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Sensitive attitudes and adherence to recommendations during the COVID-19 pandemic: Comparing direct and indirect questioning techniques[☆]

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ARTICLE INFO

Keywords:

Coronavirus
COVID-19
Indirect questioning
Crosswise model
Randomized response technique
Honesty-humility
Empathy
HEXACO

ABSTRACT

During the COVID-19 pandemic, various behavioral measures were imposed to curb the spread of the virus. In a preregistered study based on a quota-representative sample of adult Danish citizens ($N = 1031$), we compared the prevalence estimates of self-reported handwashing, physical distancing, and attitudes toward the behavioral measures between people surveyed with a direct and an indirect questioning approach (i.e., the crosswise model). Moreover, we investigated two possible predictors of sensitive behaviors and attitudes, namely empathy for people vulnerable to the virus and Honesty-Humility from the HEXACO Model of Personality. We also examined the interaction of both predictors with the questioning format. Survey participants reported more violation of guidelines regarding handwashing and physical distancing when asked indirectly rather than directly, whereas attitudes regarding the behavioral measures did not differ between the two questioning formats. Respondents with less empathy for people vulnerable to COVID-19 reported more violations of handwashing and physical-distancing, and those low on Honesty-Humility reported more violations of physical distancing.

1. Introduction

During the first year of the COVID-19 pandemic, when effective treatments and vaccines were not widely available, governments and health institutions introduced several behavioral guidelines and restrictions aimed at curbing the spread of the novel coronavirus (SARS-CoV-2). These measures included thorough handwashing, physical distancing, and mask-wearing (World Health Organization, 2021). Even after vaccines became available to the public at large in 2021, many restrictions have remained to contain the spread of the virus. To monitor people's attitudes and adherence to these guidelines and restrictions, many countries have introduced regular assessments via online surveys (Betsch et al., 2020). These assessments aimed to learn about people's

acceptance of and adherence to various guidelines and restrictions in order to draw conclusions about their effectiveness. Consequently, acquiring truthful reports from survey respondents is of the utmost importance to the validity of the results and their interpretations. However, in light of the social stigma and legal consequences associated with nonadherence to mandatory rules, it is likely that people's responses were and continue to be affected by social desirability, potentially even when they remain completely anonymous (Tourangeau & Yan, 2007).¹

As a remedy, indirect questioning techniques such as the Crosswise Model (CWM) provide an alternative to direct questioning (DQ), aiming to improve prevalence estimates of socially desirable behavior (Lensvelt-Mulders et al., 2005; Sagoe et al., 2021; Yu et al., 2008). The CWM

[☆] This research was funded by grants from the Lundbeck Foundation (R349-2020-592) and the Faculty of Social Sciences, University of Copenhagen (Denmark) to RB and IZ. Data and R scripts are available at the Open Science Framework (<https://osf.io/m6kdy>).

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¹ Such intentional misreporting of behaviors and attitudes differs from the presumably unintentional effects of self-deception or impression management (e.g., Paulhus, 1986).

fully protects the privacy of participants by rendering the observable responses uninformative with respect to the actual state of the participants. The present study investigates whether responses differ when assessed with direct versus indirect questioning. To this end, we compared the prevalence estimates of self-reported personal hygiene behavior (i.e., handwashing), physical distancing, and attitudes toward measures against the spread of SARS-CoV-2 between people surveyed with a direct and an indirect questioning format. Furthermore, we used logistic regression to predict sensitive behaviors and attitudes by participants' levels in (a) empathy for people vulnerable to the virus and (b) Honesty-Humility from the HEXACO Model of Personality (Zettler et al., 2020). Finally, we tested whether the predictive validity of these individual-differences variables was larger in the indirect format than in the DQ format.

1.1. Theoretical background

The Randomized Response Technique (RRT) is designed to improve the validity of survey responses that can be biased by social desirability (Lensvelt-Mulders et al., 2005; Warner, 1965). RRT is an umbrella term for techniques that cut the link between observable, individual answers and the latent, sensitive attributes. This maximizes the anonymity of the respondents, thereby leading to more honest answers than when asked directly (Heck et al., 2018). The CWM is a specific RRT version in which two questions are asked simultaneously: one refers to the sensitive attribute, and the other to an independent, nonsensitive attribute (e.g., Is your mother's birthday in May or June?). Participants must answer both questions jointly by selecting one of two choice options: (A) the answers to the two questions are both "yes" or both "no," or (B) one answer is "yes" and the other "no." Because the mother's birthday is not known, anonymity is fully protected with respect to answering the sensitive question. However, because the prevalence of the second, nonsensitive attribute is known, the prevalence of the sensitive attribute can be estimated at the group level (Warner, 1965).

The CWM has many benefits compared to classic RRT versions: no random device such as dice or coins is required, it is easier for participants to understand, and it has a symmetric response format, meaning that none of the response options are fully informative regarding the latent sensitive attribute of a respondent (Hoffmann et al., 2015). In the context of a global pandemic, the CWM potentially offers several advantages for measuring socially desirable constructs. It is likely to provide scientists, health institutions, and governments with more precise prevalence estimates when it comes to personal hygienic behavior and attitudes regarding behavioral interventions. More specifically, it is expected that the CWM results in higher prevalence estimates of socially undesirable (sensitive) attributes than DQ (Jensen, 2020). In recent research, both violation of recommendations regarding handwashing (Mieth et al., 2021) and violation of recommendations regarding physical distancing (Jensen, 2020) were estimated to be more common during the pandemic when using the CWM compared to DQ. Compared to previous studies, our study allows for comparing potentially different prevalence estimates for the direct versus indirect questioning formats across different outcome domains. In addition to assessing the self-reported prevalence of handwashing and physical distancing, we also compared the two questioning formats regarding people's attitudes toward measures aimed at curbing the spread of the virus.

Furthermore, our study adds to the current state of research by considering how sensitive attributes are related to individual differences in empathy and personality. Because adhering to behavioral measures, such as physical distancing and mask-wearing, can be considered prosocial behaviors (Cheng et al., in press; Pfattheicher et al., 2020), some studies have examined the relationship of empathy and self-reported physical distancing as well as mask-wearing during the pandemic. For instance, Pfattheicher et al. (2020) found that empathy toward individuals most vulnerable to the virus promoted physical distancing and mask-wearing.

One important personality trait predictive of prosocial behaviors during the COVID-19 pandemic is Honesty-Humility, one of the six factors of the HEXACO model. It represents the tendency to act sincerely and fairly when interacting with other people (Ashton & Lee, 2007). A meta-analysis of the link between different personality traits and prosocial behavior implies a strong association of the latter with Honesty-Humility (Thielmann et al., 2020). Considering that protective behaviors during a pandemic are prosocial acts, it follows that people with a higher score in Honesty-Humility should also tend to show more adherence to regulations, such as handwashing and physical distancing. In line with this reasoning, Zettler et al. (2022) found a significant correlation between Honesty-Humility and adherence to various behavioral recommendations made during the COVID-19 pandemic.

The assumption that indirect questioning methods, such as the CWM, increase the validity of responses also has consequences for correlational analyses. Compared to DQ, the CWM should not only result in larger prevalence estimates of the sensitive attributes but also in larger predictive validity with respect to relevant covariates (Heck & Moshagen, 2018). In the present study, this implies that the link between the two individual-differences variables (i.e., empathy and Honesty-Humility) and sensitive behaviors and attitudes is expected to be stronger when responses are elicited with indirect than with direct questioning.

1.2. Hypotheses and open science statement

Based on the theoretical background, we derived three hypotheses regarding sensitive behaviors (i.e., violation of handwashing and physical-distancing guidelines) and attitudes (i.e., opposition to behavioral guidelines):

Hypothesis 1. The CWM leads to higher prevalence estimates of sensitive behaviors and attitudes compared to DQ.

Hypothesis 2. Sensitive behaviors and attitudes are negatively linked to (a) empathy for people vulnerable to COVID-19 and (b) Honesty-Humility.

Hypothesis 3. (a) Empathy for people vulnerable to COVID-19 and (b) Honesty-Humility have larger predictive validity for the sensitive behaviors and attitudes in the CWM format than in the DQ format.

The study design and main analyses were preregistered prior to data collection (https://aspredicted.org/FJU_OGO). Originally, we also preregistered a fourth hypothesis about the statistical association among the three dichotomous sensitive questions. However, given that the statistical model required to test this hypothesis (i.e., a tailored multinomial processing tree model) was unidentifiable, we do not report any results regarding this hypothesis. After data collection, we also preregistered the reanalysis for the item validation (https://aspredicted.org/YYZ_MQZ). Data and analysis scripts are available at the Open Science Framework (OSF; https://osf.io/m6kdy/?view_only=d97e23bb65fa467d8c40fa30c9cccd03).

2. Methods

2.1. Participants

This study was conducted as part of the COVID-19 Snapshot Monitoring (COSMO) in Denmark (Zettler et al., in press), a (bi-)weekly, repeated cross-sectional survey on Danish citizens' knowledge, perceptions, and behaviors regarding the COVID-19 pandemic.

Participants were randomly sampled from two contact sets from Statistics Denmark, each containing information about approximately 100,000 Danish adults, of which $N = 8000$ were invited in calendar week 41 (October 5 to 11) of 2020 to participate in the current study via the software formr (Arslan et al., 2020). The invitations were sent via the Danish official email system (e-Boks; <https://www.e-boks.com/danmark/en/>).

Before data collection, we performed a sensitivity analysis to assess the statistical power for the usual sample size we expected from the COSMO survey (approx. 10% of the invited participants, thus $N = 800$ in this case). Assuming equal sample sizes of $n = 400$ in the DQ and CWM conditions, and a prevalence of the sensitive attributes of 25% in the CWM format compared to only 15% in the DQ format, the statistical power is 82% for testing [Hypothesis 1](#) at a significance level of $\alpha = 5\%$.

The dataset originally contained 1854 participants. After the exclusion of incomplete data, 1105 adults remained. Additionally, 74 participants were excluded based on the two comprehension questions for the CWM format, so that $N = 1031$ participants remained: $n = 475$ participants in the CWM condition and $n = 556$ participants in the DQ condition. The mean time for filling out the COSMO survey was 32 min.

2.2. Design and measurement of constructs

The three sensitive questions were formulated as follows: (1) "Since the outbreak of the coronavirus, I wash my hands regularly and sufficiently long (at least 20 s) with soap and water." (i.e., adherence to handwashing; similar to [Mieth et al., 2021](#)); (2) "I have violated the official recommendations by having physical contact (e.g., handshakes, hugs and high-fives) with others who are not members of my household." (i.e., violation of physical distancing); (3) "Instead of imposing restrictive counter-measures on society as a whole, people at higher risk from the coronavirus (e.g., elderly people and people with medical preconditions) should, in my opinion, isolate themselves at home or tolerate a possibly severe course of the disease." (i.e., opposition against measures restricting the spread of SARS-CoV-2). The first question concerning handwashing was reversed for the statistical analysis, so that larger prevalence estimates always indicate violations of or opposition to the recommendations.

The relatively complex wording of the sensitive questions could have resulted in misunderstandings or ambiguous responses. Assessing this possibility, an inspection of missing responses did not indicate a specific dropout in the questionnaire when participants encountered the sensitive questions in the DQ format (see Supplemental material). The concurrent validity of the first two sensitive questions (handwashing and physical distancing) in the DQ format was supported by substantial correlations ($r \geq 0.26$; see Supplemental materials) with other questions about the same behaviors that have been regularly included in the COSMO surveys. We also assessed the convergent validity of all sensitive questions in an exploratory way by pairwise correlations with theoretically related constructs, thereby supporting the validity of the three sensitive questions.

In the DQ condition, the response options were "Yes" or "No." Prior to answering the questions in the CWM condition, participants were presented with an introduction and explanation of the CWM format. The instructions highlighted the confidentiality of the CWM format by explaining that the individual answers to the questions could not be detected or recovered. In line with recent recommendations ([Sagoe et al., 2021](#)), two comprehension checks² assessed the participants' understanding of the instructions. The three sensitive questions were displayed on separate screens, each shown jointly with a non-sensitive

² The comprehension checks focused on the sensitive behavior *stealing money from another person*. The non-sensitive attribute was the mother's birthday (in November or December). The instructions for the comprehension checks were: (1) "Let's assume that you have not stolen money once before and your mother's birthday is in April. In this specific case, which of the two response options should you choose?", and (2) "Let's assume that you have stolen money once before and your mother's birthday is in August. In this specific case, which of the two response options should you choose?"

question about the birth month of the participant's mother. To maintain anonymity across the three sensitive questions, we varied the two specific months mentioned for each of the non-sensitive questions.³ In each case, the two response options were "Both statements are true or both statements are false" and "Exactly one statement is true and the other false (irrespective of which one)". Participants were assured that the scientists did not know the birthday of their mothers, and, in turn, could not know the true answer to the sensitive question.

Empathy and Honesty-Humility (as well as other variables) were measured in addition to the sensitive questions. The measure of empathy was derived from previous research regarding empathy for people vulnerable to COVID-19 ([Pfattheicher et al., 2020](#)). It consisted of three items answered on a 7-point Likert scale and had good internal consistency in our sample ($\alpha = 0.86$). An example item was, "I am very concerned about those most vulnerable to the novel coronavirus (COVID-19)." Honesty-Humility was measured via four items from the 24-item Brief HEXACO Inventory (BHI) ([De Vries, 2013](#)) answered on a 5-point Likert scale (e.g., "I find it difficult to lie."). In the present study, Honesty-Humility had a relatively low internal consistency estimate ($\alpha = 0.42$). This is because each of the four items of the BHI refers to a different facet of the Honesty-Humility factor ([De Vries, 2013](#)). Nevertheless, the BHI allows for a valid measurement of Honesty-Humility (e.g., [Roth & Altmann, 2019](#); [Schumacher & Zettler, 2019](#)), especially as compared to other brief measures for the HEXACO dimensions ([Julian et al., 2022](#)).

2.3. Statistical analysis

To estimate the prevalence π for the direct and indirect questioning formats, we used multinomial processing tree models ([Erdfelder et al., 2009](#)). [Fig. 1](#) provides an overview of the model structure and the relevant parameters for the CWM format. Essentially, the statistical model infers the latent prevalence parameter π of a sensitive attribute based on the sample estimates of the observed responses. In practice, maximum likelihood estimation can easily be performed using multi-Tree software ([Moshagen, 2010](#)). We also used multinomial processing tree models to test [Hypothesis 1](#), that is, whether the prevalence estimates for the direct and indirect formats were identical. Under the null hypothesis that the two estimates are identical in the population, the log-likelihood-ratio test statistic (G^2) has a χ^2 -distribution.

To analyze the association between the hypothesized predictor variables and the sensitive attributes ([Hypothesis 2](#)), we used modified logistic regressions ([Hilbig & Moshagen, 2014](#)). Essentially, this approach accounts for the discrepancy between the observed responses and the true latent states in the CWM. We performed the analysis in R using the function `RRlog` from the package `RRreg` ([Heck & Moshagen, 2018](#)) which allows logistic regression with the RRT variable as a criterion. We also used modified logistic regressions to test [Hypothesis 3](#), that is, whether the predictive power of empathy and Honesty-Humility is moderated by the questioning format. For this purpose, we tested the interaction of each predictor with the questioning format (which was effect-coded). First, these interactions were analyzed separately for the two predictor variables; then, we included both predictors in a joint logistic regression model.

3. Results

[Fig. 2](#) shows the maximum likelihood estimates of the prevalence π for each of the three sensitive questions separately for the two questioning formats. In the DQ condition, 7.9% (95% CI: [5.7, 10.2]) reported that they did not wash their hands regularly and sufficiently long,

³ We decided to use the mother's birthday as the non-sensitive question because almost all people know their mother. We did not ask for birthdays of other family members to minimize confusion.

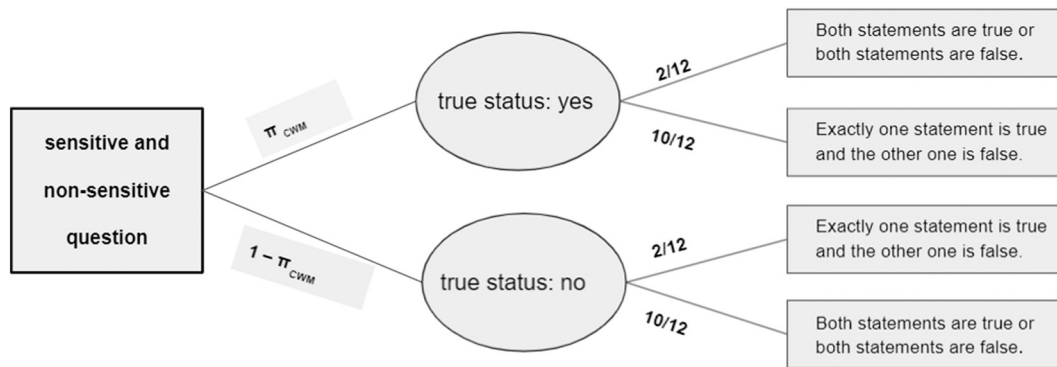


Fig. 1. Multinomial processing tree model for the CWM format.

Note. The two ovals show an individual's true but unknown status on the sensitive attribute whereas the boxes on the right side show the observable responses to the CWM question. The parameter π_{CWM} represents the prevalence of a sensitive attribute and is estimated based on the data. The prevalence of the nonsensitive question (i.e., whether the participant's mother has a birthday in the queried months: January or February; March or April; May or June) is known to be 2/12.

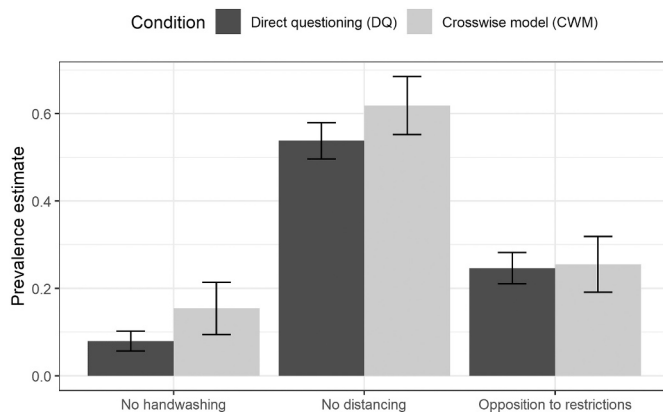


Fig. 2. Prevalence estimates of sensitive behaviors and attitudes during the COVID-19 pandemic.

Note. Error bars show 95% confidence intervals. Larger values indicate a higher prevalence of sensitive behaviors and attitudes.

53.7% (95% CI: [49.6, 57.9]) stated that they violated the physical distancing guidelines, and 24.6% (95% CI: [21.1, 28.2]) found the behavioral measures implemented to curb the spread of the virus unreasonable. In the CWM condition, 15.4% (95% CI: [9.4, 21.4]) reported not obeying regular handwashing, 61.8% (95% CI: [55.2, 68.5]) stated a violation of the physical distancing guidelines, and 25.5% (95% CI: [19.2, 31.9]) found the behavioral measures unreasonable. Note that the widths of the confidence intervals in Fig. 2 vary across questions since the variance of the binomial distribution depends on the prevalence π (i.e., $Var(\pi) = \pi(1 - \pi)/n$). Moreover, the randomization mechanism of the CWM format results in larger confidence intervals compared to the DQ format despite the larger sample size in the CWM condition.

The prevalence estimates differed significantly between the DQ and the CWM formats with regard to handwashing ($G^2(1) = 5.60, p = .018$) and physical distancing ($G^2(1) = 4.03, p = .045$). Supporting Hypothesis 1, these results indicate that participants, on average, reported more violation of guidelines regarding handwashing (+7.5%) and physical distancing (+8.1%) when asked indirectly rather than when asked directly. There was no significant difference between the two formats for people's attitudes toward measures against the spread of SARS-CoV-2 ($G^2(1) = 0.06, p = .812$).

To test Hypotheses 2a and b, we used logistic regression to predict each sensitive attribute by the mean-centered predictors' empathy and Honesty-Humility, respectively. In all six analyses, we included the questioning format as an effect-coded control factor. To estimate the incremental validity of each predictor, we also fitted an alternative

model for each sensitive attribute in which we included both predictors and the questioning format.

When fitting a separate logistic regression model for each predictor (Table 1, first column), empathy significantly predicted the violation of recommendations regarding handwashing (odds ratio of $OR = 0.782, p = .021$), physical distancing ($OR = 0.783, p < .001$) but not the overall opposition to behavioral measures ($OR = 0.884, p = .083$). Honesty-Humility predicted only violations regarding physical distancing ($OR = 0.749, p = .027$) but not regarding handwashing or opposition to measures against the spread of SARS-CoV-2.

Next, we fitted joint logistic regression models including both empathy and Honesty-Humility to test the incremental validity of both predictors (Table 1, second column). This analysis showed that empathy provides an incremental increase of information for the prediction of violations of recommendations regarding handwashing ($OR = 0.779, p = .021$) and physical distancing ($OR = 0.795, p < .001$). Table 2 shows that there was no significant interaction between empathy or Honesty-Humility with the questioning format. Therefore, we concluded that the predictors did not have larger predictive power in the CWM format than in the DQ format.

4. Discussion

Based on a large quota-representative sample of adult Danish citizens, we compared the direct versus an indirect questioning format for investigating socially undesirable behaviors and attitudes regarding the behavioral measures that were introduced to curb disease spread during the COVID-19 pandemic. Specifically, we tested whether the prevalence of socially undesirable behavior was larger in the indirect questioning condition (using the CWM) than in the DQ condition. This was indeed the case for handwashing and physical distancing but not for attitudes toward measures against the spread of SARS-CoV-2. We also tested whether sensitive behaviors and attitudes were negatively linked to individual differences with respect to empathy for people vulnerable to the virus and Honesty-Humility from the HEXACO model. This hypothesis was supported for empathy with regard to two of the three sensitive attributes, via an odds ratio smaller than one for handwashing and physical distancing. However, for Honesty-Humility, such a relation was supported only in one of three cases, via an odds ratio smaller than one for violating the recommendations regarding physical distancing. We also examined whether empathy and Honesty-Humility had a higher predictive power in the CWM than in the DQ format, but our data did not provide evidence for this hypothesis.

Taken together, our results show that some people do not truthfully report their protective behavior during the pandemic. However, when asked about their general attitudes toward measures against the spread of SARS-CoV-2 (rather than when asked about behavioral violations of two

Table 1
Results of logistic regressions for the three sensitive behaviors and attributes.

	Separate logistic regression models			Joint analysis		
	Odds ratio	95% CI	p-Value (2-sided)	Odds ratio	95% CI	p-Value (2-sided)
Violating recommendations regarding handwashing						
Empathy	0.782	[0.638, 0.958]	0.021*	0.779	[0.634, 0.958]	0.021*
Honesty-Humility	0.947	[0.606, 1.481]	0.814	1.043	[0.658, 1.655]	0.856
Violating recommendations regarding physical distancing						
Empathy	0.783	[0.689, 0.891]	<0.001***	0.795	[0.698, 0.905]	<0.001***
Honesty-Humility	0.749	[0.577, 0.971]	0.027*	0.795	[0.610, 1.035]	0.086
Opposition to measures against the spread of SARS-CoV-2						
Empathy	0.884	[0.769, 1.016]	0.083	0.894	[0.776, 1.029]	0.119
Honesty-Humility	0.794	[0.596, 1.058]	0.119	0.815	[0.609, 1.090]	0.172

Note. The predictors' empathy and Honesty-Humility were mean-centered prior to analysis. All models also included condition (CWM versus DQ) as an effect-coded control variable. * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 2
Logistic regression models testing the interaction of the predictors with the questioning format.

	CWM		DQ		Test of difference p-Value (2-sided)
	Odds ratio	95% CI	Odds ratio	95% CI	
Violating recommendations regarding handwashing					
Empathy	0.785	[0.540, 1.143]	0.780	[0.641, 0.999]	0.978
Honesty-Humility	0.723	[0.342, 1.529]	1.080	[0.638, 1.924]	0.403
Violating recommendations regarding physical distancing					
Empathy	0.799	[0.612, 1.042]	0.779	[0.671, 0.900]	0.870
Honesty-Humility	0.774	[0.455, 1.315]	0.741	[0.548, 0.996]	0.889
Opposition to measures against the spread of SARS-CoV-2					
Empathy	0.949	[0.711, 1.268]	0.864	[0.737, 1.015]	0.577
Honesty-Humility	0.732	[0.407, 1.315]	0.814	[0.587, 1.137]	0.755

Note. The predictors' empathy and Honesty-Humility were mean-centered prior to analysis. All models also included condition (CWM versus DQ) as an effect-coded control variable.

specific regulations), participants did not express more socially desirable responses, potentially because they perceived less pressure from social desirability on their attitudes compared to their behaviors.

Regarding predictors of sensitive behavior and attitudes, we found evidence that both empathy for people most vulnerable to the virus and Honesty-Humility are related to the sensitive attributes (Pfattheicher et al., 2020; Zettler et al., 2022; Zettler et al., in press). Importantly, these links appear not to be affected by socially desirable responding in the DQ format. This is good news as it indicates that the link between individual-differences variables and the reporting of sensitive behaviors and attitudes is not moderated by the type of question format.

Despite the advantages of the CWM format, some limitations need to be considered. First, to obtain similarly wide confidence intervals, the CWM requires a larger sample size than DQ (Ulrich et al., 2012). Second, the participants must understand that their answers to the sensitive question cannot be inferred from their observable responses in the CWM format. This requires detailed instruction and may be difficult for some people to understand (Hoffmann et al., 2017).

Schnapp (2019) raised another concern with regard to the CWM, namely, an increased probability of random responding due to misunderstanding or a lack of motivation. Notably, our data also speaks against this alternative explanation, because unsystematic guessing would have biased prevalence estimates toward 50% (Heck et al., 2018),

which cannot explain why the prevalence of not adhering to physical distancing was higher in the CWM condition than in the DQ condition (61.8% and 53.8%, respectively). Finally, it is not clear whether the CWM completely removes any socially desirable responding. Our study relies on the *more-is-better* hypothesis, meaning that higher prevalence estimates of socially undesirable attributes in the CWM format than in the DQ format are interpreted as evidence for the increased validity of indirect questioning (Sagoe et al., 2021). Because false positive responding, noncompliance, and overreporting need to be considered as well, our results should be seen as a conservative estimate of misreporting, as it appears in DQ.

4.1. Conclusions

Overall, the CWM format showed better performance in investigating socially desirable behavior regarding violations of guidelines and restrictions during the COVID-19 pandemic. Indirect questioning methods, such as the CWM, offer an alternative to DQ, which may lead to more accurate and less biased prevalence estimates. Future research assessing sensitive behaviors possibly affected by social desirability should therefore include indirect questioning methods and compare the results to DQ, to estimate (and potentially correct for) the measurement-related bias of prevalence estimates.

CRediT authorship contribution statement

Tabea Kaufmann: Writing – original draft, Formal analysis, Visualization, Validation, Investigation, Conceptualization, Methodology, Software. **Lau Lilleholt:** Resources, Data curation, Writing – review & editing, Project administration, Conceptualization, Methodology. **Robert Böhm:** Funding acquisition, Resources, Data curation, Writing – review & editing, Supervision, Project administration, Conceptualization, Methodology. **Ingo Zettler:** Funding acquisition, Resources, Data curation, Writing – review & editing, Supervision, Project administration, Conceptualization, Methodology. **Daniel W. Heck:** Formal analysis, Visualization, Validation, Writing – review & editing, Supervision, Conceptualization, Methodology, Software.

Declaration of competing interest

The authors have no conflict of interest to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2022.111525>.

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