Brief report

JHP

Journal of Health Psychology
2024, Vol. 29(4) 358–364

DOI: 10.1177/13591053231201038
journals.sagepub.com/home/hpq
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The moderating role of trust in pandemic-relevant institutions on the relation between pandemic fatigue and vaccination intentions

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Abstract

This research helps to clarify the relation between *pandemic fatigue* (PF) and vaccination intentions (VI). Theoretically, two patterns seem plausible. First, as with any other health protective measure, PF might reduce the motivation to get vaccinated. Second, PF might increase the motivation to get vaccinated because vaccination reduces the number of (other) health protective measure needed. We tested these two opposing predictions and further explored the moderating role of trust in pandemic-relevant institutions on the link between PF and VI in two large-scale survey studies from Denmark and Germany (collected between 2020 and 2021; total $N > 22{,}000$). Data was analyzed using multiple regression models. Analyses reveal a negative link between PF and VI that is less pronounced for people high in trust. Results remain stable when accounting for covariates and quadratic trends. Thus, trust might buffer the negative relation between PF and VI.

Keywords

adherence, corona, COVID-19, health psychology, pandemic fatigue, quantitative methods, regression, trust, vaccination intentions

During pandemics, it is crucial that people adhere to health protective measures aimed at mitigating the overall infection rate. This includes getting vaccinated as soon as safe and effective vaccines are available. However, the development of such vaccines and their distribution takes time (Excler et al., 2021). Before vaccination is even possible, other health protective measures, such as mask wearing or physical distancing, are typically required (Haug et al., 2020). A key challenge in this

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regard is that adherence to such measures has been shown to decline steadily over time (Petherick et al., 2021). One plausible explanation for this trend is (the rise of) *pandemic fatigue* (PF), defined as a "gradually emerging subjective state of weariness and exhaustion from, and as a general demotivation towards, following recommended health-protective behaviors" (Lilleholt et al., 2020: 4). Indeed, previous research has found negative relations between PF and public adherence to various health protective measures (e.g. González-Herrera et al., 2022; Lilleholt et al., 2020).

While the relation between PF and public adherence to health protective measures has been firmly established, less is known about the relation between PF and vaccination intentions (VI). Here, two opposing patterns could be expected. On the one hand, as with any other health protective measure, PF might reduce peoples' VI. That is, higher levels of PF could reduce peoples' motivation to get vaccinated (what some observational studies seem to suggest, e.g. Cleofas and Oducado, 2022; Kyprianidou et al., 2022). On the other hand, if vaccination reduces the number and/or stringency of other health protective measures needed, PF might increase peoples' VI. That is, higher levels of PF could increase peoples' motivation to get vaccinated to put an end to, or be exempted from, the health protective measures put in place to control the development of a pandemic (Zaman et al., 2022).

An important factor that might influence this relation is whether people believe that (i) the vaccination is safe and (ii) that getting vaccinated is beneficial for them. For this, trust in experts (e.g. doctors, scientists) and governmental institutions (e.g. federal state, health ministries) is crucial. Indeed, trust in the effectiveness of vaccines and health authorities has been suggested as one of seven factors determining vaccination readiness (Geiger et al., 2022), and was further found to be associated with VI itself (Kyprianidou et al., 2022; Lindholt et al., 2021). Consequently, extending previous research, we propose trust as a moderator of the relation between PF and VI. That is, trust in experts and governmental institutions might influence any association between PF and people's VI.

To test the two opposing perspectives on the relation between PF and VI as well as to explore the potential moderating role of trust, we rely on data from two large-scale studies conducted in Denmark (Study 1; $N = 11{,}026$) and Germany (Study 2; $N = 11{,}734$).

Study 1

Method

Sample and design. Data used in this study were collected as part of the *COVID-19 Snapshot Monitoring in Denmark* (COSMO-Denmark; Böhm et al., 2020; Zettler et al., 2021; for an overview of all publications using this data set see https://cosmo-denmark.dk/publications.html). Participants stem from a large pool of potential participants representative of the Danish adult population concerning age and sex. Specifically, people from this pool were invited to take part in different surveys related to COVID-19 over the course of several months between 2020 and 2021. Data handling approval for COSMO-Denmark was obtained from the University of Copenhagen (#514-0136/20-2000). Participation was voluntary and informed consent was obtained from all participants.

For the present analyses, only complete data of the repeated cross-sectional study was used from respondents unvaccinated against SARS-CoV-2 at the time of the survey. All waves including all variables of interest (i.e. PF, trust, and VI) were included in the analyses; that is, 23 waves (from calendar week 43, 2020 until calendar week 33, 2021) comprising data from $N = 11{,}026$ participants (gender: 55% female, 45% male; $M_{Age} = 55.0$, $SD_{Age} = 15.6$ years).

Measures. PF was measured with the *Pandemic Fatigue Scale* presented in Danish (PFS; Lilleholt et al., 2020). The PFS measures PF with six items, half of them indicating *behavioral*

fatigue and the other half *information fatigue*. For the main analyses, we use the overall score over all six items (Cronbach's $\alpha = 0.83$). In the supplementary analyses, we also report separate results for behavioral and informational fatigue, respectively.

Trust in governmental institutions and experts was measured using four items asking participants how much confidence they have that experts (e.g. scientists), doctors and hospitals, politicians, or state authorities are capable of handling the COVID-19 pandemic well. We used the mean over all four items for all analyses (Cronbach's $\alpha = 0.82$).

Vaccination intention was measured with a single item ("*If a vaccine against the novel coronavirus (COVID-19) becomes available, I would get it*"). All answers were given on a seven-point Likert-type scale ranging from 1 to 7 (see the documentation in the Supplementary Materials for the exact anchors for each variable).

Analyses. All effects were tested using multiple regression models. Specifically, we ran a regression model with PF, trust, and their interaction term as predictors (all z-standardized) and VI as the outcome. Further, we ran additional robustness analyses. First, we introduced the time of assessment and participants' age and gender as covariates. Next, we added quadratic terms for the main effect of PF and trust, because a (linear) interaction can become significant merely because a significant quadratic main effect is not accounted for in a regression model (Dawson, 2014). Following recommendations by Dawson (2014), if a quadratic main effect turned out significant, we ran a final model which included an interaction term between the quadratic trend of one predictor and the linear trend of the other, as well as all other covariates. To account for possible violation of the assumptions of linear regressions models, we evaluated statistical significance of all effects based on 95% confidence intervals obtained from (non-parametric) bootstrapping with 5000 iterations. All analyses were conducted in R version 4.2.1 (R Core Team, 2023).

Results and discussion

For descriptive statistics as well as pairwise correlations for all variables included in the main analyses, see Table S1 in the Supplemental Materials. Regarding the relation between PF and VI, the results of the multiple regression model (see Figure S1 in the Supplemental Materials) suggest an overall negative relation, $\beta = -0.14$, 95% CI [−0.17; −0.11]. Furthermore, a positive relation between trust and VI was found, $\beta = 0.37$, 95% CI [0.34; 0.41]. Lastly, the moderation of the relation between PF and VI moderated by trust was also significant, $\beta = 0.13$, 95% CI [0.11; 0.17]. This means that higher levels of trust served as a buffer against the negative relation between PF and VI. Additional supplementary analyses led to the same conclusions (see the supplementary analyses in the Supplemental Materials for details).

The expected moderation of trust was thus supported by the data. The average level of VI was quite high, however, so that the interpretation of the effects may be limited due to a ceiling effect of VI in the current sample. Also, the current analyses were explorative. Consequently, we tested the replicability of the obtained results in another country with lower VI. To this end, we used a German sample, because Germany is comparable to Denmark in several regards (e.g. political system), while VI and trust have been reported to be lower in Germany as compared to Denmark (Lindholt et al., 2021).

Study 2

Based on the theoretical arguments presented above and the findings from Study 1, we preregistered the following hypotheses (H; see https://aspredicted.org/cw66w.pdf):

H1: *PF is negatively related to VI.*

H2: *Trust is positively related to VI.*

H3: *Trust moderates the relation between PF and VI. That is, higher levels in trust are*

associated with a less negative association between PF and VI.

Method

Sample and design. Data used in this study were collected as part of the *COVID-19 Snapshot Monitoring in Germany* (COSMO-Germany; Betsch et al., 2020; for an overview of all publications using this data set see https://projekte.uni-erfurt.de/cosmo2020/web/publications/). It consists of 70 consecutive waves (between March 2020 and November 2022) assessing various factors related to the COVID-19 pandemic in Germany. Participants have been recruited and financially remunerated by a professional online panel provider. Each wave was recruited quota-representatively for the German adult population regarding age, gender, and federal state. COSMO-Germany obtained ethical clearance from the University of Erfurt (#20200302/20200501), and all participants provided informed consent prior to participation.

To keep the dataset comparable to the Danish sample in terms of the time of assessment, we included all waves between October 2020 and August 2021 containing all PF, trust, and VI items (16 waves in total). That is, complete datasets from Waves 24, 26, 31–35, 37–44, and 49 were included. This led to a sample size of $N = 11{,}734$ (Gender: 49% female, 51% male; $M_{Age} = 44.3$, SD = 15.6 years) for the present analyses.

Measures. PF was measured with the *Pandemic Fatigue Scale* presented in German (PFS; Lilleholt et al., 2020). Again, we used the mean over all six items (Cronbach's $\alpha = 0.86$) for the main analyses but report separate results for both behavioral and informational fatigue in supplementary analyses.

Trust in governmental institutions and experts was measured using 10 items asking participants how much confidence they have that experts (four items, i.e. science, World Health Organization, doctors, and hospitals) and governmental institutions (six items, i.e. federal government, Robert-Koch-Institute, Federal Centre for Health Education (BZgA), State Ministry of Health, Federal Ministry of Health, and local health authority) are capable of handling the novel coronavirus well and correctly. We used the mean over all 10 items for all analyses, as internal consistency was high (Cronbach's $\alpha = 0.94$). Additionally, we report the results using the two trust subscales in supplementary analyses.

Analyses. All analyses were preregistered. We used the same procedure as in Study 1: We ran a multiple regression model with the main effects of PF and trust (z-standardized) and their interaction effect in order to test all hypotheses. Furthermore, the same supplementary analyses were run as in Study 1 to confirm the robustness of the effects. Additionally, to enhance comparability between the analyses of both studies, an exploratory model with only four trust items—those with the clearest content overlap with the four items from the Danish sample—was run (see supplementary analyses for details).

Results and discussion

Descriptive statistics as well as pairwise correlations of all variables are summarized in Table S2 in the Supplemental Materials. The results of the multiple regression model (see Figure S1 in the Supplemental Materials) supported all hypotheses. That is, there was a negative relation between PF and VI (H1), $\beta = -0.37$, 95% CI [−0.42; −0.33], as well as a positive relation between trust and VI (H2), $\beta = 0.81$, 95% CI [0.76; 0.85]. Moreover, in line with H3, the moderation of trust was also significant, $\beta = 0.20$, 95% CI [0.17; 0.24]. Specifically, trust again served as a buffer against the negative relation between PF and VI. Supplementary analyses led to the same conclusions regarding all hypotheses. Taken together, all relations found in Study 1 were replicated.

General discussion

The present article investigated the relation between pandemic fatigue (PF) and vaccination

intentions (VI) during the COVID-19 pandemic using data from two different countries (Denmark and Germany; total $N > 22{,}000$). Two opposing, yet theoretically plausible patterns were sketched, namely, whether PF is associated (i) with higher VI—to put an end to or be exempted from health protective measures—or (ii) with lower VI—as reported for other health protective measures aimed at controlling the development of the pandemic. To integrate both views and supplement previous research, the role of trust in experts and governmental institutions as a potential moderator was investigated.

Results of both studies suggest an overall negative relation between PF and VI, conceptually replicating previous findings (e.g. Kyprianidou et al., 2022). Also, the positive relation between trust and VI is well established in research (e.g. Lindholt et al., 2021)[1] and aligns with the 7C model of vaccination readiness (Geiger et al., 2022). According to this model, trust in experts and governmental institutions (included in the confidence construct) has been identified as one of seven factors influencing vaccination readiness. More importantly, however, the current study advances previous research and the 7C model by lending support for the moderating role of trust. Specifically, simple slope analyses (see Table S3 in the Supplemental Materials for details) revealed that under high levels of trust in the case of the Danish sample, the negative relation of PF and VI became non-significant, while for the German sample the relation only became less negative. Overall, this underlines that trust serves as a buffer against the negative relation of PF and VI. Hence, future research could investigate whether the other factors of the 7C model might also serve as a buffer for the negative relation of PF and VI.

Results are limited due to the correlational design, thus raising the question of causality. Also, the relation might be different for countries outside Europe and for countries in which a vaccine shot does not bring any benefits regarding lifting governmental restrictions. Future research may thus investigate this relation in experimental settings and if it remains stables over more diverse and especially non-WEIRD (Henrich et al., 2010) samples. Moreover, participants were only asked about their intention to get a first dose. Future studies might investigate the effect regarding additional doses. However, it should be noted that all effects regarding the VI for a first dose were overall stable across all waves, except when the sample size was low (see Tables S4 and S5 in the Supplemental Materials).

The results have important implications for policymakers in pandemics. Not only could PF negatively affect VI, but this relation might be bolstered (or buffered) depending on the level of trust in experts and governmental institutions. Overall, the results suggest two levers for maintaining high vaccination intentions. First, policymakers can try to curb pandemic fatigue. This may be achieved by communication strategies that balance the amount of information so that people are not overwhelmed. Second, policymakers may focus on trust. As trust is easier lost than gained, safeguarding people's confidence in governmental and health institutions may help to sustain vaccination intentions despite increasing PF. Open and honest communication, consistency, and reasonableness of measures could help with that (Cantarutti and Pothos, 2022).

Data sharing statement

The current article is accompanied by the relevant raw data generated during and/or analysed during the study, including files detailing the analyses and either the complete database or other relevant raw data. These files are available in the Figshare repository and accessible as Supplemental Material via the Sage Journals platform. Ethics approval, participant permissions, and all other relevant approvals were granted for this data sharing. The data files from the current study are also available in the Open Science Framework repository at https://osf.io/pge2h/.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by a grant from the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) - GRK 2277 "Statistical Modeling in Psychology." Data underlying this research was funded by grants from both the Lundbeck Foundation (R349-2020-592) and the Faculty of Social Sciences, University of Copenhagen (Denmark), to Robert Böhm and Ingo Zettler. COSMO-Germany received external funding by the Robert Koch Institute, Federal Centre for Health Education, Klaus Tschira Foundation, Thuringian Ministry of Economy, Science and Digital Society, and the Thuringian State Chancellery.

Ethics approval

Data handling approval for COSMO-Denmark was obtained from the University of Copenhagen (#514-0136/20-2000). COSMO-Germany obtained ethical clearance from the University of Erfurt (#20200302/20200501).

Pre-registration

Hypotheses and analyses of study 2 were preregistered at https://aspredicted.org/cw66w.pdf.

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Note

1. Note that the supplementary analyses revealed a negative quadratic main effect for trust in both samples. This implies that the positive main effect of trust gets less pronounced for higher levels in trust.

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