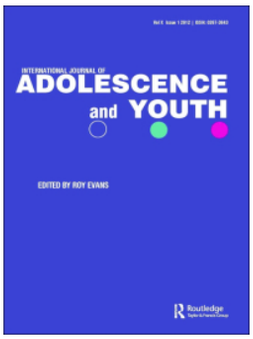

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Marta Anson & Ksenia Eritsyan

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COVID-19 in social networks: unravelling its impact on youth risk perception, motivations and protective behaviours during the initial stages of the pandemic

Marta Anson [a*] and Ksenia Eritsyan [b*]

[a]Centre for Interdisciplinary Basic Research, HSE University, Saint-Petersburg, Russia; [b]Sociology Department, HSE University, Saint-Petersburg, Russia

ABSTRACT

The study explores the roles of youth prosocial, self-interested and controlled motivations to comply with recommended protective behaviour during the initial stages of the COVID-19 pandemic. We test the interrelations of awareness of COVID-19 cases in social network, risk perception, motivation and behaviour, via structural equation modelling on self-reported data from 1,265 undergraduate university students. Analysis identified prosocial motivation and self-interested motivation as equally strong for predicting young people's behaviour while controlled motivation revealed no association. The presence of known COVID-19 cases in social networks could differently affect perceived risks of disease and motivation to comply with protective measures. While awareness of severe consequences positively affects motivation, awareness of mild cases, in contrast, decreases perceived disease severity.

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COVID-19; protective behaviour; perceived severity; perceived susceptibility; controlled motivation; prosocial motivation

The COVID-19 pandemic has pushed healthcare systems during the outbreak to their limits (Haldane et al., 2021). One of the reasons for this crisis was the inability to gain the population's full compliance with protective measures (Georgieva et al., 2021). It is even more difficult in the case of the young population: recent research (Shushtari et al., 2021; Wright et al., 2020) indicates that young adults adhere to COVID-related protective behaviours less compared to other age groups. This could be partly explained by the fact that at the beginning of the pandemic the young generation were treated by health professionals as less vulnerable to COVID-19 (Utych & Fowler, 2020).

However, it is important not to underestimate the importance of youth during the pandemic. Although the younger population has overall lower disease severity, they are not immune to COVID-19 and a significant part is medically vulnerable (Adams et al., 2020). However, even young people with vulnerability demonstrate similar insufficient adherence to protective behaviour as those at lower risk (Yang et al., 2020).

Another reason why the young population is especially important is that they might significantly contribute to the disease spread due to their high social activity (Hâncean et al., 2021) and geographical mobility (Monod et al., 2021).

CONTACT Ksenia Eritsyan ksenia.eritsyan@gmail.com
*These authors contributed equally to this work.
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Protective behaviour and motivation

In order to decrease the spread of disease, people should proceed with plenty of various protective measures including mask wearing, keeping social distance and avoiding gatherings. Extensive public health campaigns and new regulations have been introduced worldwide in order to increase people's motivation to practise the whole range of those behaviours. However, the motivation might be of a different nature. Based on the ideas of self-determination theory (Deci & Ryan, 2012) one of the crucial distinctions is the one between autonomous and controlled motivations. While the controlled motivation implies externally pressurized compliance, the autonomous one denotes voluntary compliance as a person sees the value of a certain behaviour. Compared with the autonomous motivation, the controlled one has been shown to be less related to the actual implementation of the health behaviour (Ng et al., 2012) and by its nature such motivation depends on the presence and salience of the rewards or sanctions for (non)compliance.

In recent research, adherence to such health-protective measures is commonly studied using a single construct which combines different behaviours as a composite measure (e.g. Lavallee et al., 2021; Lin et al., 2020; Nofal et al., 2020) or using one particular behaviour as an example (e.g. Badillo-Goicoechea et al., 2021; Hajdu et al., 2022). This oversimplification could limit the opportunities to generalize such findings due to the fact that protective behaviours vary greatly by their attributes including the (perceived) effectiveness of disease mitigation, the physical and social costs of adherence, and controllability by authorities. The last attribute directly resonates with the idea of controlled motivation. For example, such recommendations as face mask wearing could more easily be enforced and therefore affected by controlled motivation. While those that are less visible and vaguer, like the quality of hand washing or keeping social distance, are less easy to control and could be more resistant to external pressure.

In the present study, we separately investigate six different protective behaviours recommended by government authorities and medical organizations to answer the following research question and hypothesis:

RQ1. How motivation variables vary in their ability to predict the different types of COVID-19 protective behaviours.

Hypothesis 1. Controlled motivation better predicts more visible and sanctioned behaviours (wearing a mask in public places) compared to those generally less visible and/or less sanctioned for non-compliance during the period of the study (staying at home, social distancing, wearing gloves or using a napkin to avoid touching surfaces in public places, washing hands and avoiding contact with elderly people).

Autonomous motivation also has different natures: recent approaches distinguish between the self-interested ('do not get it') or prosocial ('do not spread it') motivations behind the efforts to avoid disease (Jordan et al., 2020). In the case of COVID, since young people's perception of personal risk is low (Yang et al., 2020), prosocial motivation might be of particular importance (Wang et al., 2021). In this study we further differentiate between targets of the prosocial motivation: protecting society versus ensuring the safety of important others. This differentiation based on the relationship closeness with the ones benefiting from prosocial action has been introduced in the psychology literature arguing that this is important for both understanding the rate and the underlying factors of such actions (Maner & Gailliot, 2007; Saulin et al., 2019). However, in the studies focused on the role of prosocial motivation in the context of COVID-19 that distinction seems to be largely missed. In experimental studies of infection disease prevention, authors usually contrast public (benefiting community) versus personal interests (Jordan et al., 2020; Vietri et al., 2012) leaving out the motivation to protect not the whole community but just the closest ones behind the equation. In this

research we integrate both the dichotomy of autonomous versus controlled motivation with the distinction between the self-interested and two different types of prosocial motivation (protect those closets versus protecting society in general).

Awareness of COVID-19 cases in a personal network, perceived threat, and motivation

But what predicts the motivation to follow the prevention measures? One of the key predictors of the motivation and intention to engage in the protective behaviour is the perception of the disease threat which is conceptualized as the belief that one could catch the disease (perceived susceptibility) and this disease would be harmful for them (perceived severity) (Becker, 1974; Duan et al., 2020; Rogers, 1975). Studies show that the perception of the COVID-19 threat could vary greatly (Dryhurst et al., 2020; Rosi et al., 2021). One of the theoretical explanations for those differences is the social amplification process. Risk perception is transferred and formed by social communication so differences in the structure of the social networks, communication quantity and content could influence the perceived threat (Kasperson et al., 1988; Scherer & Cho, 2003). This line of research has been implemented recently in regard to themes discussed (Lee et al., 2023) and their influence on the COVID-19 perception risk (Dryhurst et al., 2020; Walter et al., 2022). In the current study, we focus on the particular themes which are exclusively shared through the personal networks and as we hypothesize could have influence on the perceived threat – the presence of COVID-19 cases in young people's social network. Although a recent study has not found the effect of celebrities' statements about being infected with COVID-19 on perceived susceptibility and protective health behaviour (Walter et al., 2022) we suppose that this negative result might be partly explained by an insufficient differentiation between cases of different severity.

Presence of COVID-infected individuals in personal network can indicate the possibility of contracting the disease, thereby increasing the perceived susceptibility. However, this presence does not necessarily affect the perception of the disease severity, and therefore the overall perceived threat. Knowing someone with severe consequences of COVID-19 could increase perceived severity while knowing people whose COVID-19 experience was mild might have no or the opposite effect. We also suggest that being exposed to information that someone has severely suffered or died from COVID-19 could also serve as an emotional experience which is a dramatic relief (Prochaska et al., 1997) and directly influence the motivation to protect themselves and others from such risks. This leads us to the following hypotheses:

Hypothesis 2a: The presence of severe or fatal cases in the social network has a significant positive association with the perceived severity and susceptibility.

Hypothesis 2b: The presence of mild cases in the social network has a positive effect on the perceived susceptibility but a negative one on the perceived severity.

Hypothesis 3: The presence of severe or fatal cases in the social network is positively associated with prosocial or self-interested motivation.

The current study

This study combines several theoretical perspectives to clarify the role of different types of motivations and their possible drivers in young people's adherence to COVID-19 protective behaviours.

First, we compare the effects of controlled, self-interested, and two types of prosocial motivations on youth people's adherence to different protective recommendations.

Second, the study determined if, and under which conditions, knowledge about cases in personal social networks has a significant direct effect on the COVID perceived severity and susceptibility, and the type of motivation the person has to adhere to protective measures.

Method

Participants and procedure

The study is based on the data from a convenience sample of 1376 undergraduate students of one of the biggest universities in Saint-Petersburg, Russia. To concentrate on the behaviour of young adults, we have excluded from the analysis data from 78 students 26 years and older. The final sample ($N = 1265$) was primarily composed of females (84%) which is representative of the gender ratio of students at this university. The mean age of participants is 20 y.o. (sd = 1.69; range: 16–25 y.o). Means and standard deviations for all variables are presented in Table S1.1.

The participants were recruited via university mail services and asked to complete an anonymous online survey. The questions regarding COVID-19 experiences were integrated into a routine university monitoring study of students' life. Ethical approval for this study was granted by the Institutional Review Board of Herzen University in Saint-Petersburg (IRB00011060 Herzen State Pedagogical University of Russia IRB#1, record #19). The participants provided consent before a data collection, indicating that they had read and understood the conditions of participation and the aims of the study.

Epidemiological context at the study site

At the time of data collection, 7 months had passed since the WHO declared COVID-19 to be a global pandemic on 11 March 2020 (Cucinotta & Vanelli, 2020). In November 2020, when the data was collected, was the middle of the second wave of COVID-19 pandemic. The number of new daily confirmed cases exceeded the peak of the first wave and was rapidly increasing as well as the number of daily confirmed deaths (Mathieu et al., 2020). Although people were informed about the dangers of the disease, there were just 62 thousand cases detected in Saint-Petersburg with 5 million population so not everybody had yet cases of COVID-19 in their immediate social network (Reports of the Communication Center of the Government of the Russian Federation on the situation with coronavirus, 2020).

Mass vaccination was not available in Russia until 4 December 2020 and non-medical means of protection such as individual health-protective behaviour were the only possible means to mitigate the spread of COVID-19.

The study of government responses to COVID-19 pandemic of BRICS countries (Jiao et al., 2022) classify the strategy taken by Russia as mild mitigation, which focused on close contact tracing and critical patient treatment, supplemented by slight social restrictions. When the second wave began in October 2020, the government restarted prevention and control measures, such as restricting gathering and introduced sanctions for not wearing masks. However, a lockdown policy and an electronic pass system were not adopted for the second wave. Thus, the only behaviour that was legally regulated was wearing masks in public places. The other behaviours included in the current study were only recommended.

After a short period of mixed format in the beginning of 2020–2021 academic year, due to a noticeable increase in the number of cases in the country, in mid-November 2020, universities in Saint-Petersburg were again transferred to a distant learning mode (Valeeva & Kalimullin, 2021). Noteworthy, students faced the same regulations as non-schooled youth as they were not forced to attend classes.

Measures

Since the research questions were implemented within the larger monitoring survey, the measures were chosen considering the need to decrease the burden for respondents and increase the data quality. The construction of all variables was in line with the tools recommended by the WHO for COVID-19 behavioural studies (World Health Organization, 2020).

Protective behaviours

Behaviour implementation was measured based on the 7 days recall period (SteelFisher et al., 2012; World Health Organization, 2020). Six types of behaviour were chosen based on the official recommendations of the local health authorities in the period of the study: staying at home, social distancing, wearing a mask in public places, wearing gloves or using a napkin to avoid touching surfaces in public places, washing hands more often than usual, and avoiding contact with elderly people. Respondents were asked how frequently they perform these behaviours for the last 7 days via a 5-item Likert scale was used where '1' -' never' and '5' - 'always'.

Perceived severity/susceptibility

The validated measures have been adapted from WHO recommendations (World Health Organization, 2020). Perceived susceptibility in line with the Health belief model was operationalized as the perceived likelihood to catch the decease (Brewer et al., 2007) and was measured by self-reported estimation of chances of being infected with COVID-19 on a 7-item Likert scale where '1' -' low chances' and '7' - 'high chances'. There was an option to skip the question. Perceived severity was measured by self-reported estimation of how mild or severe participants would experience disease if they got it, on a 7-item Likert scale where '1' -' mild' and '7' - 'severe'. There was an option to skip the question.

Motivation variables

Wording for motivation items was adapted from the ones developed in the study of adolescent health protective behaviour (Oosterhoff et al., 2020) to better fit an older population. Final wording of the items was piloted on the small group of students ($N = 7$). Participants were asked to evaluate the personal importance of four reasons for implementing protective behaviour ('to protect yourself', 'to protect significant others', 'to mitigate the spread of the disease', 'to comply with the formal requirements and avoid (non-medical) negative consequences') on a 5-item Likert scale ranging from '1' -' absolutely not important and '5' - 'highly important. The correlation analysis showed the presence of moderate meaningful correlation between three autonomous motivation variables (r ranged from 0.51 to 0.61, $p = 0.000$) and the small correlation between controlled motivation and motivation to mitigate the spread of the disease ($r = 0.07$, $p = 0.01$). Based on this data the items were treated in the model as the separated variables.

Personal acquaintances with cases of COVID-19

The items from the WHO model questionnaire (World Health Organization, 2020) were further developed to be able to differentiate between COVID-19 cases with different severity. Participants were asked if they know personally an individual who has been ill with COVID-19 with one of three outcomes:

- Mild cases: 'COVID-19 was officially diagnosed, and the person had no complications'
- Hospitalization cases: 'COVID-19 was officially diagnosed, and the person was hospitalized'
- Fatal cases: 'The person died from complications associated with COVID-19'.

The respondents answered 'yes' or 'no' for each case. There was an option to skip the question.

Analysis

The data were analysed using structural equation modelling (SEM) in R (lavaan package). The SEM method was chosen as it enables checking the multiple hypotheses and examines the direct and indirect relations in a single model (Ullman & Bentler, 2012). We constructed models for four motivation types. Prerequisite associations between chosen factors were examined with the Pearson correlation analysis to conform the assumptions for further path analysis. Estimation of the parameters was carried out by the method of a diagonal weighted least-squares estimator (DWLS), as recommended for ordinal variables with a non-normal distribution (Mindrila, 2010; Yanuar et al., 2022). The DWLS estimator is applicable as our data set meet the required criteria for the sample size ($N > 800$) (Nye & Drasgow, 2011). To assess model fit of the observed data, we used the comparative fit index (CFI; >0.90; indicates acceptable fit); goodness-of-fit index (GFI; >0.95; indicates good fit); root mean square error of approximation (RMSEA) (<0.08; indicates acceptable fit); standardized root mean residual (SRMR; <0.05; indicates good fit). The model chi-square test was examined, but it was not used in assessing model fit because it has unsatisfactory properties, such as inflation with large sample sizes (Brown, 2015). Data and code can be found in online supplement, the fit measures for the final models are presented in online resource (Table S2)

Results

Protection motivation, adherence to protective behaviour and known COVID-19 cases in personal network: brief descriptive statistics

The proportion of those who highly adhered to the protective behaviour (answered 4 or 5) varied greatly depending on the protective behaviours. While the vast majority reported consistently wearing masks in public places (84%), around half of young people adhered to hand washing (64%), staying at home (56%), avoiding contact with older people (50%) and social distancing (47%). The least frequently practiced behaviour was wearing gloves (23%).

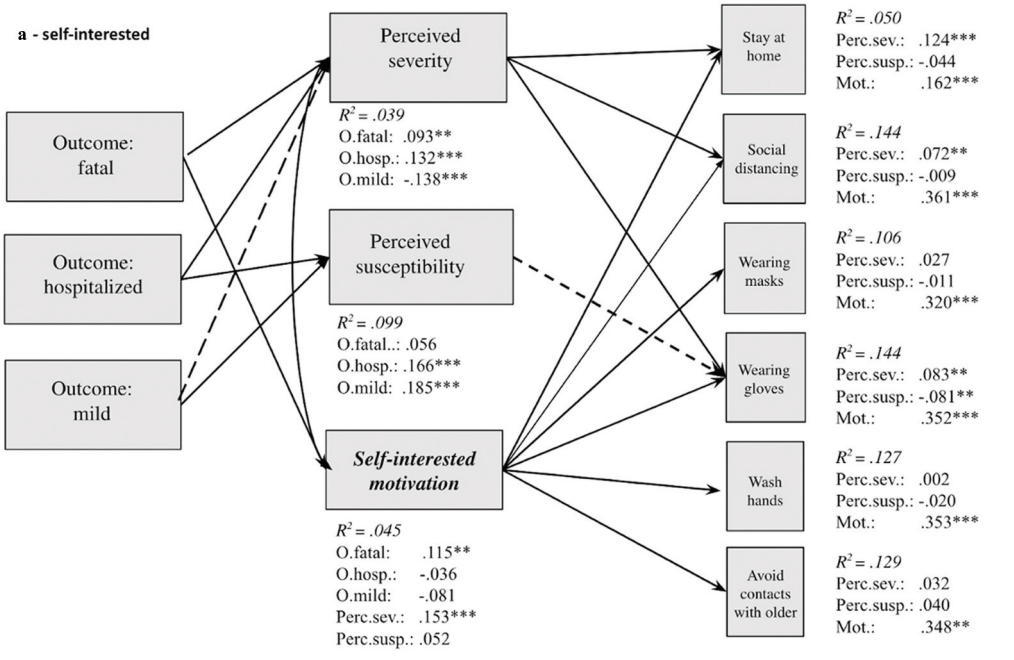
Perceived severity is skewed towards low levels (median = 3.4; SD = 1.4). Just a small proportion of respondents assessed the severity of the disease for themselves as severe or very severe (answered 6 and 7; 7.9%), while a quarter of respondents estimated the danger of being ill with COVID-19 lower or equal to 2 out of 7 (25.1%). Perceived susceptibility was revealed to be normally distributed (median = 4; SD = 1.5).

All four motivation types showed high rates of importance among youth; however, the prosocial motivations seemed to be the prevalent one: strong intention to protect significant others was the leading one (answered "4" and "5": 91%), followed by the motivation to stop spreading (79%). Individualistic (71%) and controlled (75%) motivation types were slightly less among this group.

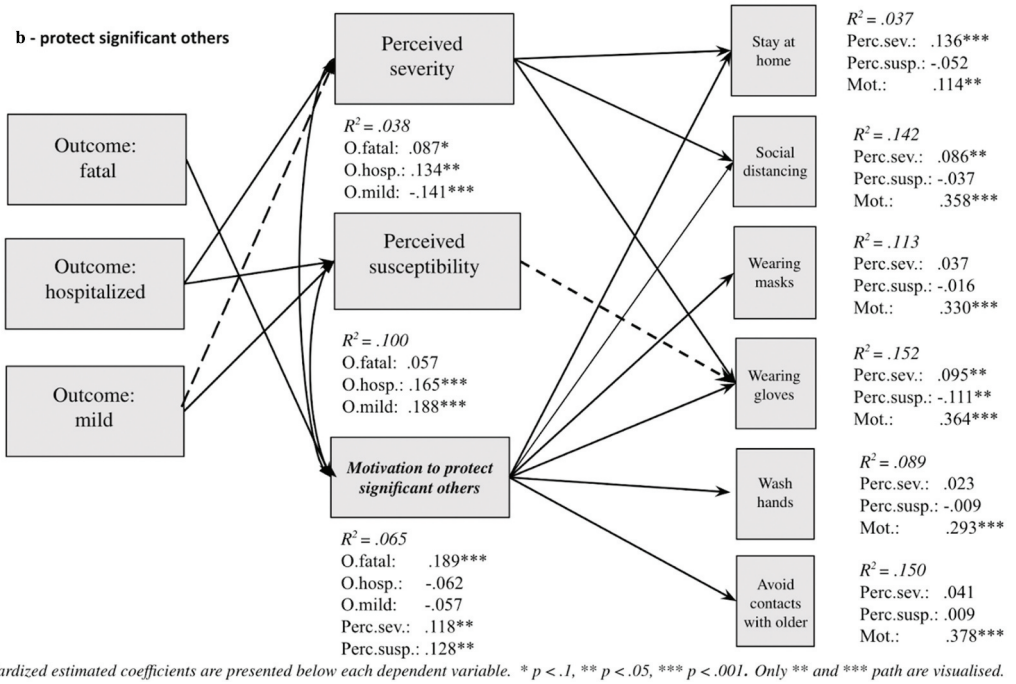
The majority of respondents knew at least one person who endured COVID-19 with minimal distress (74%). Less than half knew someone who had a severe outcome and was hospitalized (42%), and a quarter of participants knew at least one person who died of COVID-19 (25%). For detailed frequencies or descriptive statistics (median and standard deviations) see online resource (Table S1.1 and Table S1.2).

SEM modelling results

Visualization of structural equation models for each motivation type, standardized estimated coefficients and R^2 are presented in Figures 1(a–d). Since those who have already endured COVID-19 ($N = 345$) did not report regarding their perception of disease severity and susceptibility, the data from those participants have not been included in the structural equation modelling.

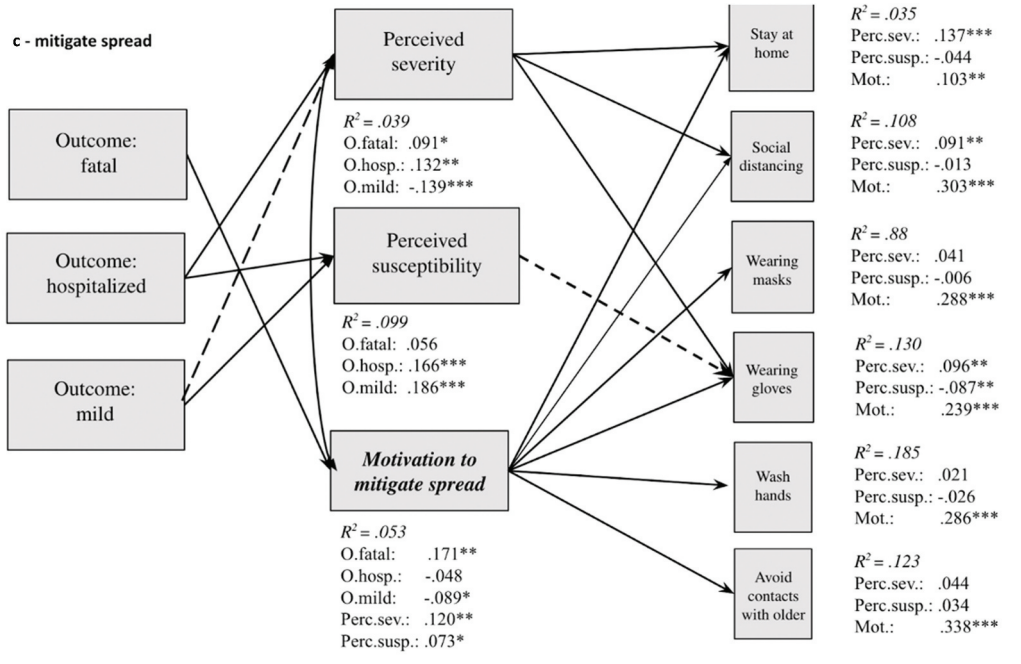


*Standardized estimated coefficients are presented below each dependent variable. * p < .1, ** p < .05, *** p < .001. Only ** and *** path are visualised.*

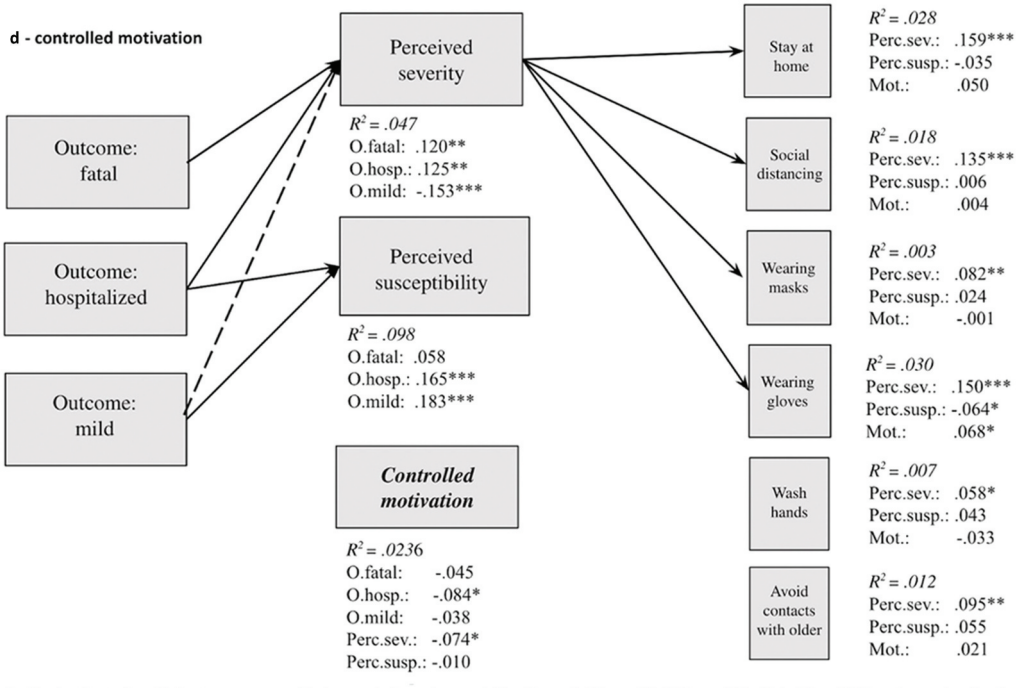


*Standardized estimated coefficients are presented below each dependent variable. * p < .1, ** p < .05, *** p < .001. Only ** and *** path are visualised.*

Figure 1. A-D Structural equation models predicting six behaviours, perceived severity and susceptibility for each of motivation type (A- self-interested motivation; B- protect significant other; C- mitigate spreading; D- controlled motivation) among undergraduate students, Saint-Petersburg, Russia, November 2020 ($n = 920$). *Note: Standardised estimated coefficients are presented below each dependent variable. * p < .1, ** p < .05, *** p < .001.Only ** and *** paths are visualized. Dashed line indicates negative association.*



*Standardized estimated coefficients are presented below each dependent variable. * p < .1, ** p < .05, *** p < .001. Only ** and *** path are visualised.*



*Standardized estimated coefficients are presented below each dependent variable. * p < .1, ** p < .05, *** p < .001. Only ** and *** path are visualised.*

Figure 1. (Continue).

Motivation types and protective behaviour

Motivation variables had a positive association with the protective behaviour. Moreover, motivation was a significantly stronger predictor of behaviour compared to perceived severity and susceptibility (motivation β = .103–.378, perceived severity β = .072–.159, perceived susceptibility β = –.111- –.064), and it affected more types of behaviours inside one model. The notable exception is a controlled motivation – it was not significantly associated with any of six types of protective behaviour. Motivation to protect significant others demonstrated the strongest association with the behaviour among all motivation types (β =.114–.378).

Perceived threat and motivation types

Self-interested and both prosocial motivation types were significantly affected by perceived severity (β =.118–.153). Perceived susceptibility had a significant effect only on motivation to protect significant others (β =.128). Thus, the motivation to protect significant others was the only one significantly affected by both dimensions of perceived threats.

Known COVID-19 cases in personal network, perceived threat and protective motivation

Awareness of COVID-19 cases in a person's network was significantly associated with the perceived threat, but this association varied greatly depending on the health outcomes of those cases. Knowledge of COVID-19 cases that led to hospitalization increases both perceived severity and susceptibility (β = .125–.134 and β = .165–.166 respectively). On the contrary, awareness of cases with the mild form of disease decreases perceived severity with a comparative strength (β= –.153 - –.138).

Both mild and hospitalization outcomes had positive association with perceived susceptibility. However, no association was revealed between the knowledge of fatal outcomes and perceived susceptibility, and it was a significant predictor of perceived severity only for models with self-interested (β = .093) and controlled motivations (β = .120).

No significant association between motivation and awareness of COVID-related hospitalization or mild COVID-19 cases was revealed, while all motivation types, except the controlled one, were positively associated with knowledge of fatal cases (β= .115–189). Moreover, knowing that other people died increases prosocial types of motivation more intensely (protect significant others β = .189.; mitigate spreading β = .171), compared to self-interested motivation (β=.115).

Prediction of various protective behaviours

All variances of behavioural variables were explained with different strengths.

The models including self-interested and prosocial motivation (Models A, B and C) have the highest explanatory power for the wearing of gloves (R2 = .130–152) and avoiding contacts (R2 =.123–150). Models for other behaviours showed relatively close explanatory power: social distancing (R2 = .108–.142), washing hands (R2 =.086–.127) and wearing masks (R2 = .088–.113). The staying at home behaviour is explained by the proposed models significantly poorly (R2 = .035–050).

Overall, among all models the hand washing was better explained by self-interested motivation, social distancing and gloves usage – equally strong by both self-interested motivation and motivation to protect significant others (see Table S3 in online resource). For mask wearing and avoiding contact with vulnerable people, the wish to mitigate the disease spread was comparably important in predicting the behaviour. Explanation of all behaviours using models with the controlled motivations was equally weak.

Perceived severity has a significant positive effect on staying at home, social distancing and wearing gloves in models A, B and C, and additionally on face mask use in model D (controlled motivation). Estimated coefficients were noticeably lower (.013–.125) than for motivation variables (.143–.607). In contrast, perceived susceptibility is directly associated with just one behaviour (wearing gloves) and with a negative effect. The negative pattern is stable in all the models.

Discussion

The COVID-19 pandemic was a global challenge that revealed the need to shape societal adherence to health-protective behaviour, even for populations at lower risk such as young people. The current study investigates previously overlooked factors, such as the presence of those who had COVID-19 with the different outcomes in a person's network, and different motivations to adhere to protective behaviours: self-interested, prosocial, and controlled. To the authors' best knowledge, the present study is the first comprehensive study to assess those factors together.

In our research we simultaneously examined three potential sources of protective behaviours: perceived severity, perceived susceptibility, and motivation. It was found that protective behaviours are infuenced by motivation, however the type of this influence depends on the motivation nature (prosocial, self-interested and controlled). During the COVID-19 pandemic government and health authorities tend to motivate people to adhere to protective behaviour via an appeal to avoid personal health risks as well as the introduction of various punishments for non-compliance. However, the present research highlights that prosocial motivation – aimed at protecting significant others – influences behaviour comparatively or even more greatly than self-interested motivation, and was reported as being of higher importance compared to other motivation types. This result supports previous findings of health-messages' framing effects on behavioural intention (Jordan et al., 2020). The importance of prosocial motives was also detected in relation to such protective behaviours as self-isolation (Petrocchi et al., 2021), social distancing (Oosterhoff et al., 2020) and face-mask use (Badillo-Goicoechea et al., 2021; Pfattheicher et al., 2020). However, to the best of our knowledge, the comparative evaluation of the influence of different motivation types on a wide range of behaviours was not conducted before.

One more distinct feature of this study is that we distinguish between two types of prosocial framing: a desire to protect significant others or to help society in general by mitigating the spread of the disease. This distinction has begun to be studied recently again via experimental studies of behaviour intentions regarding COVID-19 (Marinthe et al., 2022). Our study, utilizing behavioural data, supports the findings that the intention to protect a more intimate group would be more influential than the idea of mitigating the disease among a larger group.

Controlled motivation – the wish to avoid punishment for non-compliance – showed the most limited effect on protective behaviour. It was insignificant for the prediction of any of the measured behaviours in our study including mask wearing, which we hypothesized would be associated with controlled motivation. Overall, this result could be seen in the light of psychological reactance theory (Brehm & Brehm, 1981). When a particular action is felt to be forced, the one which is against the person's will, the person would experience reactance. This reactance would lead to the motivation to restore one's autonomy and be manifest in practice non-compliance (Reynolds-Tylus, 2019). Therefore, the behaviour driven by controlled motivation could be inconsistent – practised when observed and could be punished for non-compliance and not practised in other cases. Overall, the observed behavioural benefit of the autonomous motivation goes in line with the findings of Chan et al. (2021) whereby individuals driven by controlled motivation are more vulnerable to non-adherence in the long term than those with autonomous motivation, especially when the perceived negative health consequences are low, which is the case for the current study of young participants.

As mentioned above, the distinctive feature of the current research is that types of protective behaviour were examined separately to define specific differences between them. First, the proposed model was of different predictive power for different behaviours.

The low explanation power of the models predicting staying-at-home behaviour might be due to the fact that compliance with this recommendation requires more effort from the individual as well as is not always possible for objective reasons. It is noteworthy that behaviours of a lower adherence in the sample are explained better. We suggest that behaviours that are explained worse might be influenced by social norms which were not included in our study (Nivette et al., 2021). Kittel et al. (2021) support this suggestion, especially for a population with low health risks which is often true for young adults. Secondly, behaviours also vary in the factors explaining them. Thus, the majority of behaviours were explained by motivation coupled with perceived COVID-19 severity. Only one behaviour (wearing gloves) was explained by all three factors (motivation, perceived severity, and susceptibility). Further research is needed to explain the difference in factors behind the implementation of the different types of protective behaviour.

We see that among two different dimensions of perceived threat, the perceived severity had a significantly higher influence on behaviour than perceived susceptibility. The current study provides evidence that severity impacts more types of behaviour and influences them to a greater degree. However, in this study, three behaviours (mask wearing, hand washing and avoiding contact with elderly people) had no association with both facets of perceived threat in all examined models. Recent meta-analysis (Liang et al., 2022) supports findings in relation to the use of face masks and hand washing, reporting that there is no association between perceived severity and susceptibility and these behaviours. Moreover, as in the current research, social distancing was significantly associated with perceived severity, but not susceptibility. The only behaviour in which association with perceived susceptibility was significant was wearing gloves, which was a behaviour that young people adhere to the least. Although we expected a positive correlation, a high level of perceived susceptibility has a negative effect on adherence. Similar results were reported by a study using a British sample (Yue et al., 2022) where perceived susceptibility was associated with non-compliance with health policies. We believe that the high levels of perceived susceptibility, meaning there will be no chance to avoid the COVID-19 infection, could be the explanation for the lack of motivation to implement protective behaviour. This hypothesis could be further checked in future studies.

We hypothesized that awareness of COVID-19 cases in a person's social network, together with the outcomes of these cases, affects a person's motivation to comply with recommended behaviours, and also that the awareness affects their conception of severity and susceptibility differently based on the severity of the COVID-19 cases of which they are aware. Both hypotheses were supported in general. We did, however, uncover some unexpected results. Awareness of COVID-19 cases in a social network is positively associated with perceived susceptibility; however, we found no similar association with the awareness of fatal cases. One possible explanation for this finding could be that the perception of susceptibility is mainly related to the presence of living, infected people students could actually meet in person. As we expected, awareness of serious cases in a network, including fatalities, is positively associated with perceived severity; yet, the existence of mild cases was negatively associated for our sample. This last finding opens up a new line of future studies. Future research should investigate how narratives of disease with the different outcomes functions differently within persuasive communication.

An important aspect regarding the impact of known cases in the social network on motivation, according to our study, is that the knowledge of fatal outcomes serves as a direct source of motivation to protect oneself and others. Being aware of diseases with more mild consequences does not have a similar effect. Moreover, fatal outcomes have a stronger impact on prosocial motivations than on the self-interested one. This difference may be attributed to the fact that young people often do not perceive themselves as belonging to an at-risk group for fatal outcomes from COVID-19. Instead, they tend to be more concerned about the well-being of their family members than their own (Yang et al., 2020) so personal adherence to protective measures by young adults may be a mean of reducing risk for others.

This study underscores the necessity for a nuanced understanding behind young people's adoption of protective behaviours. Additionally, it highlights the significant role of personal connections with individuals who have experienced COVID-19 in shaping preventive motivations and behaviours.

Limitations and further research

The study has several limitations. Firstly, due to its focus on students we could not make conclusions as to whether the findings could be relevant for other age groups or are they unique for young people or particular university student populations. Moreover, the sample consists primarily of females. Although we have not found the associations between sex and the behavioural and motivation variables – the primary interest of our study, the overall sample structure could limit the generalizability of reported findings.

Behavioural variables were self-reported and could possibly be prone to self-reporting bias. However, we believe that the proper anonymization applied in the study as well as the fact that the survey questions measured a one-week period which is easy to remember help to mitigate this potential bias. Future studies could try to implement the objective measures of health-protective behaviour. It is unfortunate that the study did not include detailed information on the number of known COVID-19 cases in a social network. This information we believe could provide a more nuanced understanding of the associations between social network structure in regard to COVID-19 and the protective motivation.

Another set of limitations is associated with the analytical strategy. The research evaluated each motivation separately, and there was no possibility to reveal the predominant type of motivation for each observation. In future studies employing ecological momentary assessment or the similar design the predominant motivation in the specific moment for a particular behaviour could be measured to better differentiate between them.

Lastly, the cross-sectional design of the current study does not allow establishing causality and reveal the influence on behaviour over time. A longitudinal cohort study could largely improve the understanding of the proposed factors as changes may occur as the pandemic continues.

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Notes on contributors

Marta Anson is a research assistant in the Centre for Interdisciplinary Basic Research. She holds a bachelor's degree in Sociology and Social Informatics from National Research University Higher School of Economics, Saint-Petersburg, Russia. Her research is focused on the application of psychological theories to the identification of factors that may help to shape health-protective behaviours as well as inner motivation behind the implementation of protective behaviours. She also holds the position of an Analyst in the research department of a digital healthcare IT company.

Ksenia Eritsyan, PhD, is an Associate Professor in the Sociology department of the National Research University Higher School of Economics, Saint-Petersburg, Russia. Her research is focused on identifying and addressing challenges in health-related decision-making as well as implementation of health-related behaviour by different groups, including the most vulnerable. Before earning her PhD in Social Psychology from Moscow State University she has served for 10 years as a head of research in NGO. In that role, she was in charge of planning and carrying out applied public health research on a national and international scale that was supported by major international organizations like the WHO, CDC, and UNODC.

ORCID

Marta Anson http://orcid.org/0009-0004-5004-0702
Ksenia Eritsyan http://orcid.org/0000-0002-4400-0593

Data availability statement

The data that support the findings of this study are openly available in OSF project at http://doi.org/10.17605/OSF.IO/9SKQU.

References

Adams, S. H., Park, M. J., Schaub, J. P., Brindis, C. D., & Irwin, C. E. (2020). Medical vulnerability of young adults to severe COVID-19 illness—Data from the national health interview survey. *The Journal of Adolescent Health*, *67*(3), 362–368. https://doi.org/10.1016/j.jadohealth.2020.06.025

Badillo-Goicoechea, E., Chang, T.-H., Kim, E., LaRocca, S., Morris, K., Deng, X., Chiu, S., Bradford, A., Garcia, A., Kern, C., Cobb, C., Kreuter, F., & Stuart, E. A. (2021). Global trends and predictors of face mask usage during the COVID-19 pandemic. *BMC Public Health*, *21*(1), 2099. https://doi.org/10.1186/s12889-021-12175-9

Becker, M. (1974). The health belief model and sick role behavior. *Health Education Monographs*, *2*(4), 409–419. https://doi.org/10.1177/109019817400200407

Brehm, J. W., & Brehm, S. S. (1981). *Psychological reactance: A theory of freedom and control*. Academic Press.

Brewer, N. T., Chapman, G. B., Gibbons, F. X., Gerrard, M., McCaul, K. D., & Weinstein, N. D. (2007). Meta-analysis of the relationship between risk perception and health behavior: The example of vaccination. *Health Psychology*, *26*(2), 136. https://doi.org/10.1037/0278-6133.26.2.136

Brown, T. A. (2015). *Confirmatory factor analysis for applied research*. Guilford publications.

Chan, K. C. D., Zhang, C.-Q., & Weman-Josefsson, K. (2021). Why people failed to adhere to COVID-19 preventive behaviors? Perspectives from an integrated behavior change model. *Infection Control & Hospital Epidemiology*, *42*(3), 375–376. https://doi.org/10.1017/ice.2020.245

Cucinotta, D., & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. Acta bio-medica. *Atenei Parmensis*, *91*(1), 157–160. https://doi.org/10.23750/abm.v91i1.9397

Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In *Handbook of theories of social psychology* (Vol. 1, pp. 416–436). Sage Publications Ltd. https://doi.org/10.4135/9781446249215.n21

Dryhurst, S., Schneider, C. R., Kerr, J., Freeman, A. L. J., Recchia, G., van der Bles, A. M., Spiegelhalter, D., & van der Linden, S. (2020). Risk perceptions of COVID-19 around the world. *Journal of Risk Research*, *23*(7–8), 994–1006. https://doi.org/10.1080/13669877.2020.1758193

Duan, T., Jiang, H., Deng, X., Zhang, Q., & Wang, F. Government intervention, risk perception, and the adoption of protective action recommendations: evidence from the COVID-19 prevention and control experience of China. (2020). *International Journal of Environmental Research and Public Health*, *17*(10), 3387. Article 10. https://doi.org/10.3390/ijerph17103387

Georgieva, I., Lantta, T., Lickiewicz, J., Pekara, J., Wikman, S., Loseviča, M., Raveesh, B. N., Mihai, A., & Lepping, P. (2021). Perceived effectiveness, restrictiveness, and compliance with containment measures against the Covid-19 pandemic: An international comparative study in 11 countries. *International Journal of Environmental Research and Public Health*, *18*(7), 3806. https://doi.org/10.3390/ijerph18073806

Hajdu, N., Schmidt, K., Acs, G., Röer, J. P., Mirisola, A., Giammusso, I., Arriaga, P., Ribeiro, R., Dubrov, D., Grigoryev, D., Arinze, N. C., Voracek, M., Stieger, S., Adamkovic, M., Elsherif, M., Kern, B. M. J., Barzykowski, K., Ilczuk, E., Martončik, M. . . . Szaszi, B. (2022). Contextual factors predicting compliance behavior during the COVID-19 pandemic: A machine learning analysis on survey data from 16 countries. *PLOS ONE*, *17*(11), e0276970. https://doi.org/10.1371/journal.pone.0276970

Haldane, V., De Foo, C., Abdalla, S. M., Jung, A.-S., Tan, M., Wu, S., Chua, A., Verma, M., Shrestha, P., Singh, S., Perez, T., Tan, S. M., Bartos, M., Mabuchi, S., Bonk, M., McNab, C., Werner, G. K., Panjabi, R., Nordström, A., & Legido-Quigley, H. Health systems resilience in managing the COVID-19 pandemic: Lessons from 28 countries. (2021). *Nature Medicine*, *27*(6), 964–980. Article 6. https://doi.org/10.1038/s41591-021-01381-y

Hâncean, M.-G., Lerner, J., Perc, M., Ghiță, M. C., Bunaciu, D.-A., Stoica, A. A., Mihăilă, B.-E., & Estrada, E. (2021). The role of age in the spreading of COVID-19 across a social network in Bucharest. *Journal of Complex Networks*, *9*(4), cnab026. https://doi.org/10.1093/comnet/cnab026

Jiao, J., Shi, L., Zhang, Y., Chen, H., Wang, X., Yang, M., Yang, J., Liu, M., & Sun, G. (2022). Core policies disparity response to COVID-19 among BRICS countries. *International journal for equity in health*, *21*(1), 9. https://doi.org/10.1186/s12939-021-01614-z

Jordan, J., Yoeli, E., & Rand, D. (2020). *Don't get it or don't spread it? Comparing self-interested versus prosocial motivations for COVID-19 prevention behaviors*. PsyArXiv. https://doi.org/10.31234/osf.io/yuq7x

Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., Kasperson, J. X., & Ratick, S. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis*, *8*(2), 177–187. https://doi.org/10.1111/j.1539-6924.1988.tb01168.x

Kittel, B., Kalleitner, F., Schiestl, D. W., & Daoust, J.-F. (2021). Peers for the fearless: Social norms facilitate preventive behaviour when individuals perceive low COVID-19 health risks. *PLOS ONE*, *16*(12), e0260171. https://doi.org/10.1371/journal.pone.0260171

Lavallee, K. L., Brailovskaia, J., Scholten, S., Schneider, S., & Margraf, J. (2021). Perceptions of macro- and micro-level factors predict COVID-19 self-reported health and safety guidelines adherence. *European Journal of Psychology Open*, *80*(4), 152–164. https://doi.org/10.1024/2673-8627/a000016

Lee, E. W., Zheng, H., Goh, D. H. L., Lee, C. S., & Theng, Y. L. (2023). Examining COVID-19 tweet diffusion using an integrated social amplification of risk and issue-attention cycle framework. *Health Communication*, 1–14. https://doi.org/10.1080/10410236.2023.2170201

Liang, W., Duan, Y., Li, F., Rhodes, R. E., Wang, X., Peiris, D. L. I. H. K., Zhou, L., Shang, B., Yang, Y., Baker, J. S., Jiao, J., & Han, W. (2022). Psychosocial determinants of hand hygiene, facemask wearing, and physical distancing during the COVID-19 pandemic: A systematic review and meta-analysis. *Annals of Behavioral Medicine*, *56*(11), 1174–1187. https://doi.org/10.1093/abm/kaac049

Lin, C.-Y., Imani, V., Majd, N. R., Ghasemi, Z., Griffiths, M. D., Hamilton, K., Hagger, M. S., & Pakpour, A. H. (2020). Using an integrated social cognition model to predict COVID-19 preventive behaviours. *British Journal of Health Psychology*, *25*(4), 981–1005. https://doi.org/10.1111/bjhp.12465

Maner, J. K., & Gailliot, M. T. (2007). Altruism and egoism: Prosocial motivations for helping depend on relationship context. *European journal of social psychology*, *37*(2), 347–358. https://doi.org/10.1002/ejsp.364

Marinthe, G., Brown, G., Jaubert, T., & Chekroun, P. (2022). Do it for others! The role of family and national group social belongingness in engaging with COVID-19 preventive health behaviors. *Journal of Experimental Social Psychology*, *98*, 104241. https://doi.org/10.1016/j.jesp.2021.104241

Mathieu, E., Ritchie, H., Rodés-Guirao, L., Appel, C., Giattino, C., Ortiz-Ospina, E., Hasell, J., Macdonald, B., Beltekian, D., & Roser, M. (2020). Coronavirus pandemic (COVID-19). *Our World in Data*, Retrieved fromRetrieved from. https://ourworldindata.org/coronavirus

Mindrila, D. (2010). Maximum likelihood (ML) and diagonally weighted least squares (DWLS) estimation procedures: A comparison of estimation bias with ordinal and multivariate non-normal data. *International Journal of Digital Society*, *1*(1), 60–66. https://doi.org/10.20533/ijds.2040.2570.2010.0010

Monod, M., Blenkinsop, A., Xi, X., Hebert, D., Bershan, S., Tietze, S., Baguelin, M., Bradley, V. C., Chen, Y., Coupland, H., Filippi, S., Ish-Horowicz, J., McManus, M., Mellan, T., Gandy, A., Hutchinson, M., Unwin, H. J. T., van Elsland, S. L., Vollmer, M. A. C., & ON BEHALF OF THE IMPERIAL COLLEGE COVID-19 RESPONSE TEAM. (2021). Age groups that sustain resurging COVID-19 epidemics in the United States. *Science: Advanced Materials and Devices*, *371*(6536), eabe8372. https://doi.org/10.1126/science.abe8372

Ng, J. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on Psychological Science*, *7*(4), 325–340. https://doi.org/10.1177/1745691612447309

Nivette, A., Ribeaud, D., Murray, A., Steinhoff, A., Bechtiger, L., Hepp, U., Shanahan, L., & Eisner, M. (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*, 113–370. https://doi.org/10.1016/j.socscimed.2020.113370

Nofal, A. M., Cacciotti, G., Lee, N., & Capraro, V. (2020). Who complies with COVID-19 transmission mitigation behavioral guidelines? *PLOS ONE*, *15*(10), e0240396. https://doi.org/10.1371/journal.pone.0240396

Nye, C. D., & Drasgow, F. (2011). Assessing goodness of fit: Simple rules of thumb simply do not work. *Organizational Research Methods*, *14*(3), 548–570. https://doi.org/10.1177/1094428110368562

Oosterhoff, B., Palmer, C. A., Wilson, J., & Shook, N. (2020). Adolescents' motivations to engage in social distancing during the COVID-19 pandemic: Associations with mental and social health. *The Journal of Adolescent Health*, *67*(2), 179–185. https://doi.org/10.1016/j.jadohealth.2020.05.004

Petrocchi, S., Bernardi, S., Malacrida, R., Traber, R., Gabutti, L., & Grignoli, N. (2021). *Empathy predicts self-isolation behaviour acceptance during coronavirus risk exposure*. PsyArXiv. https://doi.org/10.31234/osf.io/h9yts

Pfattheicher, S., Nockur, L., Böhm, R., Sassenrath, C., & Petersen, M. B. (2020). The emotional path to action: Empathy promotes physical distancing and wearing of face masks during the COVID-19 pandemic. *Psychological Science*, *31*(11), 1363–1373. https://doi.org/10.1177/0956797620964422

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion*, *12*(1), 38–48. https://doi.org/10.4278/0890-1171-12.1.38

Reports of the Communication Center of the Government of the Russian Federation on the situation with coronavirus (2020, January, 16). https://стопкоронавирус.рф/info/ofdoc/reports/

Reynolds-Tylus, T. (2019). Psychological reactance and persuasive health communication: A review of the literature. *Frontiers in Communication*, *4*, 56. https://doi.org/10.3389/fcomm.2019.00056

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology: Interdisciplinary & Applied*, *91*(1), 93–114. https://doi.org/10.1080/00223980.1975.9915803

Rosi, A., van Vugt, F. T., Lecce, S., Ceccato, I., Vallarino, M., Rapisarda, F., Vecchi, T., & Cavallini, E. (2021). Risk perception in a real-world situation (COVID-19): How It changes from 18 to 87 years old. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.646558

Saulin, A., Baumgartner, T., Gianotti, L. R. R., Hofmann, W., & Knoch, D. (2019). Frequency of helping friends and helping strangers is explained by different neural signatures. *Cognitive, Affective, & Behavioral Neuroscience*, *19*(1), 177–186. https://doi.org/10.3758/s13415-018-00655-2

Scherer, C. W., & Cho, H. (2003). A social network contagion theory of risk perception. *Risk Analysis: An International Journal*, *23*(2), 261–267. https://doi.org/10.1111/1539-6924.00306

Shushtari, Z. J., Salimi, Y., Ahmadi, S., Rajabi-Gilan, N., Shirazikhah, M., Biglarian, A., Almasi, A., & Gharehghani, M. A. M. (2021). Social determinants of adherence to COVID-19 preventive guidelines: A comprehensive review. *Osong Public Health and Research Perspectives*, *12*(6), 346–360. https://doi.org/10.24171/j.phrp.2021.0180

SteelFisher, G. K., Blendon, R. J., Ward, J. R., Rapoport, R., Kahn, E. B., & Kohl, K. S. (2012). Public response to the 2009 influenza a H1N1 pandemic: A polling study in five countries. *The Lancet Infectious Diseases*, *12*(11), 845–850. https://doi.org/10.1016/S1473-3099(12)70206-2

Ullman, J. B., & Bentler, P. M. (2012). Structural equation modeling. *Handbook of Psychology*. Second Edition. https://doi.org/10.1002/9781118133880.hop202023

Utych, S. M., & Fowler, L. (2020). Age-based messaging strategies for communication about COVID-19. *Journal of Behavioral Public Administration*, *3*(1). https://doi.org/10.30636/jbpa.31.151

Valeeva, R., & Kalimullin, A. (2021). Adapting or changing: The COVID-19 pandemic and teacher education in Russia. *Education Sciences*, *11*(8), 408. https://doi.org/10.3390/educsci11080408

Vietri, J. T., Li, M., Galvani, A. P., & Chapman, G. B. (2012). Vaccinating to help ourselves and others. *Medical Decision Making*, *32*(3), 447–458. https://doi.org/10.1177/0272989X11427762

Walter, N., Saucier, C. J., Cohen, J., & Cohen, J. (2022). *Making it real: The role of parasocial relationships in enhancing perceived susceptibility and COVID-19 protective behavior*. Media Psychology.

Wang, M.-T., Scanlon, C. L., Hua, M., & Toro, J. D. (2021). Safely social: Promoting and sustaining adolescent engagement in social distancing during the COVID-19 pandemic. *Journal of Adolescent Health*, *68*(6), 1059–1066. https://doi.org/10.1016/j.jadohealth.2021.03.014

World Health Organization. (2020). Survey tool and guidance: Rapid, simple, flexible behavioural insights on COVID-19: 29 July 2020 (No. WHO/EURO: 2020-696-40431-54222).

Wright, L., Steptoe, A., & Fancourt, D. (2020). *What predicts adherence to COVID-19 government guidelines? Longitudinal analyses of 51,000 UK adults*. preprint. https://doi.org/10.1101/2020.10.19.20215376

Yang, X. Y., Gong, R. N., Sassine, S., Morsa, M., Tchogna, A. S., Drouin, O., Chadi, N., & Jantchou, P. (2020). Risk perception of COVID-19 Infection and adherence to preventive measures among adolescents and young adults. *Children*, *7*(12), 311. https://doi.org/10.3390/children7120311

Yanuar, F., Uttaqi, F. N., Zetra, A., Rahmi, I., & Devianto, D. (2022). The comparison of WLS and DWLS estimation methods in SEM to construct health behavior model. *Science and Technology Indonesia*, *7*(2), 164–169. https://doi.org/10.26554/sti.2022.7.2.164-169

Yue, R. P. H., Lau, B. H. P., Chan, C. L. W., & Ng, S.-M. (2022). Risk perception as a double-edged sword in policy compliance in COVID-19 pandemic? A two-phase evaluation from Hong Kong. *Journal of Risk Research*, *25*(9), 1131–1145. https://doi.org/10.1080/13669877.2021.1936612