this work, due to data constraints, we have measured the impact of only one dimension of the deterrence concept, *certainty*, which is a limitation of this study. Future deterrence research can address whether different dimensions of deterrence have a similar impact on compliance.

Additionally, our findings show that people are deterred from non-compliance when they *believe* that their behavior is likely to result in sanctions. Interestingly, this belief drives their behavior even when the government had only recommended compliance to rules with no formal sanctions. Prior deterrence research has established that citizens are not perfectly aware of the severity of punishments for various behaviors (Kleck et al., 2005), nor are they capable of the accurate predictions of sanction risks (Apel, 2013; Lochner, 2007). Our findings suggest that citizens perceive punishment as possible even

when the law only recommends specific behavior. It is unclear whether this is due to the lack of knowledge about existing legislation or to overall perceptions of the criminal justice system as arbitrary and capable of infringing upon citizens' rights. It must be noted that prior research shows that the effect of the perceived risks is not constant, and a strong deterrent effect manifests itself only after a certain threshold (Loughran et al., 2012). In a public health emergency, both legal provisions and law enforcement reactions to the violation of the new laws are inconsistent and dynamic. Under these conditions, it is critical to assess whether citizens accurately perceive these changes and at what level of perceived sanction risks the deterrent effect manifests itself.

Results from this study lend strong support for *social control* theory (Hypothesis 4), as those who have stronger attachments to the family are more likely to comply with wearing a mask in public and maintaining social distance/contact limitation. This finding is consistent with earlier research showing that parental attachments and bonds to the family (Cardwell et al., 2020), fear of disappointing family members (Murphy and Helmer, 2013), and fear or shame and embarrassment (Akers, 1990) are strong predictors of antisocial behavior. In addition, this finding is consistent with prior work which found that perceived disapproval from family members was associated with health-related compliance (Paykani et al., 2020; Umberson et al., 2010). One potential method to increase Covid-19-related compliance is for policy makers could encourage concerned citizens to clearly communicate their desires and expectations for compliance with their family members. Within our study, social control had the second highest effect size with respect to masks, and the third highest effect size with respect to social distancing and contact limitation.

The *social learning* perspective (Hypothesis 5) finds support for its relationship to compliance with social distancing/contact limitation but not for wearing masks. We did not find that those who observed other people not wearing masks would be less likely to wear masks themselves. This finding contrasts prior research which has consistently supported peers' influence on the decision to offend. The lack of support may be due to the timing of the study, as data collection begun 1 week after the law mandating the wearing of masks came into force and citizens were not very likely to observe negative consequences for others who would not wear masks. Social learning theory suggests that observing negative reinforcement of the behavior of others is an essential part of the learning process (Burgess and Akers, 1966). The absence of this link in the learning process may explain the lack of statistically significant findings with respect to mask compliance. However, we found that those who watch or interact with law-violating friends or family members were less likely to maintain social distance/contact limitation mandates. Given that social distancing and minimizing social contacts have always remained only recommended and not mandatory in the laws, our findings suggest that observing non-compliant behaviors that were not accompanied by sanctions promotes non-compliant behavior in individuals. This finding concurs with research on less severe forms of deviance, such as alcohol intoxication (Wall et al., 2003), and statutory violations, such as juvenile smoking behaviors (Akers and Lee, 1996). They are also consistent with interventions and recommended best practices promoted in health education (Parcel et al., 1987; WHO, 2009). Finally, these results are consistent with emerging Covid-19-related research, which found that perceptions of others' compliance influence

mitigation efforts (Van Rooij et al., 2020). The support for social learning theory, at least with respect to distancing/contact limitation, suggests that organizations, advertisers, and even individuals should be conscious of the messages they are sending to others when they choose not to comply with Covid-19 mitigation strategies or choose to put our advertisements, as these messages are learned and replicated by others, exasperating high-risk behavior. Conversely, modeling compliance can be effective and should be encouraged.

Conclusion

This research examined factors that explain citizen compliance with two types of responses to mitigate the spread of Covid-19 infections in Russia. Our findings suggest that many of the factors that explain compliance with mandatory requirements for mask-wearing also explain voluntary compliance with social distancing/contact limitation. Among these, fear of infection was the strongest predictor for wearing masks. Fear also predicted voluntary compliance with social distancing, but we found that the social learning perspective had more predictive power. These results are similar to findings from other regions of the world (Burruss et al., 2021; Miguel et al., 2021; Nivette et al., 2021). Self-control, deterrence, social control, and learning constructs also explained compliance with Covid-19 mitigation strategies, suggesting that the explanatory power of these theoretical perspectives stretches cross-nationally and transcends more traditional criminological outcomes, applying to high-risk health-related behaviors.

One of the key limitations of our research is the sampling frame. Given that this is an unfunded research project, the availability of an online format for data collection enabled us to capture information on a critical health crisis in a timely manner. Our sample over-represents females, middle-aged (25–39 years) citizens, and respondents with higher education levels. Therefore, our sample is not necessarily generalizable to the larger population of St. Petersburg, and the findings need to be interpreted cautiously.

Another limitation of this study is that the data are cross-sectional and captured at a time when the recommendations had just been put into force. Furthermore, at the time the data were collected, information about the infection and its aftermath was less clear. While in the short run fear is a strong persuader for compliance, its effect may also be short term. In other words, with time, fear may have a lesser impact on compliance. We need other mechanisms to garner greater compliance with preventive and mitigating public health concerns. As Slovic (1987) noted, those who promote and regulate health safety should have a good sense of how citizens perceive and respond to risks. As the Covid-19 virus mutates and fatigue with Covid-19 regulations increases, fear of contracting the infection may no longer be the most robust explanation for compliance. Of the various explanations, the certainty of punishment has a modest impact, but given the mixed findings for a rule that has a sanction versus just recommended action, learning, and social control theories may still be the critical approaches to rely on developing a policy around Covid-mitigating strategies.

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Notes

1. Yandex has been collecting data on Covid-19 infection since the onset of the pandemic. It draws data from multiple sources, including official governmental data from Russia, data collected by Johns Hopkins University in the United States, and a non-governmental organization website, Our World in Data.
2. Our sample is skewed as females are overrepresented in our data. In the larger population of St. Petersburg, females constitute 54.8%. We also compared the age group distributions from our data with those listed in our data source for the St. Petersburg population. In our data, age ranged from 18 to 79 years, while the St. Petersburg population data source provided ranges from 15 to 79. Our data overrepresents citizens aged 25–39 years (39.8% in our sample vs 29.3% in St. Petersburg) and underrepresents the group of 60–79 years (5.7% in our sample vs 21.4% in St. Petersburg). We caution that the percentages for St. Petersburg were not based on the entire population but only on those between 15 and 79 years.

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References

- Akers RL (1977) *Deviant Behavior: A Social Learning Approach*. Belmont, CA: Wadsworth.
- Akers RL (1990) Rational choice, deterrence, and social learning theory in criminology: The path not taken. *Journal of Criminal Law and Criminology* 81(3): 653–676.
- Akers RL and Lee G (1996) A longitudinal test of social learning theory: Adolescent smoking. *Journal of Drug Issues* 26(2): 317–343.
- Anderson AB, Harris AR and Miller J (1983) Models of deterrence theory. *Social Science Research* 12(3): 236–262.
- Anderson LS, Chiricos TG and Waldo GP (1977) Formal and informal sanctions: A comparison of deterrent effects. *Social Problems* 25(1): 103–114.
- Apel R (2013) Sanctions, perceptions, and crime: Implications for criminal deterrence. *Journal of Quantitative Criminology* 29(1): 67–101.
- Arneklev BJ, Cochran JK and Gainey RR (1998) Testing Gottfredson and Hirschi's "low self-control" stability hypothesis: An exploratory study. *American Journal of Criminal Justice* 23(1): 107–127.
- Åslund A (2020) Responses to the COVID-19 crisis in Russia, Ukraine, and Belarus. *Eurasian Geography and Economics* 61(4–5): 532–545.
- Bandura A (1971) *Social Learning Theory*. New York: General Learning Press.
- Bandura A (1977) Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review* 84(2): 191–215.

- Bargain O and Aminjonov U (2020) Trust and compliance to public health policies in times of COVID-19. *Journal of Public Economics* 192: 104316.
- Beccaria C (1972) *On Crimes and Punishment*. New York: Macmillan.
- Bentham J (1970) *The Collected Works of Jeremy Bentham: An Introduction to the Principles of Morals and Legislation*. London: The Athlone Press, University of London.
- Black RA, Serowik KL and Rosen MI (2009) Associations between impulsivity and high risk sexual behaviors in dually diagnosed outpatients. *American Journal of Drug and Alcohol Abuse* 35(5): 325–328.
- Burgess RL and Akers RL (1966) A differential association-reinforcement theory of criminal behavior. *Social Problems* 14(2): 128–147.
- Burruss GW, Bossler AM and Holt TJ (2013) Assessing the mediation of a fuller social learning model on low self-control's influence on software piracy. *Crime & Delinquency* 59: 1157–1184.
- Burruss GW, Holt TJ and Bossler A (2019) Revisiting the suppression relationship between social learning and self-control on software piracy. *Social Science Computer Review* 37(2): 178–195.
- Burruss GW, Jaynes CM, Moule RK, et al. (2021) Modeling individual defiance of COVID-19 pandemic mitigation strategies: Insights from the expanded model of deterrence and protection motivation theory. *Criminal Justice and Behavior* 48: 1317–1338.
- Cardwell SM, Mazerolle L and Piquero AR (2020) Parental attachment and truant rationalizations of antisocial behavior: Findings from a randomized controlled trial. *Journal of Crime and Justice* 43(3): 263–281.
- Chaudhary NK, Solomon MG and Cosgrove LA (2004) The relationship between perceived risk of being ticketed and self-reported seat belt use. *Journal of Safety Research* 35(4): 383–390.
- Clark C, Davila A, Regis M, et al. (2020) Predictors of COVID-19 voluntary compliance behaviors: An international investigation. *Global Transitions* 2: 76–82.
- Cohen P, West SG and Aiken LS (2014) *Applied Multiple Regression/correlation Analysis*. New York: Routledge.
- Cooper JA, Walsh A and Ellis L (2010) Is criminology moving toward a paradigm shift? Evidence from a survey of the American Society of Criminology. *Journal of Criminal Justice Education* 21(3): 332–347.
- DeVellis RF (2016) *Scale Development: Theory and Applications*, vol. 26. Thousand Oaks, CA: SAGE.
- Dillard JP (1994) Rethinking the study of fear appeals: An emotional perspective. *Communication Theory* 4(4): 295–323.
- Dollard J and Miller NE (1950) *Personality and Psychotherapy*. New York: McGraw-Hill.
- Fox KA, Nobles MR and Akers RL (2011) Is stalking a learned phenomenon? An empirical test of social learning theory. *Journal of Criminal Justice* 39(1): 39–47.
- Geerken MR and Gove WR (1975) Deterrence: Some theoretical considerations. *Law & Society Review* 9(3): 497–513.
- Gottfredson MR and Hirschi T (1990) *A General Theory of Crime*. Stanford, CA: Stanford University Press.
- Government of St. Petersburg (2020) Decree “about measures to counteract the spread of a new coronavirus infection in St. Petersburg (COVID-19).” March 13, 2021. No. 121 (with amendments of May 9, 2020).
- Grasmick HG and Bursik RJ, Jr (1990) Conscience, significant others, and rational choice: Extending the deterrence model. *Law & Society Review* 24: 837–861.

- Grasmick HG, Tittle CR, Bursik RJ, et al. (1993) Testing the core empirical implications of Gottfredson and Hirschi's general theory of crime. *Journal of Research in Crime and Delinquency* 30(1): 5–29.
- Ha OK and Beauregard E (2016) Sex offending and low self-control: An extension and test of the general theory of crime. *Journal of Criminal Justice* 47: 62–73.
- Harris LC (2022) Breaking lockdown during lockdown: A neutralization theory evaluation of misbehavior during the Covid 19 pandemic. *Deviant Behavior* 43: 765–779.
- Hinduja S and Ingram JR (2008) Self-control and ethical beliefs on the social learning of intellectual property theft. *Western Criminology Review* 9: 52–72.
- Hirschi T (1969) *Causes of Delinquency*. Berkeley, CA: University of California Press.
- Hoeben EM and Thomas KJ (2019) Peers and offender decision-making. *Criminology & Public Policy* 18(4): 759–784.
- International Monetary Fund (IMF) (2021) Policy responses for Covid-19. Available at: <https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19> (accessed 3 November 2022).
- Kleck G, Sever B, Li S, et al. (2005) The missing link in general deterrence research. *Criminology* 43(3): 623–660.
- Kromrey JD and Rendina-Gobioff G (2002) An empirical comparison of regression analysis strategies with discrete ordinal variables. *Multiple Linear Regression Viewpoints* 28(2): 30–43.
- Langton L, Piquero NL and Hollinger RC (2006) An empirical test of the relationship between employee theft and low self-control. *Deviant Behavior* 27(5): 537–565.
- Leventhal H (1970) Findings and theory in the study of fear communications. In: Berkowitz L (ed.) *Advances in Experimental Social Psychology*, vol. 5. New York: Academic Press, pp. 119–186.
- Lochner L (2007) Individual perceptions of the criminal justice system. *American Economic Review* 97(1): 444–460.
- Loughran TA, Pogarsky G, Piquero AR, et al. (2012) Re-examining the functional form of the certainty effect in deterrence theory. *Justice Quarterly* 29(5): 712–741.
- McCarthy M, Murphy K, Sargeant E, et al. (2021) Policing COVID-19 physical distancing measures: Managing defiance and fostering compliance among individuals least likely to comply. *Policing and Society* 31: 601–620.
- Meers J, Halliday S and Tomlinson J (2021) “Creative non-compliance”: Complying with the “spirit of the law” not the “letter of the law” under the Covid-19 lockdown restrictions. *Deviant Behavior*. Epub ahead of print 13 December. DOI: 10.1080/01639625.2021.2014286.
- Miguel FK, Machado GM, Pianowski G, et al. (2021) Compliance with containment measures to the COVID-19 pandemic over time: Do antisocial traits matter? *Personality and Individual Differences* 168: 110346.
- Mungan MC (2019) Salience and the severity versus the certainty of punishment. *International Review of Law and Economics* 57: 95–100.
- Murphy K and Helmer I (2013) Testing the importance of forgiveness for reducing repeat offending. *Australian and New Zealand Journal of Criminology* 46(1): 138–156.
- Murphy K, Bradford B and Jackson J (2016) Motivating compliance behavior among offenders: Procedural justice or deterrence? *Criminal Justice and Behavior* 43(1): 102–118.
- Murphy K, Williamson H, Sargeant E, et al. (2020) Why people comply with COVID-19 social distancing restrictions: Self-interest or duty? *Australian and New Zealand Journal of Criminology* 53(4): 477–496.
- Nagin DS (2013) Deterrence in the twenty-first century. *Crime and Justice* 42(1): 199–263.
- Neter J, Kutner MH, Nachtsheim CJ, et al. (1996) *Applied Linear Statistical Models*. New York: McGraw-Hill.

- Nivette A, Ribeaud D, Murray A, et al. (2021) Non-compliance with COVID-19-related public health measures among young adults in Switzerland: Insights from a longitudinal cohort study. *Social Science & Medicine* 268: 113370.
- Noone C, Warner NZ, Byrne M, et al. (2021) A scoping review of research on the determinants of adherence to social distancing measures during the COVID-19 pandemic. *Health Psychology Review* 15: 350–370.
- Norman G (2010) Likert scales, levels of measurement and the “laws” of statistics. *Advances in Health Sciences Education* 15(5): 625–632.
- Parcel GS, Simons-Morton BG, O’Hara NM, et al. (1987) School promotion of healthful diet and exercise behavior: An integration of organizational change and social learning theory interventions. *Journal of School Health* 57(4): 150–156.
- Paternoster R (1987) The deterrent effect of the perceived Certainty and severity of punishment: A review of the evidence and issues. *Justice Quarterly* 4(2): 173–217.
- Paternoster R and Brame R (1998) The structural similarity of processes generating criminal and analogous behaviors. *Criminology* 36(3): 633–670.
- Paykani T, Zimet GD, Esmaceli R, et al. (2020) Perceived social support and compliance with stay-at-home orders during the COVID-19 outbreak: Evidence from Iran. *BMC Public Health* 20(1): 1650.
- Piquero AR and Pogarsky G (2002) Beyond Stafford and Warr’s reconceptualization of deterrence: Personal and vicarious experiences, impulsivity, and offending behavior. *Journal of Research in Crime and Delinquency* 39(2): 153–186.
- Piquero AR and Tibbetts S (1996) Specifying the direct and indirect effects of low self-control and situational factors in offenders’ decision making: Toward a more complete model of rational offending. *Justice Quarterly* 13(3): 481–510.
- Plohl N and Musil B (2021) Modeling compliance with COVID-19 prevention guidelines: The critical role of trust in science. *Psychology, Health & Medicine* 26(1): 1–12.
- Pratt TC and Cullen FT (2000) The empirical status of Gottfredson and Hirschi’s general theory of crime: A meta-analysis. *Criminology* 38(3): 931–964.
- Sampson R and Laub JH (1993) *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, MA: Harvard University Press.
- Sellers CS, Cochran JK and Branch KA (2005) Social learning theory and partner violence: A research note. *Deviant Behavior* 26(4): 379–395.
- Şimşekoğlu Ö and Lajunen T (2008) Why Turks do not use seat belts? An interview study. *Accident Analysis & Prevention* 40(2): 470–478.
- Slovic P (1987) Perception of risk. *Science* 236(4799): 280–285.
- Sutherland EH (1947) *Principles of Criminology*, 4th edn. Philadelphia, PA: J. B. Lippincott.
- Umberson D, Crosnoe R and Reczek C (2010) Social relationships and health behavior across the life course. *Annual Review of Sociology* 36: 139–157.
- Van Rooij B, De Bruijn AL, Reinders Folmer C, et al. (2020) Compliance with COVID-19 mitigation measures in the United States. *Unpublished manuscript, Amsterdam Law School & University of California, Irvine School of Law*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3582626
- Wall AM, Thrussell C and Lalonde RN (2003) Do alcohol expectancies become intoxicated outcomes? A test of social-learning theory in a naturalistic bar setting. *Addictive Behaviors* 28(7): 1271–1283.
- WHO (2009) Interventions on diet and physical activity: What works: Evidence tables. In: *Interventions on diet and physical activity: What works: Summary report*, p. 48. Available at: https://apps.who.int/iris/bitstream/handle/10665/44139/9789241598255_eng.pdf (accessed 29 December 2021).

- WHO (2021) WHO coronavirus (COVID-19) dashboard. Available at: <https://covid19.who.int/> (accessed 29 December 2021).
- Williams KC (2012) Fear appeal theory. *Research in Business and Economics Journal* 5(1): 1–21.
- Wilson MS (1954) Pioneers in criminology I—Gabriel Tarde (1843-1904). *Journal of Criminal Law and Criminology* 45(1): 3–11.
- Witte K and Allen M (2000) A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior* 27(5): 591–615.
- Yakushova A (2020) Russia surpassed Germany and France in the number of infected with coronavirus. *Vedomosti*, 7 May. Available at: <https://www.vedomosti.ru/society/articles/2020/05/07/829719-chislo-zarazhennih-koronavirusom-v-rossii>
- Yandex Coronavirus Statistics (2020) Statistics for regions and countries. Available at: <https://yandex.ru/covid19/stat#statistics-table>
- Zhao S, Stone L, Gao D, et al. (2020) Imitation dynamics in the mitigation of the novel coronavirus disease (COVID-19) outbreak in Wuhan, China from 2019 to 2020. *Annals of Translational Medicine* 8(7): 1–14.

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