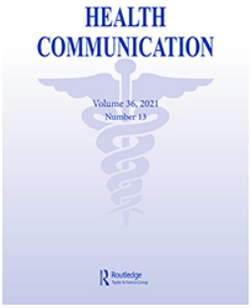

Health Communication

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/hhth20

Social Distancing during the COVID-19 Pandemic in Switzerland: Health Protective Behavior in the Context of Communication and Perceptions of Efficacy, Norms, and Threat

Thomas N. Friemel & Sarah Geber

To cite this article: Thomas N. Friemel & Sarah Geber (2021): Social Distancing during the COVID-19 Pandemic in Switzerland: Health Protective Behavior in the Context of Communication and Perceptions of Efficacy, Norms, and Threat, Health Communication, DOI: 10.1080/10410236.2021.1976360

To link to this article: https://doi.org/10.1080/10410236.2021.1976360

Published online: 06 Oct 2021.

HEALTH COMMUNICATION
https://doi.org/10.1080/10410236.2021.1976360

Social Distancing during the COVID-19 Pandemic in Switzerland: Health Protective Behavior in the Context of Communication and Perceptions of Efficacy, Norms, and Threat

Thomas N. Friemel and Sarah Geber

Department of Communication and Media Research, University of Zurich

ABSTRACT

The success of health protection measures depends on public compliance. This paper aims to understand the influence of three different types of communication (i.e., news media, social media, and interpersonal communication) on people's engagement in health protective behavior during a public health crisis. Our C-ENT model of health protective behavior proposes that *communication* raises perceptions of *efficacy, norms*, and *threat*, which in turn influence health protective behavior (communication → efficacy, norms, threat: C-ENT). We test the model for the case of social distancing during the COVID-19 pandemic, based on a representative online survey during the first week of the lockdown in Switzerland (N = 1005). The results support the C-ENT model and illustrate the important role of communication engagement during a public health crisis. News media use was associated with perceptions of behavior-related efficacy and norms and disease-related threat, and these perceptions were positively associated with compliance with social distancing. Social media use and interpersonal communication were related with perceived norms. Social media use was negatively and interpersonal communication positively associated with health behavior-supporting normative perceptions. Our findings suggest taking the distinct pattern among communication types (i.e., news media, social media, and interpersonal communication), perceptions, and behavior into account in order to understand existing dependencies and design respective communication strategies.

The coronavirus disease 2019 (COVID-19) outbreak was officially declared a pandemic by the World Health Organization (WHO) on March 11, 2020 (World Health Organization, 2020b). By the end of March 2020, when the present study was conducted, more than 750,000 confirmed cases and over 36,000 deaths were reported (World Health Organization, 2020a). In response to the exponential spread of COVID-19, social distancing – that is, keeping a physical distance of at least three to six feet from others – was introduced as a crucial public health measure by governments worldwide. The success of such public health measures depends fundamentally on the public's willingness to cooperate, and their awareness that their cooperation is sought (Fong et al., 2020; Leppin & Aro, 2009; Vaughan & Tinker, 2009).

In this paper, we investigate the compliance with social distancing from a communication perspective and propose the C-ENT model of health protective behavior. The C-ENT model builds upon the tradition of the protection motivation theory (PMT; Rogers, 1975), the extended parallel process model (EPPM; Witte, 1992), and the theory of planned behavior (TPB; Ajzen, 1991) and integrates their main constructs – efficacy, norms, and threat – into one communication-driven model.

Concretely, the model proposes that *communication* shapes behavior-related perceptions of *efficacy* (response and self-efficacy) and *norms* (descriptive and injunctive norms), as well as disease-related perceptions of *threat* (severity and susceptibility), and thus ultimately influences individuals' engagement in health protective behavior through this perception-building (communication → efficacy, norms, threat: C-ENT). The C-ENT model contributes to the current state of health communication research in two respects: First, it addresses the question of where perceptions of efficacy, norms, and threat come from and refers to the significance of communication in this regard (see also Geber et al., 2019; Wirz et al., 2020). A theoretical understanding of how behavior- and disease-related perceptions are developed has been missing in most studies on risk perception and health protective behavior during a pandemic outbreak for long time, as reviews demonstrate (Bish & Michie, 2010; Leppin & Aro, 2009). To gain a comprehensive understanding of communication's role regarding behavior- and disease-related perceptions, we distinguish between three different types of communication: news media, social media, and interpersonal communication. Second, complementary to the current state of research that mainly focuses on perceptions of threat and efficacy (Bish & Michie, 2010; Leppin & Aro, 2009), the C-ENT model considers normative perceptions (descriptive and injunctive) as important drivers of health protective behavior, especially in cases where the behavior is inherently social, as in the case of social distancing (as it depends on the behavior of others).

CONTACT Thomas N. Friemel th.friemel@ikmz.uzh.ch Department of Communication and Media Research, University of Zurich, Andreasstrasse 15, Zurich 8050, Switzerland

In addition to these contributions to the state of research, the empirical findings, which are based on a representative survey during the first days of the lockdown, provide a profound basis for communication strategies regarding COVID-19 and potential future pandemics, as they inform about effective channels and messages.

Background: COVID-19 in Switzerland

COVID-19 began as an epidemic in December 2019, in Wuhan city, Hubei province, China. By March 13, 2020, the WHO considered Europe the epicenter of the COVID-19 pandemic (World Health Organization, 2020b) and between February and March, Switzerland ranked in the top ten of reported cases worldwide (World Health Organization, 2020a). In order to contain the exponential spread of COVID-19 and to reduce the acute pressure on the health care system, the Swiss government was forced to introduce a number of far-reaching regulations within a short period of time. On March 16, 2020, the Swiss government declared an "extraordinary situation" and instituted a "lockdown," ordering a ban on all private and public events and the closing of all restaurants, bars, leisure facilities, and shops apart from grocery stores and pharmacies (The Federal Council, 2020b, March 16). It also called upon the public to avoid all unnecessary contact and to keep a physical distance from others, which was referred to as "social distancing." Four days later, on March 20, the government stepped up measures and announced a nationwide ban on gatherings of more than five people (The Federal Council, 2020a, March 20).

Social distancing as a health protective behavior

As the virus is transmitted from person to person (Chan et al., 2020; Q. Li et al., 2020), social distancing measures that "aim to reduce the frequency of contact and increase physical distance between persons" were the essential component of the public health response to COVID-19 (Fong et al., 2020). In the scientific literature, the term *social distancing* is used to refer to a set of interventions (Fong et al., 2020; Teasdale et al., 2014). This includes personal health protective behaviors, such as keeping a distance from other people, and actions taken by communities and authorities, such as the temporary closing of schools, childcare facilities, and offices, and avoiding large public gatherings in restaurants or at cultural events (Ahmed et al., 2018; Fong et al., 2020; Teasdale et al., 2014). In the public discourse about COVID-19, the term *social distancing* mainly referred to the individual-based protective behavior of keeping a physical distance of at least three to six feet from others (which equals 1.5 to two meters). As COVID-19 has a relatively long incubation time (Q. Li et al., 2020) and thus is transmittable long before the appearance of symptoms, the public was urged to keep distance not only from persons with symptoms but from all persons outside their own households. The first empirical evidence that social distancing has the potential to reduce the magnitude of the epidemic peak and leads to a smaller number of overall cases is based on a simulation of the outbreak in Wuhan (Prem et al., 2020). However, the effectiveness of this type of control measure during a pandemic outbreak depends fundamentally on the public's willingness to cooperate (Leppin & Aro, 2009; Vaughan & Tinker, 2009). The only alternative to voluntary compliance would be a law forcing all citizens to stay at home.

Communication in a public health crisis

In a public health crisis, the public perception about the disease and protective measures heavily depend on communication (Vaughan & Tinker, 2009). This holds especially true at the beginning of a disease outbreak, when only a small share of the population has first-hand experience with the disease, and mediated communication is the primary source of information regarding various dimensions of the health risk. Studies on previous disease outbreaks demonstrate people's strong need for communication and information in public health (Majid & Rahmat, 2013; Voeten et al., 2009; Wong & Sam, 2010). The present study takes into account the complexity of individuals' communication environment (Ball-Rokeach, 2008; Kim & Ball-Rokeach, 2006) and the finding that the use of different media can have distinct causal effects on health-related risk perception and attitudes (Wirz et al., 2020). To learn about the significance of different types of communication, we differentiate between traditional news media (e.g., television, newspaper), social media (e.g., Twitter, Instagram), and interpersonal communication (e.g., face-to-face, via phone).

News media communication

News media, such as newspapers and television, are a dominant source of health information in public health crises (Hobbs et al., 2004; Wong & Sam, 2010). Studies about the media coverage of the H1N1 virus in South Korea and the United States in 2009 reveal that influenza became a major focus of news media coverage within a short time of its first occurrence and that media attention corresponds with the occurrence of pandemic-related events of either international or domestic significance (Chung & Yun, 2013; Oh et al., 2012). News media play an important role in influencing the public's health-related perceptions by the means of a first and second-level agenda setting (Xu et al., 2020). This means that both the exposure rate and the framing of the topic may have an influence on perceptions and behavior. These media effects are particularly likely when individuals do not have first-hand experience of a health risk, such as in the early stage of an infectious disease outbreak (S.-H. Oh et al., 2015). Correspondingly, previous studies demonstrate that news media can substantially influence health-related perceptions during public health crises (R. Li, 2021; Nazione et al., 2021; S.-H. Oh et al., 2015; Paek et al., 2016; Wirz et al., 2020).

Social media communication

Embedded in a digital communication infrastructure with various information sources (Ball-Rokeach, 2008; Flanagin, 2017), people do not need to rely on traditional news media to receive relevant health information during a public health crisis (Kreps, 2017). Studies in the context of the H1N1 flu (Chew & Eysenbach, 2010; Signorini et al., 2011) and during the Ebola outbreak of 2014 to 2016 (Odlum & Yoon, 2018) reveal that

Twitter was used as a channel to inform others and as a means for the exchange of opinions and experiences. Social media may be effective in reinforcing and changing health-related perceptions and preventive behaviors in a health crisis (Mou & Lin, 2014). Studies on the Middle East Respiratory Syndrome (MERS) outbreak in South Korea in 2015 show that social media use was positively related to forming health-related perceptions (Choi et al., 2017; S.-H. Oh et al., 2020; Yoo et al., 2016).

Interpersonal communication

Interpersonal communication is an inherent part of people's communication environment regarding health issues. In this study, interpersonal communication refers to communication that primarily occurs in face-to-face conversations or technological mediated communication such as direct messaging/texting, telephone, or video-calls with personally known persons (Ackerson & Viswanath, 2009). Interpersonal communication in a crisis situation has been found to satisfy the need to interpret the situation – that is, to understand what has happened and what to do (Vigsø & Odén, 2016). Even though studies on the role of interpersonal communication in public health crises are rare, there are some studies in the context of the H1N1 flu (Ho et al., 2013; Lin & Lagoe, 2013) that indicate that interpersonal communication affects cognitions (such as knowledge) and personal health risk perceptions. Furthermore, interpersonal opinion leadership was found to be relevant for the adoption of tracing app technologies during the COVID-19 pandemic (Geber & Friemel, 2021).

Efficacy, norms, and threat as determinants of protective behavior

The literature on risk protection and health prevention provides a rich inventory of theories that guide our attention on crucial perceptions to understand protective behavior. Protection motivation theory (PMT; Rogers, 1975), the health belief model (HBM; Rosenstock et al., 1988), and the extended parallel process model (EPPM; Witte, 1992) point to perceptions of *efficacy* and *threat* as important determinants of health protective behaviors. Furthermore, the inclusion of *social norms* in health communication theories has proven its importance in prominent theories such as the theory of planned behavior (TPB; Ajzen, 1991) or the theory of normative social behavior (TNSB; Rimal & Real, 2005).

Efficacy

Efficacy should be differentiated with regard to response and self-efficacy; this differentiation was first introduced by Bandura (1977) and later incorporated in a revised version of PMT (Rogers, 1983) as well as EPPM, HBM, and TPB. *Response efficacy* refers to the perceived efficacy of the proposed health behavior in order to reduce the respective risk or the potential negative outcome. It thus refers to the behavior in general and not to the person. *Self-efficacy*, in contrast, pertains to the individual's expectation regarding his or her ability to execute the respective behavior. Several studies show the relevance of the perceived efficacy of protection behavior during pandemics such as SARS (Lau et al., 2004; Voeten et al., 2009), H5N1 (Lau et al., 2007), and H1N1 (Bults et al., 2011; Gilles et al., 2011; Jones & Salathé, 2009; Rubin et al., 2009).

Norms

To gain differentiated insights into the meaning of norms, the current state of norms research follows the differentiation between *descriptive norms* and *injunctive norms* introduced by Cialdini et al. (1990). Descriptive norms refer to the perceived prevalence of a behavior within the referent group; injunctive norms pertain to the social approval of the behavior by relevant others. Thus, the two types of norms can be thought of as norms regarding what *is done* (descriptive) as compared to norms of what *ought to be done* (injunctive; Deutsch & Gerard, 1955). A review of Bish and Michie (2010) reveals that social norms have been considered in only a few studies on protective behavior during disease outbreaks, as regarding face mask use (Tang & Wong, 2004) or quarantine (Cava et al., 2005), both in the context of SARS. However, in these studies, norms (in terms of what people think is expected of them by relevant others) have been shown to be crucial with regard to protective behavior.

Threat

PMT, HBM, EPPM, and most other theories on risk perception and health behavior consider severity and susceptibility as two distinct aspects of perceived threat. *Severity* refers to the magnitude of a negative health outcome and *susceptibility* to the probability of being affected (Witte, 1992). Given the subjective nature of risk perception, the perceived threat of a specific disease may vary across cultures (e.g., ethnic background), world regions (e.g., Asian vs. Western), and countries (Voeten et al., 2009; de Zwart et al., 2009). Threat has been found to be an important predictor for health protective behavior in many studies regarding respiratory infectious diseases (Bish & Michie, 2010; Leppin & Aro, 2009).

C-ENT model of health protective behavior

The starting point of our C-ENT model of health protective behavior is the vital role of communication during a disease outbreak, such as COVID-19 (Figure 1).

Communication is assumed to shape disease- and behavior-related perceptions and, in this vein, to ultimately influence health protective behavior. Thus, the C-ENT model is an indirect effect model in which communication and protective behavior are indirectly related through disease- and behavior-related perceptions. In terms of disease- and behavior-related perceptions, the C-ENT model differentiates between perceptions of efficacy (response and self-efficacy), norms (descriptive and injunctive norms), and threat (severity and susceptibility). By taking into account normative perceptions, the C-ENT model goes beyond the scope of risk protection and health prevention theories that focus on efficacy and threat perceptions (e.g., PMT, Rogers, 1975; EPPM; Witte, 1992). Inspired by TPB (Ajzen, 1991) and theories on

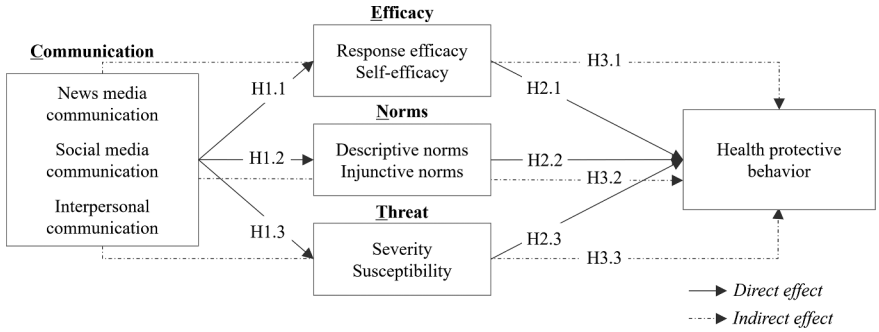

Figure 1. C-ENT model of health protective behavior.

normative influences (e.g., TNSB, Rimal & Real, 2005), social factors are considered to be particularly important regarding behavior that is observable by others or is related to other persons as in the case of social distancing. Thus, the C-ENT model integrates efficacy, norms, and threat into one communication-driven model to provide important insights for health communication research.

To gain an understanding of how different types of communication are associated with the health related perceptions (i.e., efficacy, norms, and threat), we take news media, social media, and interpersonal communication into account. In combination, these types of communication constitute the communication environment (Ball-Rokeach, 2008). Based on the above-cited theories and empirical evidence, the first set of hypotheses of the C-ENT model of health protective behavior assumes direct associations between communication (news media, social media, and interpersonal communication) and perceptions of behavior-related efficacy (response and self-efficacy), norms (descriptive and injunctive norms), and disease-related threat (severity and susceptibility). Thus, our first hypotheses are as follows:

H1.1-H1.3: COVID-19-related communication via news media, social media, or interpersonal communication is positively related with perceived efficacy of social distancing (H1.1; response and self-efficacy), norms toward social distancing (H1.2; descriptive and injunctive norms), and threat of COVID-19 (H1.3; severity and susceptibility).

The second part of the C-ENT model addresses the relations between perceived efficacy, norms, and threat and health protective behavior. Based on the respective literature cited above, we state the second set of hypotheses:

H2.1-H2.3: Perceived efficacy of social distancing (H2.1; response and self-efficacy), norms toward social distancing (H2.2; descriptive and injunctive norms), and threat of COVID-19 (H2.3; severity and susceptibility) are positively related with compliance with social distancing.

Ultimately, the C-ENT model proposes that communication is not only related with perceptions of efficacy, norms, and threat but also indirectly related to health protective behavior (social distancing in the present study). We therefore propose the third set of hypotheses:

H3.1-H3.3: COVID-19-related communication via news media, social media, and interpersonal communication is indirectly positively related with compliance with social distancing, transmitted by perceived efficacy of social distancing (H3.1; response and self-efficacy), norms toward social distancing (H3.2; descriptive and injunctive norms), and threat of COVID-19 (H3.3; severity and susceptibility).

Methods

Sample

To test the C-ENT model of protective behavior and understand how communication is related to social distancing, we collected data via an online survey based on an online access panel in the German-speaking part of Switzerland. Ethical approval was given according to the guidelines for research with human subject at the University of Zurich. Participation was voluntary and based on informed consent. The sample was provided by GfK Switzerland and stratified for age, gender, and residential region, striving for representativeness in these variables. The data collection started on March 19, 2020, three days after the lockdown in Switzerland and the official appeal for social distancing (see sections "Background" and "Social distancing"). The survey was closed on March 24, 2020, with a total sample of N = 1005. Of the respondents, 49% were male, and the mean age was 47.8 (SD = 17.98; Min = 16, Max = 88). No post-hoc weighting of the data was necessary.

Measures

The online survey included all measures of the proposed C-ENT model, adapted to social distancing during the COVID-19 outbreak. All items and questions were assessed and answered on 5-point Likert scales, as displayed in Table 1.

Age and gender (1 = *male*) served as control variables, as both have been found to have significant effects on protective behaviors in previous disease outbreaks (Bish & Michie, 2010).

Data analysis

Preliminary analyses (Table 2) demonstrated substantial zero-order correlations among the C-ENT variables, indicating the relevance of communication regarding the protective behavior of social distancing and the related perceptions of efficacy, norms, and threat.

To test the C-ENT model of health protective behavior and its underlying hypotheses, we used path analysis run with the R package lavaan (Rosseel, 2012). The first set of hypotheses

Table 1. Question wording and scales of the C-ENT model of health protective behavior.

Construct	
Social distancing	1 = *not strictly at all*,
"How strictly do you follow the appeal of social distancing (i.e., keeping distance of at least two meters to other people)?"	5 = *very strictly*
Communication	
"How important are the following information sources and communication types for you regarding the coronavirus crisis?"	1 = *not important at all*, 5 = *very important*
News media	
Index of 7 items (Cronbach's α = .70): *national (public) TV broadcaster, regional TV broadcaster, foreign TV broadcaster, national (public) radio broadcaster, private local radio broadcaster, online newspaper, and printed newspaper*	
Social media	
Index of 3 items (α = .73): *Facebook, Twitter, and Instagram*	
Interpersonal communication	
Index of 3 items (α = .71): *personal/face-to-face, telephone/videotelephony, and texting (SMS/messenger)*	
Efficacy	
Response efficacy: "If I follow the recommendation of social distancing, I can effectively protect myself from the coronavirus."	1 = *do not agree at all*, 5 = *fully agree*
Self-efficacy: "I believe I can consistently implement the recommendation of social distancing in everyday life."	1 = *do not agree at all*, 5 = *fully agree*
Norms	
Descriptive norm: "What do you think: how strictly do the people from your daily environment comply with the appeal of social distancing?"	1 = *not strictly at all*, 5 = *very strictly*
Injunctive norm: "What do you think: how important do people from your daily environment find it to comply with the appeal of social distancing?"	1 = *not important at all*, 5 = *very important*
Threat	
Severity: "If I become infected with the coronavirus, this will have serious consequences for my health."	1 = *do not agree at all*, 5 = *fully agree*
Susceptibility: "If I get closer than two meters to a person, there is a high risk that I will be infected."	1 = *do not agree at all*, 5 = *fully agree*

Table 2. Means, standard deviations, and zero-order correlations for all variables.

	M (SD)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Social distancing	4.35 (0.83)	.27***	.00	.10**	.39***	.64***	.44***	.42***	.30***	.38***	.39***	−.09**
(2) News media	3.28 (0.81)	-	.31***	.37***	.24***	.23***	.21***	.20***	.34***	.25***	.26***	−.11***
(3) Social media	1.81 (0.99)		-	.28***	.01	−.01	−.07*	−.06	.11***	.09**	−.17***	−.03
(4) Interpersonal	3.62 (1.06)			-	.12***	.11***	.11***	.15***	.14***	.11***	.03	−.13***
(5) Response efficacy	4.09 (1.01)				-	.42***	.22***	.26***	.21***	.40***	.17***	−.09**
(6) Self-efficacy	4.31 (0.09)					-	.33***	.36***	.25***	.33***	.30***	−.10**
(7) Descript. norms	3.77 (0.95)						-	.53***	.13***	.15***	.23***	−.07*
(8) Injunct. norms	4.10 (0.92)							-	.18***	.17***	.29***	−.10**
(9) Severity	3.36 (1.30)								-	.40***	.42***	−.01
(10) Susceptibility	3.61 (1.13)									-	.16***	−.04
(11) Age	47.8 (17.98)										-	−.03
(12) Gender (male)	0.49 (0.50)											-

Scales: (1)/(7): 1 = *not strictly at all*, 5 = *very strictly*; (2)/(3)/(4)/(8): 1 = *not important at all*, 5 = *very important*; (5)/(6)/(9)/(10): 1 = *do not agree at all*, 5 = *fully agree*, (11): in years, (12): 1 = male
$N = 1005$; ***$p \leq .001$ **$p \leq .01$, *$p \leq .05$

were tested by correlating the importance of different types of communication (news media, social media, and interpersonal communication) with perceived efficacy (H1.1), norms (H1.2), and threat (H1.3). To test the second set of hypotheses, correlations between perceptions of efficacy (H2.1), norms (H2.2), threat (H2.3), and social distancing were modeled. The indirect communicative correlations with social distancing, as proposed in the third set of hypotheses, were examined by defining all perceptions as intervening variables and estimating the indirect effects (via efficacy, H3.1; norms, H3.2; threat, H3.2) by bootstrapping (Preacher & Hayes, 2008). Following the recommendations of Preacher and Hayes (2008), the residuals of all intervening variables were allowed to covary in order to avoid biases in standard errors. The fit indices indicated a good fit for the model (Hu & Bentler, 1999): $\chi^2(4) = 14.120$, $p = .007$, $CFI = 0.995$; $RMSEA = .050$, 90% CI [.025, .078]; $SRMR = .016$.

Results

The descriptive results showed that the Swiss population reported to follow social distancing (the call of the government to keep a distance of at least two meters; $M = 4.35$, $SD = 0.83$; see also Table 2). Of the respondents, 87.5% stated that they comply strictly with social distancing.

Association of communication with perceptions of efficacy (H1.1), norms (H1.2), and threat (H1.3)

Table 3 presents the results for the first set of hypotheses. There were significant associations between the importance that people assigned to different types of communication and efficacy, norms, and threat that account for 6 to 12% of variance of these perceptions (R^2_{excl}). Concretely, reporting that news media was

Table 3. Associations between the importance of communication and perceptions of efficacy (H1.1), norms (H1.2), and threat (H1.3).

Path			*b (SE)*	β
H1.1 Communication	→	**Efficacy**		
News media	→	Response efficacy	0.261 (.052)	.211***
Social media	→	R^2_{incl} = .079	−0.055 (.035)	−.054
Interpersonal	→	R^2_{excl} = .068	0.047 (.035)	.049
Age	→		0.006 (.002)	.103**
Gender	→		−0.112 (.063)	−.056
News media	→	Self-efficacy	0.162 (.044)	.150***
Social media	→	R^2_{incl} = .124	−0.026 (.029)	−.029
Interpersonal	→	R^2_{excl} = .064	0.040 (.029)	.048
Age	→		0.012 (.002)	.253***
Gender	→		−0.127 (.053)	−.073*
H1.2 Communication	→	**Norms**		
News media	→	Descriptive norms	0.207 (.045)	.178***
Social media	→	R^2_{incl} = .095	−0.118 (.032)	−.123***
Interpersonal	→	R^2_{excl} = .071	0.063 (.031)	.071*
Age	→		0.008 (.002)	.160***
Gender	→		−0.077 (.057)	−.041
News media	→	Injunctive norms	0.126 (.043)	.112**
Social media	→	R^2_{incl} = .120	−0.082 (.030)	−.089**
Interpersonal	→	R^2_{excl} = .067	0.103 (.030)	.118**
Age	→		0.012 (.002)	.236***
Gender	→		−0.126 (.055)	−.069*
H1.3 Communication	→	**Threat**		
News media	→	Severity	0.326 (.057)	.204***
Social media	→	R^2_{incl} = .246	0.141 (.040)	.107***
Interpersonal	→	R^2_{excl} = .119	0.032 (.039)	.026
Age	→		0.028 (.002)	.384***
Gender	→		0.087 (.072)	.033
News media	→	Susceptibility	0.280 (.055)	.202***
Social media	→	R^2_{incl} = .077	0.052 (.039)	.045
Interpersonal	→	R^2_{excl} = .064	0.016 (.036)	.015
Age	→		0.007 (.002)	.119***
Gender	→		−0.020 (.069)	−.009

N = 1005; maximum likelihood estimation with robust standard errors (MLM); *b* = unstandardized coefficient, β = standardized coefficient; significance levels of coefficients: *** = $p < .001$, ** = $p < .01$, * = $p < .05$; R^2_{incl}: explained variance with control variables; R^2_{excl}: explained variance without control variables.

an important communication source was positively associated with perceived efficacy, which was in line with H1.1: The more important respondents considered news media to be, the more they trusted in being able to implement the recommendation in their everyday lives (i.e., self-efficacy: β = .211; $p < .001$) and the higher their belief that social distancing was an effective measure (i.e., response efficacy: β = .150; $p < .001$).

Table 4. Associations between perceptions of efficacy (H2.1), norms (H2.2), and threat (H2.3) and social distancing.

Path			*b (SE)*	β
H2.1 Efficacy	→	**Social distancing**		
Response efficacy	→		0.056 (.022)	.069*
Self-efficacy	→		0.399 (.034)	.426***
H2.2 Norms	→	**Social distancing**		
Descriptive norms	→		0.156 (.031)	.179***
Injunctive norms	→		0.071 (.031)	.079*
H2.3 Threat	→	**Social distancing**		
Severity	→		0.013 (.017)	.020
Susceptibility	→		0.097 (.021)	.134***
Age	→	**Social distancing**	0.007 (.001)	.161***
Gender	→		−0.019 (.036)	−.012

N = 1005; maximum likelihood estimation with robust standard errors (MLM); *b* = unstandardized coefficient, β = standardized coefficient; significance levels of coefficients: *** = $p < .001$, ** = $p < .01$, * = $p < .05$; R^2 for social distancing incl. control variables: R^2_{incl} = .523; R^2 excl. control variables: R^2_{excl} = .499.

While efficacy was only associated with using news media, all communication types were related to normative perceptions. News media and interpersonal communication were both associated with the perceptions that others comply with social distancing (i.e., descriptive norm; news media: β = .178; $p < .001$, interpersonal: β = .071; $p < .05$) and consider it important (i.e., injunctive norm; news media: β = .112; $p < .001$, interpersonal: β = .118; $p < .01$). For social media, we found the opposite: the more important social media platforms were considered by an individual, the lower the perceived prevalence (i.e., descriptive norm; β = −.123; $p < .001$) and approval (i.e., injunctive norm; β = −.089; $p < .01$) of social distancing. Assuming a positive relation between communication and norms, H1.2 was thus not fully supported.

Threat perceptions were mainly related with news media. Corroborating H1.3, severity (β = .204; $p < .001$) and susceptibility (β = .202; $p < .001$) were positively associated with the increased importance of news media. Regarding the perception that an infection comes with severe consequences (severity), social media also played a role (β = .107; $p < .001$).

Association of perceived efficacy (H2.1), norms (H2.2), and threat (H2.3) with social distancing

Table 4 reports the results of the second set of hypotheses. Apart from the perception that an infection would have severe consequences (severity), all behavior- and disease-related perceptions were found to be relevant regarding compliance with the appeal to keep physical distance, which supported H2.1 (response efficacy: β = .069; $p < .05$; self-efficacy: β = .426; $p < .001$), H2.2 (descriptive norms: β = .179; $p < .001$, injunctive norms: β = .079; $p < .05$), and H2.3 (susceptibility: β = .134; $p < .001$). By far the strongest relation was found between social distancing and having trust in the ability to implement the recommendation (self-efficacy), but normative perceptions also turned out to be relevant. In sum, the C-ENT variables explained half of the variance of social distancing (exclusively control variables: R^2_{excl} = .499).

Indirect association of communication with social distancing through perceptions of efficacy (H3.1), norms (H3.2), and threat (H3.3)

The assumption that communication is indirectly associated with protective behavior via perceptions of efficacy, norms, and threat was mainly corroborated by our results for news media (Table 5). The association between the importance assigned to COVID-19-related news media use and the compliance with social distancing was documented by the positive effects via efficacy (H3.1, response efficacy: β = .015; $p < .05$, self-efficacy: β = .064; $p < .001$), norms (H3.2, descriptive norms: β = .032; $p < .001$), and threat (H3.3, susceptibility β = .027; $p < .001$). The negative association between social media with normative perceptions was transmitted to social distancing through an undermined descriptive normative perception (β = −.022;

Table 5. Associations between communication and social distancing (SDI), through perceptions of efficacy (H3.1), norms (H3.2), and threat (H3.3).

	Path		*b(SE)*	β
H3.1 Comm. → SDI	**via**	**Efficacy**	*b(SE)*	β
News media	via	Response	0.015 (.007)	.015*
Social media	via	efficacy	−0.003 (.002)	−.004
Interpersonal	via		0.003 (.002)	.003
News media	via	Self-efficacy	0.064 (.019)	.064***
Social media	via		−0.010 (.012)	−.012
Interpersonal	via		0.016 (.011)	.021
H3.2 Comm. → SDI	**via**	**Norms**		
News media	via	Descriptive	0.032 (.009)	.032***
Social media	via	norms	−0.018 (.006)	−.022**
Interpersonal	via		0.010 (.005)	.013
News media	via	Injunctivex`	0.009 (.005)	.009
Social media	via	norms	−0.006 (.003)	−.007
Interpersonal	via		0.007 (.004)	.009
H3.3 Comm. → SDI	**via**	**Threat**		
News media	via	Severity	0.004 (.006)	.004
Social media	via		0.002 (.003)	.002
Interpersonal	via		0.000 (.001)	.001
News media	via	Susceptibility	0.027 (.008)	.027***
Social media	via		0.005 (.004)	.006
Interpersonal	via		0.002 (.004)	.002

N = 1005; SDI = social distancing; estimation of indirect effects via bootstrapping.

$p < .01$). This relation was negative and thus opposed to the assumed positive association (H3.2). No indirect association was found for interpersonal communication.

Discussion

Our results support the basic idea of the C-ENT model of protective behaviors for the case of social distancing in the COVID-19 pandemic. The importance of COVID-19 communication types was directly associated with their perceptions of efficacy, norms, and threat, which were related with the engagement in social distancing. Hence, communication was indirectly associated with protective behavior. Corroborating the idea of an indirect relation, further analyses demonstrated that communication was not directly associated with health protective behavior. The finding of indirect, small to moderate effects of communication (6 to 12% of variance explanation) was in line with the current state of media effects research (Valkenburg et al., 2016).

The results also emphasize that news media, social media, and interpersonal communication should be distinguished as distinct forms of communication that are relevant for protective behavior. The importance of news media as an information source turned out to have the strongest association with perceived efficacy, norms, and threat. Attention to news media was positively related with all perceptions regarding social distancing (efficacy and norms) and COVID-19 (threat). A closer look reveals that the relation of news media was particularly strong with threat perceptions (severity and susceptibility) and less with self-efficacy. This finding might be explained by a predominance of alarm frames that focus on the threat over coping frames addressing the efficacy of preventions in news media, which have been found in previous studies (Berry et al., 2007; Chang, 2012). The importance of news media as an information source was also related with normative perceptions. This may be due to presumed influence processes (Gunther & Storey, 2003): An influence of COVID-19-related communication is presumed for others' behavior and attitudes, which then influences normative perceptions about the prevalence and social approval of behavior in the social environment (Geber & Hefner, 2019; Hong & Kim, 2019). Ultimately, mass media is the only communication type that had a significant indirect relation with social distancing via multiple perceptions (i.e., self-efficacy, response efficacy, descriptive norms, and susceptibility). This may be explained by the communicative power that was found for news media outlets as a trusted source in a crisis situation (Paek et al., 2016).

Social media communication turned out to have a weaker association than mass media in terms of effect size and the variety of perceptions that it is related with. Moreover, it seems to play a different role: A high importance of social media for COVID-19-related communication was associated with lower perceptions that others engage in social distancing (i.e., descriptive norm) and find it important (i.e., injunctive norm). Beside the negative association between social media and norms there was also a negative indirect relationship between social media and compliance with the protective measure of social distancing. Previous studies show that social media is used to express frustration regarding persons who do not meet the measures, as in a study by Mollema et al. (2015) in the context of the measles outbreak in the Netherlands in 2013. This might explain why social media was related with lower social-norm perceptions. Beside this negative relation, the importance of social media was positively associated with perceived severity of COVID-19, which may be due to high fear-arousing sensationalism levels in the majority of social media posts, as demonstrated by a sample of Facebook posts regarding the Zika virus by Ali et al. (2019).

Last, interpersonal communication was revealed to be exclusively related with normative perceptions. The results may be interpreted as a process of "sense-making," as suggested by Vigsø and Odén (2016), in which people try to understand how others evaluate the situation. In sum, explaining 50% of social distancing, the C-ENT model can be evaluated as a suitable framework to contextualize protective behavior, health-related perceptions, and different types of communication in a public health crisis.

Implications

The proposed C-ENT model and the empirical results contribute to the current state of research in two respects: First, they underline the crucial role of communication in relation with health behavior and the necessity of differentiating between different types of crisis-related communication. Second, perceived norms proved to play a central role in the C-ENT model and turned out to be complex communicative phenomena (Geber & Hefner, 2019). Norms were associated with all three types of communication, with positive relations to news media and interpersonal communication and a negative relation with social media. The importance of norms might be partly reasoned with the inherently social nature of social distancing in the present application case. However the attribute-centered

approach (Rimal et al., 2011) proposes that the consideration of norms is beneficial for the explanation of a variety of behaviors, such as public behaviors.

Furthermore, the results provide a fruitful basis for health communication strategies in public health crises, as they provide guidance regarding both effective channels and messages (Leppin & Aro, 2009; Vaughan & Tinker, 2009). First, the results point to the power of news media in public health crises. However, this potential is not fully realized in the present case of COVID-19: Given the crucial role of self-efficacy regarding the compliance with protective measures, the news media's association with self-efficacy should be strategically used. In line with previous reviews (Bish & Michie, 2010), we therefore conclude that health communication strategies might capitalize on coping frames in news media communication, strengthening the belief that measures can be put into practice (Berry et al., 2007; Chang, 2012). Additionally, the results of the C-ENT model advise addressing the negative association between perceived social norm of social distancing and social media use. Strategies might counteract this negative relation by distributing normative messages via news media (e.g., "Ninety percent of the Swiss population comply with the call to keep physical distance"), stimulating "sense-making" in interpersonal communication (Vigsø & Odén, 2016), raising awareness among social media users of the destructive potential of hostile communication on social media (as demonstrated in the study of Mollema et al., 2015), and motivating them to display compliance with public health measures (e.g., by promoting respective hashtags such as #WeStayAtHome).

The C-ENT model builds on well-established theories of health behavior and health communication (i.e., PMT; Rogers, 1975), HBM (Rosenstock et al., 1988), EPPM (Witte, 1992), TPB (Ajzen, 1991), and TNSB (Rimal & Real, 2005)) in order to investigate the relation between different types of communication and health protective behavior at the outset of the COVID-19 pandemic. Perceived social norms and their association with different types of communication are likely to be of special relevance to communicable disease as protective behavior not only relates to a person but also to his/her everyday contacts. However, we assume that the proposed model can be also applied to pro-health behaviors or health promotion in general, comparably to health protection models it builds on.

Limitations

Our study has three main methodological limitations. First, based on cross-sectional data, we can not test the causal relation of the associations found. However, given the timing of our field work during the first days of the lockdown and the fact that social distancing was a newly introduced health protection behavior in Switzerland, it is plausible to assume that the causal direction is most likely to be from communication to perceptions, and finally to protective behavior. This assumption is also supported by other studies on the influence of media content on health-related perceptions during public health crises (R. Li, 2021; Nazione et al., 2021; S.-H. Oh et al., 2015; Paek et al., 2016; Wirz et al., 2020). Nevertheless, testing the proposed model in future studies should build on longitudinal design to control for rivaling explanations such as selective media use and active information seeking due to preexisting behavior or perceptions (Wang et al., 2020). Second, all constructs are based on single-item measures. The validity of single items has been questioned because items might go along with measurement errors (Nunnally & Bernstein, 1994, p. 67). However, we take into account the complexity of the theoretical constructs (e.g., response and self-efficacy in terms of efficacy), while previous studies are often limited to only one aspect, as reviews reveal (Bish & Michie, 2010; Leppin & Aro, 2009). Third, our question regarding the importance of different communication types is a proxy but not a direct measurement of communicative behavior. However, the question how to measure media use in a valid way has not been finally answered in communication research and is a challenge that all survey-based measurements face as they rely on the participants' self-reports (Eveland et al., 2009).

Conclusion

The C-ENT model of health protective behavior is a response to the call for theory-based approaches to protective behaviors regarding pandemic outbreaks (Bish & Michie, 2010; Leppin & Aro, 2009). To understand social distancing during the COVID-19 pandemic, the C-ENT model unfolds a communication perspective on health protective behaviors, which proves to be valuable in two regards. First, the C-ENT model contributes to the question of how behavior-relevant perceptions are associated with different types of communication. Second, with the integration of norms along with efficacy and threat perceptions, it takes into consideration the social dimension of health protective behavior. By its theoretically driven perspective, the C-ENT model ultimately provides vital starting points for health communication strategies, as it informs about both effective channels and messages.

Future research in line with the C-ENT model may complement the personal-level risk perceptions by societal-level risk perceptions (i.e., people's judgment about risks to others or to society in general), as suggested by the impersonal-impact hypothesis (Paek et al., 2016; Tyler & Cook, 1984). Furthermore, the applicability of the C-ENT model of protective behavior should be tested with a longitudinal design and in different contexts, such as cultures, media systems, and beyond the special situation of a pandemic outbreak.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Thomas N. Friemel http://orcid.org/0000-0001-8088-0113
Sarah Geber http://orcid.org/0000-0002-0541-9148

References

Ackerson, L. K., & Viswanath, K. (2009). The social context of interpersonal communication and health. *Journal of Health Communication*, *14* (Suppl 1), 5–17. https://doi.org/10.1080/10810730902806836

Ahmed, F., Zviedrite, N., & Uzicanin, A. (2018). Effectiveness of workplace social distancing measures in reducing influenza transmission: A systematic review. *BMC Public Health*, *18*(1), 518. https://doi.org/10.1186/s12889-018-5446-1

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ali, K., Zain-ul-abdin, K., Li, C., Johns, L., Ali, A. A., & Carcioppolo, N. (2019). Viruses going viral: Impact of fear-arousing sensationalist social media messages on user engagement. *Science Communication*, *41*(3), 314–338. https://doi.org/10.1177/1075547019846124

Ball-Rokeach, S. J. (2008). Media system dependency theory. In W. Donsbach (Ed.), *The international encyclopedia of communication* (Vol. 12, pp. 485). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781405186407.wbiecm051

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Berry, T. R., Wharf-Higgins, J., & Naylor, P. J. (2007). SARS wars: An examination of the quantity and construction of health information in the news media. *Health Communication*, *21*(1), 35–44. https://doi.org/10.1080/10410230701283322

Bish, A., & Michie, S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. *British Journal of Health Psychology*, *15*(Pt 4), 797–824. https://doi.org/10.1348/135910710X485826

Bults, M., Beaujean, D. J., de Zwart, O., Kok, G., van Empelen, P., van Steenbergen, J. E., Richardus, J. H., & Voeten, H. A. (2011). Perceived risk, anxiety, and behavioural responses of the general public during the early phase of the influenza A (H1N1) pandemic in the Netherlands: Results of three consecutive online surveys. *BMC Public Health*, *11*(1), 2. https://doi.org/10.1186/1471-2458-11-2

Cava, M. A., Fay, K. E., Beanlands, H. J., McCay, E. A., & Wignall, R. (2005). Risk perception and compliance with quarantine during the SARS outbreak. *Journal of Nursing Scholarship*, *37*(4), 343–347. https://doi.org/10.1111/j.1547-5069.2005.00059.x

Chan, J. F.-W., Yuan, S., Kok, K.-H., To, K. K.-W., Chu, H., Yang, J., Xing, F., Liu, J., Yip, C. C.-Y., Poon, R. W.-S., Tsoi, H.-W., Lo, S. K.-F., Chan, K.-H., Poon, V. K.-M., Chan, W.-M., Ip, J. D., Cai, J.-P., Cheng, V.-C.-C., Chen, H., & Yuen, K.-Y. (2020). A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster. *The Lancet*, *395*(10223), 514–523. https://doi.org/10.1016/S0140-6736(20)30154-9

Chang, C. (2012). News coverage of health-related issues and its impacts on perceptions: Taiwan as an example. *Health Communication*, *27*(2), 111–123. https://doi.org/10.1080/10410236.2011.569004

Chew, C., & Eysenbach, G. (2010). Pandemics in the age of Twitter: Content analysis of tweets during the 2009 H1N1 outbreak. *PloS One*, *5*(11), e14118. https://doi.org/10.1371/journal.pone.0014118

Choi, D.-H., Yoo, W., Noh, G.-Y., & Park, K. (2017).The impact of social media on risk perceptions during the MERS outbreak in South Korea. *Computers in Human Behavior*, *72*, 422–431. https://doi.org/10.1016/j.chb.2017.03.004

Chung, J. B., & Yun, G. W. (2013).Media and social amplification of risk: BSE and H1N1 cases in South Korea. *Disaster Prevention and Management: An International Journal*, *22*(2), 148–159. https://doi.org/10.1108/09653561311325299

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*(6), 1015–1026. https://doi.org/10.1037/0022-3514.58.6.1015

de Zwart, O., Veldhuijzen, I. K., Elam, G., Aro, A. R., Abraham, T., Bishop, G. D., Voeten, H. A. C. M., Richardus, J. H., & Brug, J. (2009). Perceived threat, risk perception, and efficacy beliefs related to SARS and other (emerging) infectious diseases: Results of an international survey. *International Journal of Behavioral Medicine*, *16*(1), 30–40. https://doi.org/10.1007/s12529-008-9008-2

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology*, *51*(3), 629–636. https://doi.org/10.1037/h0046408

Eveland, W. P., Hutchens, M. J., & Shen, F. (2009). Exposure, attention, or "use" of news? Assessing aspects of the reliability and validity of a central concept in political communication research. *Communication Methods and Measures*, *3*(4), 223–244. https://doi.org/10.1080/19312450903378925

Flanagin, A. J. (2017). Online social influence and the convergence of mass and interpersonal communication. *Human Communication Research*, *43*(4), 450–463. https://doi.org/10.1111/hcre.12116

Fong, M. W., Gao, H., Wong, J. Y., Xiao, J., Shiu, E. Y. C., Ryu, S., & Cowling, B. J. (2020). Nonpharmaceutical measures for pandemic influenza in nonhealthcare settings-social distancing measures. *Emerging Infectious Diseases*, *26*(5), 976–984. https://doi.org/10.3201/eid2605.190995

Geber, S., Baumann, E., & Klimmt, C. (2019). Where do norms come from? Peer communication as a factor in normative social influences on risk behavior. *Communication Research*, *46*(5), 708–730. https://doi.org/10.1177/0093650217718656

Geber, S., & Friemel, T. (2021). A typology-based approach to tracing-app adoption during the COVID-19 pandemic: The case of the SwissCovid app. *Journal of Quantitative Description: Digital Media*, *1*(1), 1–28. https://doi.org/10.51685/jqd.2021.007

Geber, S., & Hefner, D. (2019). Social norms as communicative phenomena: A communication perspective on the theory of normative social behavior. *Studies in Communication and Media*, *8*(1), 6–28. https://doi.org/10.5771/2192-4007-2019-1-6

Gilles, I., Bangerter, A., Clémence, A., Green, E. G. T., Krings, F., Staerklé, C., & Wagner-Egger, P. (2011). Trust in medical organizations predicts pandemic (H1N1) 2009 vaccination behavior and perceived efficacy of protection measures in the Swiss public. *European Journal of Epidemiology*, *26*(3), 203–210. https://doi.org/10.1007/s10654-011-9577-2

Gunther, A. C., & Storey, J. D. (2003). The influence of presumed influence. *Journal of Communication*, *53*(2), 199–215. https://doi.org/10.1111/j.1460-2466.2003.tb02586.x

Ho, S. S., Peh, X., & Soh, V. W. L. (2013). The cognitive mediation model: Factors influencing public knowledge of the H1N1 pandemic and intention to take precautionary behaviors. *Journal of Health Communication*, *18*(7), 773–794. https://doi.org/10.1080/10810730.2012.743624

Hobbs, J., Kittler, A., Fox, S., Middleton, B., & Bates, D. W. (2004). Communicating health information to an alarmed public facing a threat such as a bioterrorist attack. *Journal of Health Communication*, *9*(1), 67–75. https://doi.org/10.1080/10810730490271638

Hong, Y., & Kim, S. (2019). Influence of presumed media influence for health prevention: How mass media indirectly promote health prevention behaviors through descriptive norms. *Health Communication*, *35*(14), 1–11. https://doi.org/10.1080/10410236.2019.1663585

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Jones, J. H., & Salathé, M. (2009).Early assessment of anxiety and behavioral response to novel swine-origin influenza A (H1N1). *PloS One*, *4*(12), e8032. https://doi.org/10.1371/journal.pone.0008032

Kim, Y.-C., & Ball-Rokeach, S. J. (2006). Civic engagement from a communication infrastructure perspective. *Communication Theory*, *16*(2), 173–197. https://doi.org/10.1111/j.1468-2885.2006.00267.x

Kreps, G. L. (2017). Online information and communication systems to enhance health outcomes through communication convergence. *Human Communication Research*, *43*(4), 518–530. https://doi.org/10.1111/hcre.12117

Lau, J. T. F., Kim, J. H., Tsui, H. Y., & Griffiths, S. (2007). Anticipated and current preventive behaviors in response to an anticipated human-to-human H5N1 epidemic in the Hong Kong Chinese general population. *BMC Infectious Diseases*, *7*(1), 18. https://doi.org/10.1186/1471-2334-7-18

Lau, J. T. F., Yang, X., Tsui, H., Pang, E., & Kim, J. H. (2004). SARS preventive and risk behaviours of Hong Kong air travellers. *Epidemiology and Infection*, *132*(4), 727–736. https://doi.org/10.1017/S0950268804002225

Leppin, A., & Aro, A. R. (2009). Risk perceptions related to SARS and avian influenza: Theoretical foundations of current empirical research. *International Journal of Behavioral Medicine*, *16*(1), 7–29. https://doi.org/10.1007/s12529-008-9002-8

Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Leung, K. S. M., Lau, E. H. Y., Wong, J. Y., Xing, X., Xiang, N., Wu, Y., Li, C., Chen, Q., Li, D., Liu, T., Zhao, J., Liu, M., & Feng, Z. (2020). Early transmission

dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *The New England Journal of Medicine*, *382*(13), 1199–1207. https://doi.org/10.1056/NEJMoa2001316

Li, R. (2021). Fear of COVID-19: What causes fear and how individuals cope with it. *Health Communication*, 1–10. https://doi.org/10.1080/10410236.2021.1901423

Lin, C. A., & Lagoe, C. (2013). Effects of news media and interpersonal interactions on H1N1 risk perception and vaccination intent. *Communication Research Reports*, *30*(2), 127–136. https://doi.org/10.1080/08824096.2012.762907

Majid, S., & Rahmat, N. A. (2013). Information needs and seeking behavior during the H1N1 virus outbreak. *Journal of Information Science Theory and Practice*, *1*(1), 42–53. https://doi.org/10.1633/JISTaP.2013.1.1.3

Mollema, L., Harmsen, I. A., Broekhuizen, E., Clijnk, R., de Melker, H., Paulussen, T., Kok, G., Ruiter, R., & Das, E. (2015). Disease detection or public opinion reflection? Content analysis of tweets, other social media, and online newspapers during the measles outbreak in the Netherlands in 2013. *Journal of Medical Internet Research*, *17*(5), e128. https://doi.org/10.2196/jmir.3863

Mou, Y., & Lin, C. A. (2014). Communicating food safety via the social media. *Science Communication*, *36*(5), 593–616. https://doi.org/10.1177/1075547014549480

Nazione, S., Perrault, E., & Pace, K. (2021).Impact of information exposure on perceived risk, efficacy, and preventative behaviors at the beginning of the COVID-19 pandemic in the United States. *Health Communication*, *36*(1), 23–31. https://doi.org/10.1080/10410236.2020.1847446

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). *McGraw-Hill Series in Psychology*. McGraw-Hill.

Odlum, M., & Yoon, S. (2018). Health information needs and health seeking behavior during the 2014-2016 Ebola outbreak: A Twitter content analysis. *PLoS Currents*, *10*. https://doi.org/10.1371/currents.outbreaks.fa814fb2bec36e29b718ab6af66124fa

Oh, H. J., Hove, T., Paek, H.-J., Lee, B., Lee, H., & Kyu Song, S. (2012). Attention cycles and the H1N1 pandemic: A cross-national study of US and Korean newspaper coverage. *Asian Journal of Communication*, *22*(2), 214–232. https://doi.org/10.1080/01292986.2011.642395

Oh, S.-H., Lee, S. Y., & Han, C. (2020). The effects of social media use on preventive behaviors during infectious disease outbreaks: The mediating role of self-relevant emotions and public risk perception. *Health Communication*, *36*(8), 1–10. https://doi.org/10.1080/10410236.2020.1724639

Oh, S.-H., Paek, H.-J., & Hove, T. (2015).Cognitive and emotional dimensions of perceived risk characteristics, genre-specific media effects, and risk perceptions: The case of H1N1 influenza in South Korea. *Asian Journal of Communication*, *25*(1), 14–32. https://doi.org/10.1080/01292986.2014.989240

Paek, H.-J., Oh, S.-H., & Hove, T. (2016). How fear-arousing news messages affect risk perceptions and intention to talk about risk. *Health Communication*, *31*(9), 1051–1062. https://doi.org/10.1080/10410236.2015.1037419

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891. https://doi.org/10.3758/BRM.40.3.879

Prem, K., Liu, Y., Russell, T. W., Kucharski, A. J., Eggo, R. M., Davies, N., Jit, M., Klepac, P., Flasche, S., Clifford, S., Pearson, C. A. B., Munday, J. D., Abbott, S., Gibbs, H., Rosello, A., Quilty, B. J., Jombart, T., Sun, F., Diamond, C., & Hellewell, J. (2020). The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: A modelling study. *The Lancet Public Health*, *5*(5), e261–e270. https://doi.org/10.1016/S2468-2667(20)30073-6

Rimal, R. N., Lapinski, M. K., Turner, M. M., & Smith, K. C. (2011). The attribute-centered approach for understanding health behaviors: Initial ideas and future research directions. *Studies in Communication Sciences*, *11*(1), 15–34. https://doi.org/10.5169/seals-791183

Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms: A test of the theory of normative social behavior. *Communication Research*, *32*(3), 389–414. https://doi.org/10.1177/0093650205275385

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

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. T. Cacioppo & R. E. Petty (Eds.), *Social psychophysiology* (pp. 153–176). Guilford.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly*, *15*(2), 175–183. https://doi.org/10.1177/109019818801500203

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 2. https://doi.org/10.18637/jss.v048.i02

Rubin, G. J., Amlôt, R., Page, L., & Wessely, S. (2009). Public perceptions, anxiety, and behaviour change in relation to the swine flu outbreak: Cross sectional telephone survey. *BMJ (Clinical Research Ed.)*, *339*(jul02 3), b2651. https://doi.org/10.1136/bmj.b2651

Signorini, A., Segre, A. M., & Polgreen, P. M. (2011). The use of Twitter to track levels of disease activity and public concern in the U.S. during the influenza A H1N1 pandemic. *PloS One*, *6*(5), e19467. https://doi.org/10.1371/journal.pone.0019467

Tang, C. S. K., & Wong, C.-Y. (2004).Factors influencing the wearing of facemasks to prevent the severe acute respiratory syndrome among adult Chinese in Hong Kong. *Preventive Medicine*, *39*(6), 1187–1193. https://doi.org/10.1016/j.ypmed.2004.04.032

Teasdale, E., Santer, M., Geraghty, A. W. A., Little, P., & Yardley, L. (2014). Public perceptions of non-pharmaceutical interventions for reducing transmission of respiratory infection: Systematic review and synthesis of qualitative studies. *BMC Public Health*, *14*(1), 589. https://doi.org/10.1186/1471-2458-14-589

The Federal Council. (2020a, March 20). *Coronavirus: Federal council bans gatherings of more than five people*. https://www.admin.ch/gov/en/start/documentation/media-releases/media-releases-federal-council.msg-id-78513.html

The Federal Council. (2020b, March 16). *Coronavirus: Federal council declares 'extraordinary situation' and introduces more stringent measures*. https://www.admin.ch/gov/en/start/documentation/media-releases/media-releases-federal-council.msg-id-78454.html

Tyler, T. R., & Cook, F. L. (1984). The mass media and judgments of risk: Distinguishing impact on personal and societal level judgments. *Journal of Personality and Social Psychology*, *47*(4), 693–708. https://doi.org/10.1037/0022-3514.47.4.693

Valkenburg, P. M., Peter, J. & Walther, J. B. (2016). Media effects: Theory and research. *Annual Review of Psychology*, *67*(1), 315–338. https://doi.org/10.1146/annurev-psych-122414-033608

Vaughan, E., & Tinker, T. (2009). Effective health risk communication about pandemic influenza for vulnerable populations. *American Journal of Public Health*, *99*(Suppl 2), S324–32. https://doi.org/10.2105/AJPH.2009.162537

Vigsø, O., & Odén, T. (2016). The dynamics of sensemaking and information seeking in a crisis situation. *Nordicom Review*, *37*(1), 71–84. https://doi.org/10.1515/nor-2016-0003

Voeten, H. A. C. M., de Zwart, O., Veldhuijzen, I. K., Yuen, C., Jiang, X., Elam, G., Abraham, T., & Brug, J. (2009). Sources of information and health beliefs related to SARS and avian influenza among chinese communities in the United Kingdom and the Netherlands, compared to the general population in these countries. *International Journal of Behavioral Medicine*, *16*(1), 49–57. https://doi.org/10.1007/s12529-008-9006-4

Wang, X., Shi, J., & Kong, H. (2020). Online health information seeking: A review and meta-analysis. *Health Communication*, *36*(10), 1–13. https://doi.org/10.1080/10410236.2020.1748829

Wirz, C. D., Mayorga, M., & Johnson, B. B. (2020). A longitudinal analysis of Americans' media sources, risk perceptions, and judged need for action during the Zika outbreak. *Health Communication*, 1–10. https://doi.org/10.1080/10410236.2020.1773707

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, *59*(4), 329–349. https://doi.org/10.1080/03637759209376276

Wong, L. P., & Sam, I.-C. (2010).Public sources of information and information needs for pandemic influenza A (H1N1). *Journal of Community Health*, *35* (6), 676–682. https://doi.org/10.1007/s10900-010-9271-4

World Health Organization. (2020a). *Coronavirus disease 2019 (COVID-19): Situation report - 71*. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200331-sitrep-71-covid-19.pdf?sfvrsn=4360e92b_

World Health Organization. (2020b). *Rolling updates on coronavirus disease (COVID-19)*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen

Xu, Z., Ellis, L., & Laffidy, M. (2020).News frames and news exposure predicting flu vaccination uptake: Evidence from U.S. Newspapers, 2011-2018 using computational methods. *Health Communication*, 1–9. https://doi.org/10.1080/10410236.2020.1818958

Yoo, W., Choi, D.-H., & Park, K. (2016). The effects of SNS communication: How expressing and receiving information predict mers-preventive behavioral intentions in South Korea. *Computers in Human Behavior*, *62*, 34–43. https://doi.org/10.1016/j.chb.2016.03.058