HEALTH COMMUNICATION
2024, VOL. 39, NO. 1, 148–160
https://doi.org/10.1080/10410236.2022.2162224

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"Compliant Supporters," "Anxious Skeptics," and "Defiant Deniers": A Latent Profile Analysis of People's Responses to COVID-19 Communications

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ABSTRACT

This study investigates whether people's responses to official communications about COVID-19 could be "profiled" with respect to socio-economic-demographic and behavioral characteristics. Such profiles could enhance the effectiveness of future crisis management through the use of profile-adapted communications that maximize message comprehension. A representative web panel survey (742 respondents) was conducted across Switzerland in February 2022 to assess the population's reaction to COVID-19 communications during the pandemic. Latent profile analysis was conducted to explore if distinct profiles of reactions to the communications would emerge, and how each of them relate to conspiracy mentality and SED measures. The analyses revealed three latent profiles: "Compliant supporters" (54%), "defiant deniers" (23.6%), and "anxious skeptics" (22.4%). Respondents with high conspiracy mentality were more likely to belong to "defiant deniers" or "anxious skeptics." Each profile was characterized by distinct SED and behavioral features (discussed in the paper). The COVID-19 pandemic demonstrated that one communication does not work for all people. Our study evidenced three different types of respondent profiles that require profile-adapted communications for more effective crisis control. Our study is the first to profile people's responses to COVID-19 communications in a systematic, person-centered way. The results can be used for more effective future crisis management that delivers to each profile's communicative needs.

Humankind's response to the novel coronavirus resembled ants' reactions to a rock that hit their anthill. It could be summarized in two words: *Frantic chaos*. No one ever saw the rock – but it was talked about in ways that triggered this response.

While research has looked into people's responses to the COVID-19 pandemic (AlAmodi et al., 2021; Douglas et al., 2020; King's College London, 2020; Leung et al., 2022; Salari et al., 2020), little effort has been invested into understanding people's responses to the *communications* surrounding the virus, apart from the "infodemic" that challenged crisis control (Lazarus et al., 2020; Logar et al., 2022; Naeem & Bhatti, 2020; Pian et al., 2021). Unless we are talking about responses to an actual COVID-19 infection, the former focus is misplaced. As long as the virus itself remains invisible to our eyes, there is only a response to the *communication* about the virus, because our communication is the only way through which the virus becomes "tangible" to us.

Once we recognize this important distinction, "frantic chaos" is not a response to the virus anymore, but rather a response to the way we communicated about it. This perspective opens up a more helpful approach to understanding human crisis behavior: Unless everyone communicates exactly the same message about the virus, different opinions will emerge, all of which might be considered as containing equivalent degrees of "truth" – because of course, each actual experience with the virus on which these communications are based varies in intensity and symptomology (Centers for Disease Control and Prevention, 2022), and each of them are "true" perceptions to the person having experienced it. For example, if someone had an asymptomatic infection, why should they believe communications claiming that the virus poses a threat to humankind? In contrast, if a person lost their dear mother to the virus, how could they believe that the virus is *not* a threat to human life? The list goes on, and it encompasses also people silently suffering mental illnesses (Leung et al., 2022; Salari et al., 2020) from the chronic uncertainty maintained through chaotic communications surrounding the pandemic (Logar et al., 2022), whereas those stuck in the "gray zone" in between the opinionated polar extremes have received little recognition or attention in the limelight.

Although an emergence of diverse opinions about the virus is to be expected, given that they are based on different communications and experiences, our frantic reactions to these natural disagreements was estranging. Heated discussions about "truth" and "fake news" suddenly emerged in the form of a frightening infodemic that infected people across the globe alongside the virus, with equivalent threats to public health (Naeem & Bhatti, 2020; Pian et al., 2021). Instead of seeing disagreements as a natural emergence of the diverse

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communications about the virus and searching for sound explanations of how these communications caused societal fragmentation, constructive discussions were paralyzed. People were classified into good and evil (Van Scoy et al., 2022). "Covidiots" and "conspiracy theorists" were labeled and portrayed as a part of humanity whose "stupidity" or reckless behavior destroys society (Urban Dictionary, 2020), whereas those portrayed to be destructive claimed themselves to be strategically destroyed by those who are not in their camps. This absurd societal division continues into 2023, as we are entering new global crises that will challenge our communication in similar ways, tasking us to use our communication with each other to more effectively maintain societal collaboration and peaceful coexistence. What will we do differently to tackle the next global crisis in better ways?

Covid-19 has demonstrated that crisis situations are a communication challenge like no other, calling for the attention of all communication science domains (e.g., Ratzan et al., 2020). We are not reacting to the virus, we are reacting to *communications* about the virus. Yet, studies to this date have merely delivered scattered puzzle pieces to a more holistic understanding of how the pandemic has affected people. They have done so primarily as singular studies and mostly through statistical correlations, taking a variable-centered approach, with very little focus on communication.

Research is needed to "profile" people's responses, not only to the pandemic but to the *communications* surrounding COVID-19 in a more systematic way. Such evidence could be critical for designing effective response protocols for similar global challenges that are already imminent, with energy crisis, economic collapse and climate change discussion penetrating the news all over the world, while new Covid mutations are still keep creeping up. Such protocols could help authorities customize crisis communications to each profile, e.g. by the means of personalized approaches that optimize each recipient's message comprehension and, as a result, effective crisis control.

To provide this missing evidence, we conducted a study to see whether it is possible to identify such "profiles" of people's responses to COVID-19 communications. Given that most of the official communications during COVID-19 were conducted through the government and traditional news media, we particularly looked at people's reactions to these two sources, while also asking them about their relative trust levels in communications they received through the social media, internet, families and friends. Our study took a person-centered rather than variable-centered approach to the matter, addressing the following three research questions:

RQ_1: To what extent can people's responses to official COVID-19 communications (i.e., messages from the Federal Office of Public Health "FOPH" and the traditional news media "TNM") be "profiled" with respect to their:

- Loneliness vs. social engagement during Covid-19
- Ability to comprehend the messages (literacy)
- Information-seeking activities
- Perceived safety and effectiveness of the communications
- Mental health response (depression, anxiety)
- Conflict styles
- Coping tactics
- Risk perceptions
- General attitude toward rule compliance
- Compliance with pandemic measures

RQ_2: To what extent did people's predisposition to believe in conspiracy theories predict belonging to any of the profiles?

RQ_3: Did the profilers differ in terms of their socio-economic-demographic (SED) characteristics?

Method

Sampling and procedures

A representative, cross-sectional web panel survey ("COM-COVID") was conducted across Switzerland in February 2022 to assess the Swiss population's reaction to official COVID-19 communications during the pandemic (i.e., messages about COVID-19 that were communicated through the Swiss FOPH and TNM). The data were collected using a 30-minute questionnaire carried out by the survey company "Polyquest" in Bern. A random sample of existing members of the Swiss national web panel was contacted via personal e-mail to

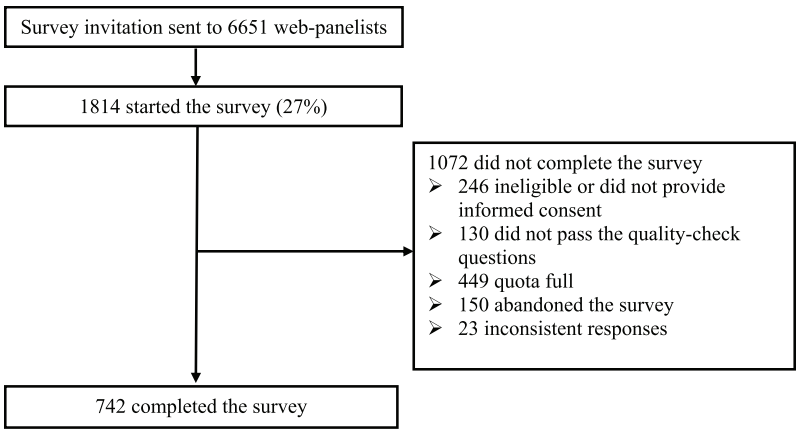

Figure 1. COM-COVID survey recruitment.

participate in the COM-COVID study (see Figure 1). The entire panel consisted of 50.000 Swiss residents, who had been recruited through various channels (e.g. phone, social media, print- and online ads) to reach also "non-heavy" online users.

The composition of the Swiss national web panel reflects the composition of the Swiss population in terms of age, gender and region. Members sign up with the panel and regularly receive e-mails inviting them to take part in surveys. The online panels are run with rigorous recruitment and quality control processes to ensure individuals can only join once and remain attentive throughout the survey. Panelists receive small incentives to participate in surveys in the form of points that can be redeemed for rewards. For the completion of the COM-COVID survey, respondents earned award points equivalent to 5 Swiss Francs.

Eligible participants were at least 18 years of age and had resided in Switzerland for the entire duration of the COVID-19 pandemic. The characteristics gender and age (3 age categories) were quoted interlocked for each of the seven major geographical regions of Switzerland (see Figure 2). In addition, the respondents were randomly split into 2 response groups for each major region, to gather independent assessments of their responses to COVID-19 communications from the (1) FOPH and (2) TNM (TV, radio, newspaper).

Ethical approval was obtained from the ethics committee of the Università della Svizzera italiana (USI). Participants provided informed consent before beginning the survey. The questionnaire can be attained from the first author upon request.

Data analysis

Latent profile analysis (LPA; Spurk et al., 2020) was conducted to explore if distinct profiles of reactions to the Swiss FOPH and news media's pandemic communications would emerge, and how each of them relate to conspiracy mentality. LPA is a person-centered technique that is commonly used for identifying subgroups within heterogenous populations. It identifies such subgroups based on similarities between individuals' response patterns (Masyn, 2013). LPA is mostly used in an exploratory way, for subdividing individuals into latent (i.e. not directly observable) typologies or "profiles" (Flaherty & Kiff, 2012). It relies on maximum likelihood estimations and probability functions to categorize individuals into their most likely "profile," based on their response patterns on some indicator items. Once the estimated responses are calculated for each profile, they can be graphed for each measurement and profile into a single plot, revealing the pattern of responses for each profile. While parallel lines for different profiles suggest uniform response patterns, lines that cross between profiles suggest differentiated response patterns. These response patterns can provide insights into profile members' experiences and behaviors (Williams & Kibowski, 2016). In the context of this study, identifying such profiles might imply that profile-specific communications could serve each profile members' particular communicative needs, improving crisis management and pandemic outcomes.

Instruments

Loneliness

The UCLA 3-item loneliness scale was used for measuringloneliness (Hughes et al., 2004). Participants indicated how often (1 = hardly ever, 4 = always), they felt left out, isolated from others, and in lack of companionship (Cronbach's α = 0.88).

Social engagement

Participants indicated the frequency with which they had face-to-face contact with family members or friends (1 = less than once a month; 2 = once or twice a month; 3 = once or twice a year; 4 = three or more times a week), how often they participated in community group activities, and how often they engaged in cultural activities (1 = never; 2 = once or twice a year; 3 = every few months; 4 = monthly or more) during the COVID-19 pandemic. Participants also rated how frequently

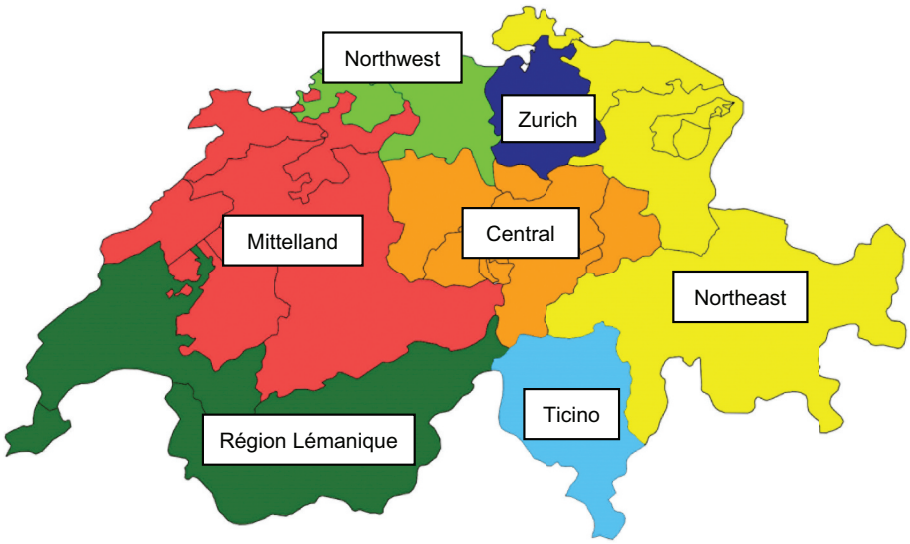

Figure 2. Geographical regions of Switzerland.

(1 = at least once a day; 2 = 1–6 days per week, 3 = 1–4 days per month, 4 = less frequently than once a month) they talked with friends or family members about the coronavirus in person, via telephone call, video call, text message, social media or other ways (α = 0.75).

Literacy

Five items based on Ishikawa et al. (2008) measured participants' functional literacy, defined as the ease with which they were able to understand and comprehend the FOPH's and TNM's messages about Covid-19. Participants rated their difficulty of comprehending the messages on a four-point scale, anchored at 1 = *never* and 4 = *often* (α = 0.86).

Information-seeking during Covid-19

Frequency. A random half the sample was asked to indicate how frequently they accessed eight different news media sources for COVID-19 information (i.e., TV-channels and their websites, newspapers and their websites, radio stations and their websites, Facebook, Twitter, YouTube, Instagram and Telegram) on a scale ranging from 1 (= at least once a day) to 5 (= never). Cronbach's α amounted to 0.71 for the scale. The other random half of the sample was asked to indicate how frequently they followed the FOPH's official communications about the pandemic by visiting its website, watching live broadcasts, and following reports about the measures taken by FOPH (α = 0.58).

Most trusted sources of Covid-information. Participants were presented with a list of seven sources of information (i.e. healthcare providers, scientific experts, scientific publications, social media, internet, friends and family members) and asked to select their most trusted source(s) of COVID-19 information from the list. Factor analysis of the items suggested a two-factor solution, with four items (social media, internet, friends, family) loading on one factor ("unofficial sources," α = 0.64) and three items (scientific experts, scientific reports and health care providers) loading on a second factor ("official sources," α = 0.49).

Contentment with Covid-19 communications

Satisfaction with response to Covid-19. A random half of the sample was asked to indicate their satisfaction with the news media's response to the pandemic, while the other half was asked to indicate their satisfaction with the FOPH's response to the pandemic (1 = very dissatisfied, 4 = very satisfied; 1 item).

Perceived communication safety. Consistent with the SACCIA safe communication framework (Hannawa, 2018), participants were asked to rate their agreement with 20 items on 4-point Likert scale, which measured respondents' perceived (1) sufficiency of information (three items, e.g., *Their messages could have contained more complete information*,), (2) message accuracy (three items, e.g., *What they said seemed accurate to me*), (3) message clarity (three items, e.g., *They expressed themselves clearly)*, (4) contextualization (six items, e.g. *Their communication was consistent with their proclaimed goals; they communicated with me "eye-to-eye;" their messages helped me understand things in the context of what was happening at the time*), and (5) interpersonal adaptation (three items, e.g., *The way they talked (e.g. speaking pace, level of detail) helped me grasp things better in my mind*). Cronbach's alpha amounted to 0.91 for the SACCIA scale.

Perceived communication outcomes. Participants were asked to rate their agreement with 18 items (1 = strongly disagree, 4 = strongly agree) assessing their perceived outcomes of the FOPH's and TNM's official COVID-19 communications, with respect to their *sense of safety* (e.g., *The way they communicated helped me stay safe during the pandemic), ability to cope* (e.g., *The way they communicated during the pandemic had a positive effect on me overall), empowerment* (e.g., *The way they communicated inspired me), conflict arbitration* (e.g., *The way they communicated pacified societal aggressions*), *societal cohesion* (e.g., *The way they communicated divided society*, reverse coded), and *impact mitigation* (e.g., *The way they communicated prevented worse outcomes*). Cronbach's alpha amounted to 0.96 for the scale.

Mental health

The hospital anxiety and depression scale (Zigmond & Snaith, 1983) was used to measure participants' self-reported symptoms of clinical anxiety (7 items, e.g. *I felt more restless, as if I had to be on the move*, α = .85) and depression (7 items, e.g. *I felt as if I was slowed down*, α = .71) in response to the FOPH's and TNM's COVID-19 communications.

Conflict behavior

Engagement in conflict. Participants indicated whether they experienced COVID-19 related conflict (no conflict = 0, conflict = 1, not applicable = missing value) with their friends, spouse or romantic partner, non-spousal family member, and/or colleagues. We computed an index by summing the items and dividing that number by the number of total opportunities for conflict (i.e. if participants indicated that the item was not applicable, then they had one less opportunity for conflict; α = 0.68).

Conflict styles. We adapted the scale of conflict styles (LaValley & Guerrero, 2012) to assess people's communication during interpersonal conflicts about Covid-19. Participants were presented with 24 statements measuring six distinct conflict styles (4 items each), and were asked to indicate how closely they described their behaviors when they found themselves in arguments about the pandemic on a 4-point Likert scale: (1) *Competitive fighting* (α = 0.76), (2) *indirect fighting* (α = 0.68), (3) *avoiding* (α = 0.85), (4) *yielding* (α = 0.87), (5) *collaborating* (α = 0.81), and (6) *compromising* (α = 0.75).

Coping tactics

To measure respondents' coping behaviors, we adapted the items of the coping tactics scale (Nguyen et al., 2012) to the context of our study. The items were grouped according to the actions participants took in response to their exposure to COVID-19 communications: (1) "*Moving with*" (four items, e.g. *I acted in accordance with their messages*, α = 0.80), (2) *"Moving against"* (four items, e.g. *I expressed disapproval against their communication*, α = 0.83), (3) "*Moving toward*" (five items, e.g. *The way they*

communicated made me want to contact them if I needed information, α = 0.76), (4) *"Moving outwards"* (eight items, e.g. *The way they communicated made me want to make arrangements to have someone ready to help me if I became sick or quarantined*, α = 0.84), (5) *"Moving away"* (four items, e.g. *The way they communicated made me want to ignore what they say*, α = 0.79), and (6) *"Moving inward"* (six items, e.g. *The way they communicated made me worry more about things*, α = 0.74).

Risk perception

Participants indicated their agreement (1 = strongly disagree, 4 = strongly agree) with six statements assessing the degree to which they perceived a personal risk of getting infected and being harmed by the coronavirus (α = 0.86).

General attitudes toward rule compliance

The rule noncompliance subscale of the Antisocial Beliefs and Attitudes Scale (Butler et al., 2007) was used for measuring people's general attitudes toward having to follow other people's rules. The subscale consisted of ten items (e.g., *I don't like having to obey others' rules*). However, due to unsatisfactory reliability, we removed four items from the analyses, so that the internal consistency reached an acceptable level (α = 0.61).

Compliance with the pandemic control measures

Participants indicated the degree to which they complied with the government's pandemic control measures, such as practicing hygienic behavior and social distancing (1 = never, 4 = always, as prescribed), wearing a surgical or FFP2 face mask (1 = never, unable for medical reasons, 2 = never, I didn't want to, 3 = occasionally, 4 = always as prescribed), and getting vaccinated (1 = I did not want to get vaccinated; 2 = I couldn't not get vaccinated for medical reasons, 3 = one shot, 4= two shots, 5, two shots + at least one booster). Each compliance item was treated as a single variable.

Conspiracy beliefs

Finally, conspiracy beliefs were measured with the conspiracy ideation subscale of the Conspiracy Mentality Scale (CMS, Stojanov & Halberstadt, 2019). The subscale consists of seven items. Participants indicated their agreement with each item on a 4-point scale (1 = untrue of me, 4 = true of me; α = 0.93).

Demographic variables

A number of demographic variables (age, sex, income, migration status, region, education, relevance of COVID-19 to work, and pandemic impact) were included for assessing RQ3.

Results

Sample

The sample consisted of 742 residents of Switzerland (51.3% female). The average age was 42.91 years (*SD* = 13.74, range 18–69 years). Detailed demographics of the sample are provided in Table 1.

Preliminary analyses

Inspection of the kurtosis and skewness statistics suggested only minor deviations form normality, −1.31 < kurtosis <3.05; −1.71 < skewness <1.91, with a majority of the values ranging between −1 and +1 for both. According to Byrne (2010) and Hair et al. (2010), skewness between −2 and +2 and kurtosis values between −7 and +7 are considered indicators of normally distributed data. Therefore, we considered our data to be normally distributed.

Latent profile analysis (RQ1)

As the majority of the questions in the COM-COVID survey were framed without particular reference to the Swiss FOPH or TNM, and as the number of participants in the two subsamples was not large enough to conduct separate latent profile analyses, we pooled the data from the two randomly assigned halves of the sample (i.e. FOPH and TNM) into one group. For the few questions that were referring to Covid-communications by either the FOPH or TNM, we conducted ANOVAs to check if there was any difference between the groups. After controlling for type 1 error, there was only a difference in (1) communication outcomes, and in (2) the moving "with," "toward" and "away" factors of the coping tactics scale. We still included these variables in the analysis and later checked if class membership and group foci (FOPH vs. TNM) interacted in predicting the abovementioned variables. They did in neither case, which evidences that the profiles were representative for the whole sample.

To devise latent profiles of participants' responses to the FOPH's and TNM's COVID-19 communications, we used the tidyLPA package in R (Rosenberg et al., 2018). We used standardized z-scores to obtain a clear sense of which scores were

Table 1. Respondent demographics.

Employment status	***%***
Working full-time	52.8
Working part-time	26.5
Not working	20.6
Relationship status	***%***
Widowed	.9
Married	40.2
Divorced	8.2
Married but separated	2.3
Single + cohabiting	17.9
Single + dating	10.2
Other	20.2
Education	***%***
Compulsory school	4.9
Vocational school, trade school	36.4
Higher technical school, vocational training	20.6
High school	12.8
College, university	25.3
Income	***%***
<45.000 CHF	12.4
45.000–59.999 CHF	12.7
60.000–89.999 CHF	24.7
90.000–119.999 CHF	16.6
120.000–180.000 CHF	12.0
>180.000 CHF	3.8
No response	17.9
Migration status	***%***
Neither parents nor self born in Switzerland	22.1
Only self (no parent) born in Switzerland	10.4
Self + one parent born in Switzerland	14.0
Everyone born in Switzerland	53.5

above or below the average. We started with a solution with two classes, and successively added up to seven profiles (Nylund et al., 2007). For each solution, we looked at the AIC, BIC, SABIC, BLRT and the associated *p* values, entropy (i.e. the confidence with which participants were classified into the different classes), profile size, and the LL (likelihood ratio) test, which quantifies the comparison between the model of interest and the model with one class less (Spurk et al., 2020). We compared subsequent models using relative fit information criteria (BIC), considering also the entropy values.

BIC suggested the best solution was a model with six classes. However, we also noticed two elbows in the BIC plot, suggesting a model with either six or three classes. As the six classes solution contained profiles which overlapped substantially (i.e. parallel lines), we settled for a model with three classes. This model classified the cases well, as evidenced by the entropy value of 0.9, and minimum and maximum probabilities of 0.93 and 0.97 respectively. The largest class contained 54% of the cases, and the smallest 22.4%.

As seen in Figure 3, the first latent profile (red line, 54% of participants), which we dubbed "compliant supporters," describes participants who complied with the pandemic control measures and saw the pandemic as a severe threat to their health. They were not particularly anxious, depressed or lonely, and well-able to comprehend the messages about COVID-19 (high literacy). They rated the way in which the FOPH and TNM communicated about COVID-19 as safe (i.e. as facilitating shared understanding), and experienced the communications as supporting positive pandemic outcomes. The conflict style "collaboration" was slightly more dominant than the other conflict styles among people in this profile, evidencing a tendency toward a constructive conflict approach. Members of this class tended to use *moving with* and *moving toward* as coping behaviors, both of which are also of constructive nature. Compliant supporters trusted official sources more so than unofficial sources (e.g. social media, internet, family, friends). The frequency of their social engagement was average, as were their general attitudes toward rule compliance.

The next latent profile (green line, 23.6% of participants) was named "defiant deniers." Respondents in this class did not comply with the government's pandemic control measures, rated the pandemic as low in severity, and were moderately anxious, depressed and lonely. Defiant deniers scored around the average in literacy (i.e. message comprehension ability). They rated the safety of the FOPH's and TNM's COVID-19 communication as low (i.e. as failing to create a shared understanding), and felt that their communications triggered negative pandemic outcomes. While they experienced conflicts about Covid-19, they had no dominant conflict style that could be considered characteristic for this group. Indeed, this group scored low on the use of all six types of conflict behaviors. They tended to use *moving against* and *moving away* from the message source as well as *moving inward* as preferred coping tactics, all of which are destructive to self, to relationships, and to effective pandemic crisis management. They trusted unofficial sources of information (e.g. social media, internet, family, friends) much more so than official sources, were slightly more socially engaged than the other profiles, and scored highest on general attitudes against rule compliance.

The third profile (blue line, 22.4% of participants) was labeled "anxious skeptics." This class describes residents who were moderately compliant with the pandemic control measures, while they

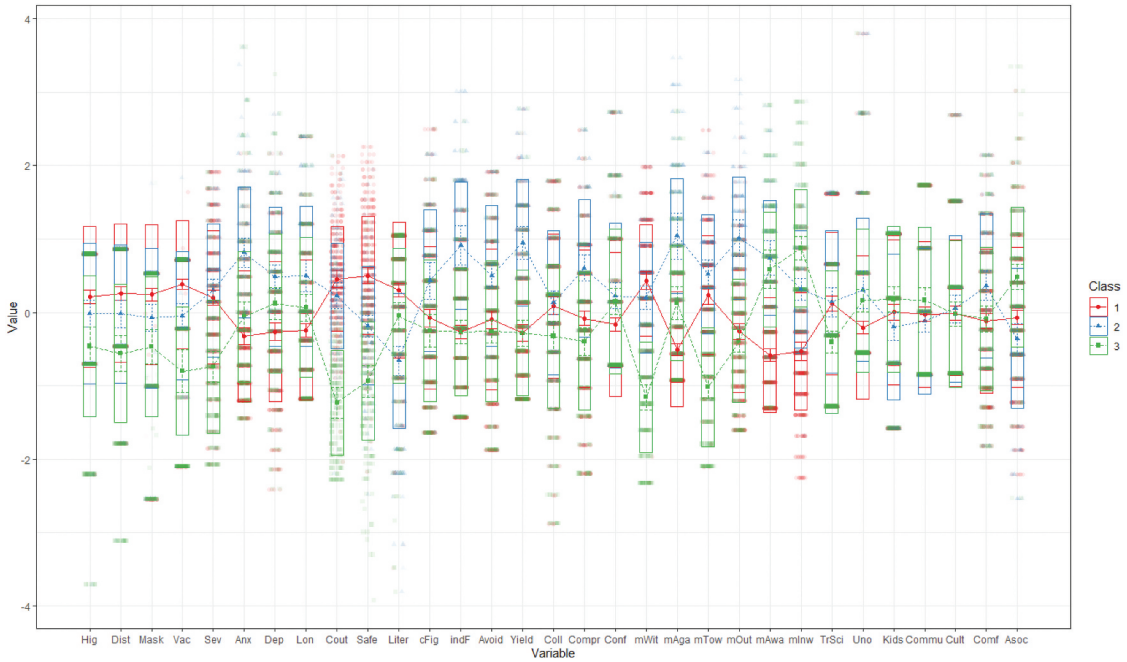

Figure 3. Latent profiles. *Note.* Hyg = compliance hygiene measures; Dist = compliance social distancing; Mask = compliance mask wearing; Vac = compliance vaccination; Anx = anxiety; Dep = depression; Lon = loneliness, Cout = communication outcomes, Safe = communication safety; Liter = Functional illiteracy; cFif = competitive fighting; indF = indirect fighting; Avoid = avoiding conflict; Yield = yielding; Coll = collaborating, Compr = compromising; Conf = conflict; mWit = moving with; mAga = moving against; mTow = moving towards; mOut = moving outwards; mAwa = moving away, mInv = moving inwards; TrSci = trust in science and physicians; Uno = trust in unofficial sources; Kids = social engagement with kids; Commu = with community, Cult = with cultural institutions, Comf = communication with friends; Asoc = antisocial behaviour.

Table 2. Logistic regression with conspiracy mentality as predictor and class membership as outcome.

		B	SE	Lower 95% CI	Odds ratio	Upper 95% CI
Defiant deniers	Intercept	−3.93**	.32			
	Conspiracy mentality	1.52**	.15	3.42	4.59	6.15
Anxious sceptics	Intercept	−4.80**	.40			
	Conspiracy mentality	1.85**	.16	4.64	6.36	8.73

Note. The reference category is "Compliant supporters;" ** $p < 0.01$; $R^2 = 0.26$ (Cox & Snell), 0.30 (Nagelkerke), Model X^2 (2) = 223.436 $p < 0.01$.

perceived the risk of the pandemic as severe. They were highly anxious, depressed and lonely. Members in this class had the highest difficulty comprehending the COVID-19 messages (low literacy). While they experienced the COVID-19 messages as promoting good outcomes, they perceived the way they were communicated as less safe (in terms of facilitating a shared understanding) than the "compliant supporters." They tended to use *indirect fighting* and *yielding* as dominant conflict strategies, both of which are characteristic of passive communication. They primarily used *moving against* the message source and *moving outward* (reaching out to third parties) as coping strategies in response to the FOPH's and TNM's COVID-19 communications. They trusted unofficial sources (e.g. social media, internet, family, friends) more than official sources, were moderately socially engaged, but tended to communicate more frequently about the pandemic compared to the other profiles. Finally, they scored lowest on general attitudes against rule compliance, suggesting that they were generally more willing to follow other people's rules.

Relating conspiracy beliefs to the latent profiles (RQ2)

We next performed multinomial regression to examine if conspiracy mentality predicted profile membership. As seen in Table 2, conspiracy mentality significantly predicted whether participants belonged to "compliant supporters" vs. "anxious skeptics," and also whether they belonged to "compliant supporters" vs. "defiant deniers." As conspiracy mentality increased by one unit, the change in the odds of belonging to "defiant deniers" or "anxious skeptics" (rather than "compliant supporters") was 4.59 and 6.36, respectively. In other words, one was more likely to belong to "defiant deniers" or "anxious skeptics" than "compliant supporters," if they had a high conspiracy mentality.

Demographic features of the latent profiles (RQ3)

We next examined if the profiles were associated with particular SED characteristics. The analysis indicated that there was no significant association between the profiles and geographical region ($X^2(12) = 11.95$, $p > 0.05$) or professional relevance to COVID-19 ($X^2(16) = 12.05$, $p > 0.05$). However, there was a significant difference between the profiles in terms of age (F (2, 739) = 13.45, p < 0.01). Post-hoc tests showed that the difference was between "compliant supporters" ($M = 44.24$, $SD = 13.92$) and both the "defiant deniers" ($M = 40.87$, $SD = 13.\ 69$) and the "anxious skeptics" ($M = 39.43$, $SD = 12.30$), indicating that "compliant supporters" were somewhat older in age than the other two groups.

We also found a significant association with respect to income ($X^2(10) = 29.28$, $p < 0.01$). "Compliant supporters" were more likely to have a higher income than the "anxious skeptics" and "defiant deniers" (see Table 3).

In terms of education ($X^2(8) = 24.58$, $p < 0.01$), "defiant deniers" tended to have a lower education level compared to "compliant supporters." Similarly, "compliant supporters" were also more likely to have higher education than "anxious skeptics" (see Table 4).

Our analyses also evidenced significant sex differences (X^2 (2) = 9.54, $p < 0.01$), suggesting that males were more likely to be "anxious skeptics," while females were more likely to be "compliant supporters" (see Table 5).

We also found profile differences with respect to respondents' migration status ($X^2(6) = 16.45$, $p < 0.05$), with

Table 3. Table of observed and expected frequencies and standardized residuals from the crosstabulation between income and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
<45.000 CHF	Count	34	26	32	92
	Expected Count	48.5	21.6	21.9	92.0
	Adjusted Residual	−3.3	1.2	2.7	
45.000–59.999 CHF	Count	39	33	22	94
	Expected Count	49.5	22.1	22.4	94.0
	Adjusted Residual	−2.4	2.9	−.1	
60.000–89.999 CHF	Count	100	37	46	183
	Expected Count	96.5	43.0	43.6	183.0
	Adjusted Residual	.6	−1.2	.5	
90.000–119.999 CHF	Count	72	29	22	123
	Expected Count	64.8	28.9	29.3	123.0
	Adjusted Residual	1.4	.0	−1.7	
120.000–180.000 CHF	Count	57	13	19	89
	Expected Count	46.9	20.9	21.2	89.0
	Adjusted Residual	2.3	−2.1	−.6	
>180.000 CHF	Count	19	5	4	28
	Expected Count	14.8	6.6	6.7	28.0
	Adjusted Residual	1.6	−.7	−1.2	
Total	Count	321	143	145	609
	Expected Count	321.0	143.0	145.0	609.0

Table 4. Table of observed and expected frequencies and standardized residuals from the crosstabulation between education and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
Compulsory school	Count	10	18	8	36
	Expected Count	19.5	8.1	8.5	36.0
	Adjusted Residual	−3.2	4.1	−.2	
Vocational/trade school	Count	139	55	76	270
	Expected Count	145.9	60.4	63.7	270.0
	Adjusted Residual	−1.1	−1.0	2.2	
Higher technical school/vocational training	Count	90	28	35	153
	Expected Count	82.7	34.2	36.1	153.0
	Adjusted Residual	1.3	−1.4	−.2	
High school	Count	52	23	20	95
	Expected Count	51.3	21.3	22.4	95.0
	Adjusted Residual	.1	.5	−.6	
College, university	Count	110	42	36	188
	Expected Count	101.6	42.1	44.3	188.0
	Adjusted Residual	1.4	.0	−1.7	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

Table 5. Table of observed and expected frequencies and standardized residuals from the crosstabulation between sex and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
Male	Count	180	98	83	361
	Expected Count	195.1	80.8	85.1	361.0
	Adjusted Residual	−2.2	3.0	−.4	
Female	Count	221	68	92	381
	Expected Count	205.9	85.2	89.9	381.0
	Adjusted Residual	2.2	−3.0	.4	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

immigrants more likely than the ethnically Swiss to be "anxious skeptics" (see Table 6).

Significant profile differences also emerged with respect to the degree to which respondents' lives had been impacted by the pandemic (e.g. Covid infection, loss of job or income, loss of a loved one, etc.; $X^2(4) = 25.32$, $p < 0.01$). The frequency of "compliant supporters" who had been tested positive for COVID was less than expected, but higher than expected for "defiant deniers." The frequency of "compliant supporters" who never had Covid symptoms nor a positive Covid test was higher than expected, while those of "defiant deniers" and "anxious skeptics" was lower than expected (see Table 7). A similar pattern emerged for those who had been hospitalized because of COVID-19 ($X^2(2) = 9.28$, $p < 0.01$): There were more than expected "anxious skeptics" respondents in this group, compared to the group of those who had not been hospitalized for COVID-19 (see Table 8). On the other hand, there were less than expected "compliant supporters" who had been hospitalized for Covid-19, but more than expected who were not, suggesting that the likelihood to be hospitalized was higher for the "anxious skeptics" than for "compliant supporters."

There was also an association between class membership and knowing someone who had been hospitalized for COVID-19 ($X^2(2) = 6.88$, $p < 0.05$). "Compliant supporters" were more likely than "defiant deniers" to know someone who had been hospitalized because of COVID-19 (see Table 9).

In terms of knowing someone who has died of COVID-19 ($X^2(2) = 7.24$, $p < 0.05$), "defiant deniers" replied "yes" less frequency than expected, and "no" more frequently than expected, suggesting that membership in the "defiant deniers"

Table 6. Table of observed and expected frequencies and standardized residuals from the crosstabulation between migration status and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
No family member born in Switzerland	Count	82	48	34	164
	Expected Count	88.6	36.7	38.7	164.0
	Adjusted Residual	−1.2	2.4	−1.0	
Only self born in Switzerland	Count	36	24	17	77
	Expected Count	41.6	17.2	18.2	77.0
	Adjusted Residual	−1.4	2.0	−.3	
Self + one parent born in Switzerland	Count	49	24	31	104
	Expected Count	56.2	23.3	24.5	104.0
	Adjusted Residual	−1.5	.2	1.6	
Everyone born in Switzerland	Count	234	70	93	397
	Expected Count	214.6	88.8	93.6	397.0
	Adjusted Residual	2.9	−3.3	−.1	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

Table 7. Table of observed and expected frequencies and standardized residuals from the crosstabulation between pandemic impact (infection) and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
Tested positive	Count	81	43	63	187
	Expected Count	101.1	41.8	44.1	187.0
	Adjusted Residual	−3.4	.2	3.8	
Suppose I got infected, but no (positive) test	Count	65	40	34	139
	Expected Count	75.1	31.1	32.8	139.0
	Adjusted Residual	−1.9	2.0	.3	
Never had symptoms or positive test	Count	255	83	78	416
	Expected Count	224.8	93.1	98.1	416.0
	Adjusted Residual	4.5	−1.8	−3.5	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

Table 8. Table of observed and expected frequencies and standardized residuals from the crosstabulation between pandemic impact (hospitalization – self) and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
No hospitalization	Count	400	161	174	735
	Expected Count	397.2	164.4	173.3	735.0
	Adjusted Residual	2.1	−3.1	.6	
Hospitalization	Count	1	5	1	7
	Expected Count	3.8	1.6	1.7	7.0
	Adjusted Residual	−2.1	3.1	−.6	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

Table 9. Table of observed and expected frequencies and standardized residuals from the crosstabulation between pandemic impact (hospitalization – other) and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
No hospitalization	Count	180	77	99	356
	Expected Count	192.4	79.6	84.0	356.0
	Adjusted Residual	−1.8	−.5	2.6	
Hospitalization	Count	221	89	76	386
	Expected Count	208.6	86.4	91.0	386.0
	Adjusted Residual	1.8	.5	−2.6	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

group was associated with a lower likelihood of knowing someone who died of COVID-19 (see Table 10).

With respect to losing one's job because of COVID-19 ($X^2(2) = 22.21$, $p < 0.01$), the finding suggested that "compliant supporters" suffered less in terms of losing their job as a result of COVID-19 compared to the "anxious skeptics" (see Table 11).

Finally, to the question if participants suffered income reductions because of COVID-19 ($X^2(2) = 11.43$, $p < 0.01$), the "anxious skeptics" replied with "no" less frequently and "yes" more frequently than expected, whereas the opposite pattern was true for the "compliant supporters" profilers (see Table 12), again suggesting that the "anxious skeptics" were impacted more by COVID-19 than the "compliant supporters" with respect to their income.

Because the sample was randomly split and assigned to information-seeking and satisfaction questions with focus on either the FOPH or TNM, as a final analysis, we examined whether the three profiles differed in terms of frequency of information-seeking and their satisfaction with the FOPH'S/news media's response to Covid-19. Post-hoc comparisons showed that "defiant deniers" sought information significantly more frequently than the other two groups, followed by "compliant supporters" who engaged in such behavior more frequently than the "anxious skeptics." Defiant deniers also

Table 10. Table of observed and expected frequencies and standardized residuals from the crosstabulation between pandemic impact (knew someone who died of COVID-19) and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
No	Count	253	97	126	476
	Expected Count	257.2	106.5	112.3	476.0
	Adjusted Residual	−.7	−1.7	2.5	
Yes	Count	148	69	49	266
	Expected Count	143.8	59.5	62.7	266.0
	Adjusted Residual	.7	1.7	−2.5	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

Table 11. Table of observed and expected frequencies and standardized residuals from the crosstabulation between pandemic impact (lost job) and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
Lost job - No	Count	392	148	170	710
	Expected Count	383.7	158.8	167.5	710.0
	Adjusted Residual	3.0	−4.7	1.1	
Lost job - yes	Count	9	18	5	32
	Expected Count	17.3	7.2	7.5	32.0
	Adjusted Residual	−3.0	4.7	−1.1	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

Table 12. Table of observed and expected frequencies and standardized residuals from the crosstabulation between pandemic impact (lower income) and class membership.

		Compliant supporters	Anxious sceptics	Defiant deniers	Total
Lower income - No	Count	327	114	138	579
	Expected Count	312.9	129.5	136.6	579.0
	Adjusted Residual	2.5	−3.3	.3	
Lower income - yes	Count	74	52	37	163
	Expected Count	88.1	36.5	38.4	163.0
	Adjusted Residual	−2.5	3.3	−.3	
Total	Count	401	166	175	742
	Expected Count	401.0	166.0	175.0	742.0

engaged in significantly more frequent information-seeking from FOPH compared with the compliant supporters and anxious skeptics, but the latter did not differ from each other. Defiant deniers were also significantly less satisfied with the government response to Covid-19, as well as the news media coverage, compared with the other two groups, which did not differ from each other (see Table 13).

Discussion

With this study, we set out to investigate how Swiss residents responded to official communications about Covid-19. Our goal was to detect certain patterns or "profiles" that might describe distinct ways in which people reacted to such communications. We assumed that this research could help authorities adapt future crisis communications to each profile, e.g. through personalized communications, in order to optimize message comprehension of each recipient and achieve effective crisis control. In a nutshell, we pursued the following fundamental question: What can we do differently to manage the next global crisis in better ways?

Three respondent "profiles" emerged

The Swiss populatispect to their responses to COVID-19 communications. The first half consisted of "compliant supporters" – mostly well-educated, literate, "ethnically Swiss" people of mature adult age, with stable jobs and incomes. They understood and trusted the COVID-19 communications from the FOPH and TNM, recognized the pandemic as a severe risk, and exhibited collaborative behaviors in active support of the government's crisis management efforts.

The other half of the Swiss population, however, reacted to the contrary. They perceived that the COVID-19 messages of the FOPH and TNM did not facilitate a shared understanding. They actively turned against their messages and exhibited lower compliance with the pandemic measures. People in this half of the Swiss population were less educated and socially more engaged than the "compliant supporters." They trusted

Table 13. ANOVA results with class as independent variable, and Frequency of Information-Seeking (FIS) and satisfaction as dependent variables.

		N	M	SD	SE	F
FIS from TNM	Compliant supporters	179	3.53	.58	.04	$F(2,366) = 18.72^{**}$
	Anxious sceptics	83	3.20	.89	.10	
	Defiant deniers	107	3.79	.57	.05	
	Total	369	3.53	.69	.04	
FIS from FOPH	Compliant supporters	222	2.29	.66	.04	$F(2,370) = 8.19^{**}$
	Anxious sceptics	83	2.19	.67	.07	
	Defiant deniers	68	2.61	.67	.08	
	Total	373	2.33	.67	.03	
Satisfaction with TNM response to COVID-19	Compliant supporters	179	2.89	.83	.06	$F(2,366) = 23.87^{**}$
	Anxious sceptics	83	2.72	.72	.08	
	Defiant deniers	107	2.21	.82	.08	
	Total	369	2.66	.85	.04	
Satisfaction with FOPH response to COVID-19	Compliant supporters	222	2.88	.75	.05	$F(2,370) = 16.78^{**}$
	Anxious sceptics	83	2.68	.74	.08	
	Defiant deniers	68	2.30	.60	.07	
	Total	373	2.73	.75	.04	

Note. $^{**}p < 0.01$.

the internet, social media, friends and family more with respect to COVID-19 information than their physicians or science.

The latter, more "oppositional" half of the Swiss population further divided into two distinct subgroups of equivalent size: "defiant deniers" and "anxious skeptics." Contrary to defiant deniers, anxious skeptics perceived the pandemic as a severe risk. They thought the FOPH and TNM's COVID-19 communications promoted positive pandemic outcomes, but were less apt to understand them. The exact opposite applied to defiant deniers. Anxious skeptics were also more anxious, depressed, and lonely than defiant deniers. Anxious skeptics seemed more helpless (e.g. by engaging passive conflict styles), while defiant deniers did not make much use of any conflict style at all. While both of them actively resisted the COVID-19 messages, they split paths in that anxious skeptics reached out to third parties, whereas defiant deniers distanced themselves. Understanding how individuals with these different social characteristics build message convergence in the content they seek constitutes a critical quest for future research.

While anxious skeptics had no problem following other people's rules, defiant deniers were generally predisposed against rule compliance. There were also some clear demographic distinctions between these two subgroups: Anxious skeptics were more likely to be males with migration background who had lost their jobs or suffered lower incomes because of Covid-19. In other words, they had lower message comprehension abilities and a less stable economic standing. While defiant deniers did not know many people who had been hospitalized with Covid-19, anxious skeptics were the ones who were hospitalized most frequently, which also explains their oppositional risk perceptions.

Applications

Crises require profile-adapted communications. The three profiles that emerged from this study combined critical SED factors with behavioral measures of communication, coping, and compliance, all of which are essential for successful crisis management. The more "troublesome" half of the population (i.e., anxious skeptics and defiant deniers) struggled greatly during Covid-19, particularly in response to the pandemic communications from the FOPH and TNM. This finding raises the question how such communications can transpire differently in the future, to assist this half of the population with a healthier crisis response.

Reflecting on the results of this investigation, communication with "compliant supporters" who were fully dedicated to assist crisis management was effortless, compared to communication with migrants who had difficulty understanding the messages in the context of an already distressing situation that threatened their economic livelihoods. At the same time, the latter was a very different task than communicating with fearless residents who mistrusted official sources of information and were generally opposed to following rules. That said, our study delivered important insights as to how communication needs to be adapted to each of these profiles to be more "effective," in terms of enabling better message comprehension and compliance, both of which are essential crisis management features.

Future research now needs to deliver experimental evidence to address concrete practical questions in anticipation of the next global crisis. Objective facts and rational arguments seem to have worked for "compliant supporters" who were able to understand official COVID-19 messages with ease, were motivated to collaborate with the government's crisis control efforts, and needed no "convincing" that the pandemic posed a severe threat to society, while they had no reason to fear for their own financial well-being. But what form of communication is needed to better reach "defiant deniers," who generally do not like to follow rules, mistrust official sources, rely on social media and friends for "trustworthy" information, and tend to engage in destructive coping behaviors? Similarly, what kind of communication is required to help "anxious skeptics" in a crisis, who are generally willing to follow rules and also perceived the pandemic as a threat, but had difficulty comprehending the kinds of messages that reached the other profiles, while suffering from emotional anxiety, depression and loneliness, and resorting to passive behaviors that guided them away from official to unofficial sources of information? Concrete profile-adapted communication protocols need to be developed and tested to deliver evidence-based answers to these critical questions, which can ultimately support governments and news media with a better response in future global crises.

Implications

Ancient response patterns in modern times? The three respondent profiles that emerged from our study seem similar to the "fight-flight-freeze" limbic brainstem response that humans commonly experience instinctively in anxiety-ridden situations (Gray & McNaughton, 1982). One could argue that the compliant supporters' response patterns to the official Covid communications corresponded with limbic "fight" reactions against the risks imposed by the pandemic. In similar ways, the defiant deniers' distancing behaviors might resonate a "flight" response to the Covid communications, while the anxious skeptics' passive helplessness more closely resembles "freeze-and-faint" reactions.

While such an explanation makes sense, our profiles add more granularity to the picture. Humans are not individual creatures who respond to crises detached from their demographic and social surroundings. Rather, the opposite is true: particularly in an era where digitalization and globalization rapidly stimulate our "social" human nature, our response patterns cannot be taken out of context. Our communication channels have also become more complex. Digital channels now allow deception, manipulation, and deliberate distribution of fake news to transpire in more subtle ways that are more difficult to detect than in traditional face-to-face communication. The lines that define "truth" have become more blurry, with the internet delivering "facts" at face value. Not surprisingly, our study showed that the two profiles that trusted the internet more than their physicians or science (anxious skeptics, defiant deniers) were also more prone to believe conspiracy theories.

It's not a "Covidiot" problem. Conspiracy theorizing has been discussed as a significant barrier to effective crisis

management. However, the results of our study suggest that we need to broaden the scope: While conspiracy theorists constitute a small percentage of the population, half of the Swiss population in our study struggled with COVID-19 compliance. Not because they believed in fake news, but because they had problems with message comprehension, conflict communication, and maladaptive social coping mechanisms in the context of a highly distressing crisis situation. Communication gone astray is poison to successful crisis control. It is the tool for joining society into a shared effort that serves public health and societal peace. Profile-adapted communication can help half of the Swiss population do better in future global crises. This effect is *only* attainable through more successful communication, and ultimately serves the well-being of entire humanity.

Are the profiles a cross-cultural phenomenon? A British study (King's College London, 2020) has previously clustered people into three population segments, based on their reactions to COVID-19 after the first lockdown measures. These clusters were labeled "the accepting," "the suffering," and "the resisting." While the framing of the UK study and its cluster-defining measures were different from ours, some of the cluster characteristics resembled the three profiles that emerged from our study. For example, "the accepting" resembled the "compliant supporters" in their shared contentment with the government's communication, their support of the crisis management efforts, their high compliance with the pandemic measures, and their low rates of anxiety and depression. Similar to the"anxious skeptics" in our study, "the suffering" in the UK study were anxious and depressed, felt a sense of helplessness, and mistrusted official information. While there were some nuanced differences between the anxious skeptics and the suffering (e.g. low vs. high compliance), the similarity between the "defiant deniers" in our study and "the resisting" in the UK study were striking: Both had low pandemic risk perceptions, actively resisted the government's messages, mistrusted official sources of information, and exhibited low compliance. Given these similarities, future research is needed to examine to what extent the three response profiles might be a universal rather than cultural phenomenon, particularly in light of the above mentioned correspondence with our ancient limbic brainstem responses to uncertain situations.

Limitations

Like it is the case with any data collection, the benefits of the COM-COVID survey are counterweighed by some limitations. Most notably, COM-COVID was an online survey. While participants were recruited through diverse (non-online) channels to reach also non-heavy online users, the survey did require web participation. The demographics of the participants properly mirror the demographics of the Swiss population, but a potential sampling bias cannot be ruled out completely. Second, two of the scales showed low Cronbach alphas. However, it is not unusual for scales comprising a small number items (e.g. official sources only had three items) to have low reliability. Finally, some variables could not be included in the latent profile analysis (e.g., satisfaction with communication), but we included them in post-hoc analyses instead. Despite these limitations, our study provided important insights about respondents' reactions to official COVID-19 communications, which can now be used in future global crises for tailoring messages to the communicative needs of these three different groups.

Conclusion

In crisis situations, we rely on effective communication. Important information must be conveyed in a timely manner and affect population compliance and collaboration. For that to be achieved, these messages need to be understood as intended. Miscomprehension or confusion would be fatal for effective crisis management efforts. We learned from COVID-19 that such information cannot be thrown into the masses like a rock into an anthill. Crisis communication does not work in the form of linear information delivery. It requires an active sense-making effort that goes hand-in-hand with the population. Its success does not lie in a large quantity of information, but in *how* the messages are conveyed. Our study revealed that when it comes to communication in a global crisis, one size does not fit all. Three different types of residents in the Swiss population had very different communicative needs for successful message comprehension. Our profiles give insight into how the same informational content can be conveyed in three different ways, adapted to each profile's communicative needs. Adaptive choices, for example, might include the choice of words, the speaking rate, a calming tone, clarifying visual aids, and so forth. Using the profiles from our study to customize information delivery to these three different groups will prevent a kind of communication that might otherwise patronize compliant supporters by being too simplified, intimidate anxious skeptics by being too difficult to understand, or offend defiant deniers by lacking the extra pinch of detail. Instead, a kind of communication that centers around each profile's communicative needs would prioritize bringing all three profiles of people together in a shared understanding. Our study suggests that communication should focus less on quantity of content that is distributed through various different experts with multiple opinions. Instead, the focus should be on the comprehension of the receiver, to ensure that the most important information is understood and acted upon.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The data collection for this study was funded by the Swiss Federal Office of Public Health (FOPH), Bern University of Applied Sciences (Health Division), Stefan Dräger, and Roche Diagnostics Switzerland.

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