Exemplifying Risk: Effects of Health Exemplars and Risk Prevalence on Perceived Susceptibility, Severity, and Vaccination Intentions

Sherine El-Toukhy
School of Media and Journalism, The University of North Carolina at Chapel Hill
sh.eltoukhy@gmail.com

Lynette Holman
The Department of Communication, College of Fine and Applied Arts, Appalachian State University
holmanlm1@appstate.edu

Rhonda Gibson
School of Media and Journalism, The University of North Carolina at Chapel Hill
gibsonr@email.unc.edu

Abstract

News reports on infectious diseases often feature stories of individuals who contract these diseases and either die or recover. Journalists use such exemplars to increase attention to, comprehension and retrieval of health messages, and intentions to engage in promoted behavior. However, little is known about whether and how death and recovery exemplars affect audiences' risk perceptions and behavioral intentions and whether these effects vary by risk attributes such as perceptions of how common a health risk is. In a 3 x 2 between-subject experiment, participants (N= 174) were exposed to death, recovery, or no exemplars in mock news reports on influenza and meningitis as high- and low-prevalence risks. We examined whether perceived susceptibility, severity, and vaccination intentions differed as a function of exemplar type and risk prevalence and if perceived susceptibility and severity mediated the relationship between exemplar type and vaccination intentions.

Participants exposed to recovery exemplars had higher perceived severity than did those exposed to no exemplars. Participants exposed to a high-prevalence risk story had higher perceived susceptibility but lower perceived severity than those exposed to a low-prevalence risk story. Exposure to recovery exemplars led to increased perceived severity, which increased perceived susceptibility, which increased influenza vaccination intentions.

Key Words: exemplification, perceived severity, perceived susceptibility, vaccination intentions

Introduction

Health messages are replete with personal stories. A news story describes a stream of candles [that] lit up Sanford Mall Wednesday evening as more than 100 students mourned the loss of one of their own: 21-year-old Landon Hill … [who died of] bacterial meningitis' ('ASU student dies,' 2011). An op-ed details the ailments of a toddler who had the measles but 'slowly … recovered' (Harmon, 2014). *Tips from Former Smokers* anti-smoking campaign highlights stories of former smokers like Terrie Hall. Terrie started smoking at age 13, was diagnosed with oral and throat cancer at age 40, and died at age 53. Her tip: 'Don't smoke. And if you do smoke, quit' (Centers for Disease Control and Prevention [CDC], 2015a).

Concrete stories of individuals whose experiences represent health risks and their consequences are called exemplars. Exemplars make health messages personal, dramatic, and sensational. These characteristics result in increased audience engagement with and attention to the message, comprehension, storage, retrieval, and intentions to engage in the promoted behavior (Brosius & Bathelt, 1994; Zillmann, 1999, 2002, 2006). Studies show consistent use of exemplars to deliver health information (e.g., Jensen, Moriarty, Hurley, & Stryker, 2010). However, less is known about the effects of different exemplar types and if these effects vary by health risks presented in health messages. In a 3 x 2 experiment, we expose participants to death, recovery, or no exemplars in mock news reports on high- and low-prevalence

health risks (i.e., influenza and meningitis). We examine the effects of exemplar type and risk prevalence on perceived susceptibility and severity (Brewer et al., 2007) as well as self-report and behavioral measures of vaccination intentions. Finally, we test if perceived susceptibility and severity mediates the relationship between exemplar type and vaccination intentions.

This study extends health communication literature in several ways. We examine the effects of death and recovery exemplars in health messages and the effects of perceived prevalence that have been shown to affect susceptibility and severity perceptions (El-Toukhy, 2015). Second, we examine effects of exemplar types and risk prevalence on perceived susceptibility and severity as distinct concepts (El-Toukhy, 2015), whereas previous studies examined risk perceptions as additive or multiplicative indices of susceptibility and severity (e.g., Rimal & Real, 2003). Third, we incorporate behavioral measures of vaccination intentions, whereas previous studies documented only self-report behavioral outcomes (e.g., Gibson & Zillmann, 2000). Behavioral measures complement self-report outcomes and reduce demand characteristics in experimental studies (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Schwartz, 1999). Finally, in response to calls for identifying mediators between message characteristics and behavioral intentions (Sperber, Brewer, & Smith, 2008), we examine perceived susceptibility and severity as mediators of the effects of exemplars on vaccination intentions.

Background

Infectious diseases are a public health concern for which vaccines are a forefront prevention strategy (Morens, Folkers, & Fauci, 2004). However, vaccination rates remain low, especially among racial and ethnic minorities and individuals without health coverage (Williams et al., 2016). The national coverage of influenza vaccine among adults 18 years and older was 42.2% in 2013-2014 (CDC, 2015b). Among adolescents 13-17 years old, meningococcal vaccine coverage was 77.8% in 2013. Only 29.6% of adolescents who received the first meningitis dose before turning 16 received the second recommended dose in 2013 (CDC, 2015c). Studies show outbreaks of vaccine-preventable diseases in communities with low vaccination rates (Omer, Salmon, Orenstein, deHart, & Halsey, 2009).

Much of the public's health information comes from mass media (Dutta-Bergman, 2004). Health communicators often construct messages to communicate risk information to the public and to promote vaccine acceptability and vaccination behaviors (Ball, Evans, & Bostrom, 1998). Journalists use exemplars in health and medical reporting for various reasons, such as providing a human-interest angle and simplifying statistical figures (Hinnant, Len-Ríos, & Young, 2013; Viswanath et al., 2008). Exemplars are vivid and emotion-evoking 'illustrative individual case[s]' (Brosius & Bathelt, 1994, p. 48) that are presented as being representative of larger populations or events. They increase attention to messages, comprehension, retention, recall (Zillmann, 1999, 2002), and intentions to engage in healthy behaviors (Kim, Bigman, Leader, Lerman, & Cappella, 2012).

Exemplification theory is based on the premise that people form judgments of a phenomenon based on observed events that represent similar (but not necessarily identical) events (Zillmann, 2002). Exemplar effects occur through various mechanisms such as quantification, representativeness, and availability heuristics (Zillmann, 1999). In a process that requires minimal cognitive effort, individuals assess the occurrence of a phenomenon based on the prevalence of exemplars (Zillmann, 2006). Further, they underutilize factual information such as percentages and use exemplars to make judgments about the actual occurrence of a phenomenon (Brosius & Bathelt, 1994). Accessible exemplars are more likely to then be used to make judgments. Recently activated exemplars have short-term accessibility, whereas frequently activated exemplars have long-term or chronic accessibility, and their effects are, thus, more dominant than those of recently activated exemplars (Zillmann, 2006). From a narratives perspective, exemplars result in story immersion, identification with characters, and transportation, which ultimately lead to persuasion (Green, 2006; Green & Brock, 2000).

Despite the widespread use of exemplars in health messaging, their selection does not follow specific guidelines (Hinnant et al., 2013). Consequently, exemplars can be misrepresentative of the health topic (Holman, 2011). Previous studies held exemplars constant in comparison to factual information (Allen, Preiss, & Gayle, 2006). Studies show that audiences exhibit persistent judgmental and perceptual changes that are consistent with exemplars rather than base-rate information (i.e., factual, numeric information such as percentages) (Zillmann, 1999) even when exemplars are at odds with base-rate information (Gibson & Zillmann, 1994). These findings are important in health communication where erroneous perceptions and decisions are costly (Fischhoff, Bostrom, & Quadrel, 1993).

Perceived susceptibility and severity

Health messages often focus on risk perceptions (Fischhoff, 1995) because they drive

behavioral change and influence message processing (Ajzen, 1991; Becker, 1974; Edwards, 1954; Montaño & Kasprzyk, 2008; Rogers, 1975; Witte, 1992). They are defined as subjective probabilities that a risk can occur (Slovic, 1987). Risk perceptions have two dimensions: perceived susceptibility is the likelihood of experiencing a risk, whereas severity is the extent of its harm (Brewer et al., 2007). However, people inaccurately estimate personal risks (Kahneman, 1991; Plight, 1996; Tversky & Kahneman, 1974; Weinstein, 1989a) often deviating from objective risk estimates (e.g., Gerend, Aiken, West, & Erchill, 2004), presenting a situation in which exemplars can exacerbate inaccuracies (Gibson & Zillmann, 1994).

Research has indeed shown that exemplars exhibit a disproportionate long-term effect on risk perceptions (Zillmann, 2006). For example, Aust and Zillmann (1996) found that news exemplars that featured victims of random shootings and salmonella poisoning increased participants' perceptions of their own risks. Similarly, Zillmann and Gan (1996) found that participants exposed to graphic images of skin cancer exhibited heightened personal risks of contracting melanoma from sun exposure, which grew over time. Thus, we hypothesize that risk perceptions will align with exemplar type whereby death exemplars would lead to increased risk perceptions compared to recovery exemplars. This hypothesis represents assimilation effects whereby people transfer message portrayal of risk to their personal risk perceptions (Hovland, Harvey, & Sherif, 1957).

H_1: *Perceived susceptibility and severity will be higher among participants exposed to stories featuring death exemplars than among those exposed to stories featuring recovery exemplars, which, in turn, will be higher than among those exposed to stories with no exemplars.*

Risk perceptions vary for different health risks, which is attributed to underlying risk attributes such as perceived prevalence and personal experience (Slovic, Fischhoff, & Lichtenstein, 1982). For example, people exhibit high susceptibility and low severity perceptions for health conditions that are perceived as highly prevalent (e.g., flu) versus those that are perceived as less prevalent (e.g., bone cancer) (El-Toukhy, 2015; Jemmott, Ditto, & Croyle, 1986). Thus, we hypothesize that risk prevalence will have distinct effects on perceived susceptibility and severity whereby people will exhibit high perceived susceptibility but low perceived severity for high-prevalence risks (and vice versa for low-prevalence risks).

H_2: *Perceived susceptibility will be higher among participants exposed to a high-prevalence risk story than among those exposed to a low-prevalence risk story. Conversely, perceived severity will be lower among participants exposed to a high-prevalence risk story than among those exposed to a low-prevalence risk story.*

Behavioral intentions

Previous studies have examined exemplar effects on behavioral intentions. For example, Kim et al. (2012) found that exemplars led to greater smoking cessation intentions. Studies also show that risk prevalence is associated with behaviors. For example, low-prevalence diseases are associated with riskier and less protective behaviors (Kalichman & Cain, 2005). We hypothesize that exemplar type and risk prevalence will be directly associated with positive vaccination intentions.

H_3: *Vaccination intentions will be higher (a) among participants exposed to stories featuring death exemplars than among those exposed to stories featuring recovery exemplars, which, in turn, will be higher than among those exposed to stories with no exemplars and (b) among those exposed to a high-prevalence risk story than among those exposed to a low-prevalence risk story.*

Scholars documented several mediators through which exemplars influence behavioral intentions and behaviors. Examples include narrative engagement (Kim et al., 2012) and selective exposure (Knobloch-Westerwick & Sage, 2013). From a health behavioral change perspective, we examined perceived susceptibility and severity as mediators of exemplar effects on behavioral intentions. Common across behavioral change theories is the assumption that risk perceptions motivate people to engage in self-protective behaviors (Ajzen, 1991; Becker, 1974; Rogers, 1975; Witte, 1992). Risk perceptions are an important predictor of behavioral intentions (Brewer et al., 2007; Brewer, Weinstein, Cuite, & Herrington, 2004) and subjective risk beliefs are more powerful predictors of intentions than objective risk estimates (Brewer & Hallman, 2006). However, little is known about the nature of mediation: (a) perceived susceptibility and severity independently mediate the effects of exemplars on intentions (i.e., parallel mediation) or (b) one risk dimension precedes and influences the other (i.e., serial mediation). Thus, we pose a research question about the mediation path(s) through which risk perceptions will mediate the relationship between exemplars and behavioral intentions, if any.

RQ_1: *Will perceived susceptibility and severity mediate the relationship between exemplars and vaccination intentions for high- and low-prevalence health risks? If so, will the mediation be parallel and/or serial in nature?*

Method

We examined effects of exemplar type and risk prevalence on perceived susceptibility, severity, and vaccination intentions using a 3 (exemplar type: death, recovery, no exemplar) x 2 (risk prevalence: high, low) between-subjects factorial design. A convenience sample of students (*N*= 174) from a public university participated in the study for course credit. Mean age was 20.62 years (*SD*= 1.06). The majority was female (*n*= 142, 81.6%), Caucasian (*n*= 145, 83.3%), and lived somewhere other than a dormitory (*n*= 131, 75.3%).

Procedures and manipulations

Participants were told they would assist in a study about how people respond to online health articles. Students first completed demographics and covariates questions; read one news story that appeared on a faux health website; and completed measures of perceived susceptibility, severity, and vaccination intentions.

To manipulate exemplar type, three versions of a news story were created for each high- and low-prevalence health risk, for a total of six news stories. We selected influenza and meningitis, two infectious diseases with significant health consequences that can be prevented or reduced by vaccines (CDC, 2015d, 2015e; World Health Organization, 2015). A pilot study (*N*= 70) that assessed attributes of 99 health risks among college students showed that influenza was perceived as a high-prevalence disease (*M*= 73.2, *SD*= 24.0) and meningitis was perceived as a low-prevalence disease (*M*= 23.5, *SD*= 24.9) where prevalence was measured on a 0–100 scale (El-Toukhy, 2012, 2015). Relevance of influenza and meningitis to study participants and availability of vaccines for both diseases allowed us to investigate perceived susceptibility, severity, and vaccination intentions as dependent variables.

All six stories shared a base news report. Within exemplar type conditions, stories were identical except for references to exemplars that appeared in the opening and closing paragraphs in the death and recovery exemplar conditions, but were absent in the no-exemplar conditions. Stories in the death conditions featured a fictitious college student who had contracted a disease and died (e.g., 'East Carolina University officials confirmed the cause of 21-year-old David Biddle's death was bacterial meningitis.'). In the recovery conditions, the student recovered after being hospitalized (e.g., 'Biddle not only survived but also returned to East Carolina University this spring.'). The college student exemplar ensured similarity between exemplar and study participants (Andsager, Bemker, Choi, & Torwel, 2006). Within risk prevalence conditions, base-rate information, disease symptoms, and life cycle remained constant across all three exemplar type conditions (e.g., 'Meningitis is a disease caused by the inflammation of the protective membranes covering the brain and spinal cord.').

Measures

Participants answered a manipulation-check item for exemplar type (i.e., 'Influenza/Meningitis can cause death') on a 1= *strongly disagree* to 9= *strongly agree* scale (Nichol, Lofgren, & Gapinski, 1992). Dependent measures included: (1) a four-item perceived susceptibility scale (e.g., 'If I don't get immunized, there is a high chance of me getting the influenza/meningitis') was measured on 0= *impossible* to 8= *extremely likely* (α= 0.87); (2) a three-item perceived severity scale (e.g., 'If I had influenza/meningitis, I would not be able to manage daily activities') was measured on a 1= *strongly disagree* to 9= *strongly agree* (α= 0.83); and (3) a three-item vaccination intentions scale (e.g., 'I will get an influenza/a meningitis vaccine this year') was measured on a 1= *strongly disagree* to 9= *strongly agree* (α= 0.88) (Brewer et al., 2007; Chapman & Coups, 2006; El-Toukhy, 2015; Madhavan, Rosenbluth, Amonkar, Fernandes, & Borker, 2003; Nexoe, Kragstrup, & Sogaard, 1999; Zimmerman et al., 2003). We also included (4) two behavioral measures of intentions, which were supposedly unrelated to the study and were presented as services sponsored by the university's campus health. As participants received a debriefing form, they could choose to (a) sign up for vaccination clinic with campus health and/or (b) request a copy of their vaccine record. Responses were dichotomized into 1= *yes*, 0= *no*. The first measure represented a behavioral equivalent to self-report vaccination intentions. The second measure was an equivalent to validating one's vaccination status before deciding to get vaccinated.

We controlled for personal experience (Jemmott, Ditto, & Croyle, 1986; Weinstein, 1989b), past vaccination (Quellette & Wood, 1998), and worry (Sjöberg, 1998) that past research has shown are associated with risk perceptions and/or behavioral intentions. We collected data on covariates for either influenza or meningitis based on condition assignment: (1) personal experience (i.e., 'Do you know of anyone to whom influenza/meningitis has happened?') was

measured on a 0= *has not happened to anyone I know before* to 6= *has happened to me more than once* ($M_{Influenza}$ = 1.52, *SD*= 1.71; $M_{Meningitis}$ = 0.44, *SD*= 0.89) (Christensen-Szalanski, Brck, Christensen-Szalanski, & Koepsell, 1983; Weinstein, 1980), (2) past vaccine (i.e., 'Have you received an influenza/a meningitis vaccine?') was dichotomized into 0= *not vaccinated/don't know*, 1= *vaccinated* ($M_{Influenza}$ = 0.21, *SD*= 0.40; $M_{Meningitis}$= 0.38, *SD*= 0.48), and (3) a two-item measure of worry (e.g., 'I am very concerned about influenza/meningitis') was measured on a 1= *strongly disagree* to 9= *strongly agree*(*r*= 0.74, *p*< 0.01; $M_{Influenza}$ = 4.21, *SD*= 1.95; $M_{Meningitis}$ = 4.86, *SD*= 2.07).

Participants completed an affect-arousal scale (α= 0.83) (Aarts & Dijksterhuis, 2003) to ensure group differences were attributed to experimental manipulation rather than affective and arousal statuses. No differences were detected for the interaction term ($F_{(2, 168)}$ = 0.06, *p*= 0.941), exemplar type ($F_{(2, 168)}$ = 0.79, *p*= 0.453), and risk prevalence ($F_{(1, 168)}$ = 0.20, *p*= 0.653).

Results

Exemplar type manipulation was successful ($F_{(2, 171)}$ = 4.02, *p*= 0.020, η_p^2= 0.045). Participants exposed to death exemplars perceived the disease to be a cause of death (*M*= 8.59, *SD*= 1.03) than those exposed to recovery (*M*= 8.05, *SD*= 1.42) and no (*M*= 7.95, *SD*= 1.46) exemplars. Post-hoc comparisons showed significant differences between death exemplars and both recovery (*MD*= 0.54, *p*= 0.029) and no (*MD*= 0.64, *p*= 0.009) exemplars but not between the recovery and no exemplars (*MD*= 0.10, *p*= 0.672).

Effects of exemplar type and risk prevalence on perceived susceptibility and severity

We conducted two-way ANCOVAs with exemplar type and risk prevalence as independent variables. One dependent variable was tested in each model: perceived susceptibility and severity. Personal experience, past vaccination, worry, age, and gender served as covariates.

The interaction term ($F_{(2, 163)}$ = 1.01, *p*= 0.364) and exemplar type ($F_{(2, 163)}$ = 0.14, *p*= 0.862) did not affect perceived susceptibility (Table 1). Means were 4.42 (95% CI: 4.10–4.73), 4.48 (95% CI: 4.16–4.80), and 4.36 (95% CI: 4.04–4.67) for death, recovery, and no exemplar conditions. However, risk prevalence did affect perceived susceptibility ($F_{(1, 163)}$ = 8.08, *p*= 0.005, η_p^2= 0.047). Susceptibility was higher among participants exposed to the influenza story (*M*= 4.71, 95% CI: 4.45–4.98) than among those exposed to the meningitis story (*M*= 4.12, 95% CI: 3.84–4.41) (*MD*= 0.59, *p*= 0.005). Two controls affected perceived susceptibility: worry ($F_{(1, 163)}$ = 41.96, *p*<0.001, η_p^2= 0.205), and gender ($F_{(1, 163)}$ = 8.47, *p*= 0.004, η_p^2= 0.049).

Both exemplar type ($F_{(2, 163)}$ = 3.66, *p*= 0.028, η_p^2= 0.043) and risk prevalence ($F_{(1, 163)}$ = 16.21, *p*<0.001, η_p^2= 0.90) affected perceived severity but not their interaction ($F_{(2, 163)}$ = 1.24, *p*= 0.292) (Table 1). Severity was higher among participants exposed to recovery exemplars (*M*= 7.15, 95% CI: 6.81–7.49) than among those exposed to no exemplar (*M*= 6.49, 95% CI: 6.15–6.83) (*MD*= 0.66, *p*= 0.008). Severity did not differ between participants exposed to death exemplars (*M*= 6.88, 95% CI: 6.54–7.22) and either recovery (*MD*= -0.26, *p*= 0.274) or no (*MD*= 0.39, *p*= 0.111) exemplars. Severity was higher among those exposed to meningitis story (*M*= 7.29, 95% CI: 6.98–7.59) than among those exposed to influenza story (*M*= 6.39, 95% CI: 6.11–6.68) (*MD*= 0.89, *p*<0.001). Personal experience ($F_{(1, 163)}$ = 4.41, *p*= 0.037, η_p^2= 0.026) and worry ($F_{(1, 163)}$ = 25.79, *p*<0.001, η_p^2= 0.137) affected perceived severity.

In sum, analyses showed partial support for H_1 and full support for H_2. Consistent with H_1, perceived severity was higher among those exposed to stories featuring recovery exemplars than among those exposed to stories with no exemplars. Consistent with H_2, risk prevalence affected perceived susceptibility and severity. Participants exposed to the influenza story had higher perceived susceptibility and lower perceived severity compared to those exposed to the meningitis story.

Effects of exemplar type and risk prevalence on vaccination intentions

We conducted a two-way ANCOVA with exemplar type and risk prevalence as independent variables; self-report vaccination intentions as a dependent variable; and personal experience, past vaccination behavior, worry, age, and gender as covariates.

Exemplar type ($F_{(2, 163)}$ = 0.29, *p*= 0.742), risk prevalence ($F_{(1, 163)}$ = 0.65, *p*= 0.419), and their interaction ($F_{(2, 163)}$ = 1.04, *p*= 0.353) did not affect intentions (Table 1). Means were 4.86 (95% CI: 4.37–5.34), 4.79 (95% CI: 4.29–5.28), and 5.05 (95% CI: 4.56–5.53) for death, recovery, and no exemplar conditions, and were 4.77 (95% CI: 4.36–5.18) and 5.03 (95% CI: 4.59–5.46) for influenza and meningitis, respectively. Past vaccination behavior ($F_{(1, 163)}$ = 19.86, *p*<0.001, η_p^2= 0.109) and worry ($F_{(1, 163)}$ = 89.24, *p*<0.001, η_p^2= 0.354) predicted vaccination intentions where both past vaccination behavior (β= 0.27, *p*<0.001) and worry (β= 0.57, *p*<0.001) led to increased self-report intentions.

Table 1 *Effects of exemplar type and risk prevalence on perceived susceptibility, severity, and vaccination intentions*

Outcome	Perceived susceptibility	Perceived severity	Self-report intentions	Behavioral measure 1	Behavioral measure 2
	F	*F*	*F*	χ^2	χ^2
Personal experience	3.06	4.41*	0.46	0.14	0.46
Past vaccination	1.85	0.81	19.86***	0.57	0.03
Worry	41.96***	25.79***	89.24***	7.93**	2.90
Demographics					
Age	1.59	0.04	0.52	0.18	0.25
Gender	8.47**	0.26	1.30	0.71	0.008
Exemplar type	0.14	3.66*	0.29		
Recovery				0.30	0.88
Death				0.73	0.02
Risk prevalence	8.08**	16.21***	0.65	1.91	11.47**
Interaction term	1.01	1.24	1.04		

N = 174 for risk perceptions and self-report vaccination intentions analyses, N = 173 for behavioral measures analyses.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
χ^2 reflects Wald chi square test for the regression coefficient of each variable in the model. For logistic regression analyses, exemplar type and risk prevalence were dummy coded where no exemplar and high-prevalence risk (i.e., influenza) conditions were reference groups.

We used sequential logistic regressions to assess behavioral measures of intentions based on control variables and then after adding exemplar type and risk prevalence. Exemplar type and risk prevalence did not increase the likelihood of signing up for a vaccine clinic (χ^2= 2.60, *p*= 0.457). Worry enhanced the prediction of signing up for a vaccine clinic (B= 0.23, *p*= 0.005) where a one-point increase on the worry scale was associated with 1.26 (95% CI: 1.07–1.48) odds of signing up for a vaccine clinic. In regard to requesting vaccine records, comparison of log-likelihood ratios showed a significant improvement to the model after adding exemplar type and risk prevalence (χ^2= 13.14, *p*= 0.004). Risk prevalence increased the likelihood of requesting vaccination records (B= 1.23, *p*= 0.001) where participants exposed to the meningitis story (95% CI: 1.68–6.99) were 3.42 more likely than those exposed to the influenza story to request their vaccine records (Table 1).

In sum, analyses showed no support for H_3. Exemplar type and risk prevalence did not affect self-report vaccination intentions or signing up for a vaccine clinic. Risk prevalence affected the likelihood of requesting one's vaccination records. Inconsistent with H_3, participants exposed to a low-prevalence (i.e., meningitis) risk story were more likely to request their vaccine records compared to those exposed to a high-prevalence (i.e., influenza) risk story. This result could be attributed to the recurring versus sporadic administration of influenza versus meningitis vaccines. With a mean age of 22 years, our participants received a booster meningitis shot at 16, if at all. Requesting vaccination records seems a starting point to decide whether one needs a meningitis vaccine.

Mediation analyses

Using PROCESS macro (Hayes, 2012, 2013), we conducted mediation analyses to examine whether perceived susceptibility and severity mediated the relationship between exemplar type and vaccination intentions for high- and low-prevalence risks and whether the mediation was parallel (i.e., mediators were assumed to be independent) and/or serial (i.e., mediators were assumed to be causally correlated) in nature.

Table 2 *Path coefficients from mediation analysis for effects of exemplar type on self-report vaccination intentions through perceived susceptibility and severity*

	High-prevalence risk (Influenza)		Low-prevalence risk (Meningitis)	
	Recovery exemplar	Death exemplar	Recovery exemplar	Death exemplar
c	-0.46 (0.68)	-0.14 (0.67)	-0.22 (0.62)	0.29 (0.55)
*c*1'	-0.60 (0.67)	0.05 (0.64)	-0.31 (0.56)	0.11 (0.55)
*a*1	0.20 (0.35)	-0.41 (0.35)	0.02 (0.33)	0.51 (0.39)
*a*2	1.02 (0.33)**	0.63 (0.41)	0.21 (0.35)	0.25 (0.33)
*b*1	0.85 (0.24)**	0.74 (0.22)**	0.79 (0.23)**	0.17 (0.18)
*b*2	-0.03 (0.25)	0.17 (0.19)	0.32 (0.21)	0.36 (0.22)
*d*1	0.29 (0.11)*	0.19 (0.14)	-0.04 (0.14)	0.05 (0.11)
*d*2	0.32 (0.13)*	0.14 (0.11)	-0.04 (0.13)	0.07 (0.16)

Cells represent unstandardized coefficients (standard error).

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

c Total effects

c1' Direct effects

a1Exemplar → Perceived susceptibility

a2 Exemplar → Perceived severity

b1Perceived susceptibility → Vaccination intentions

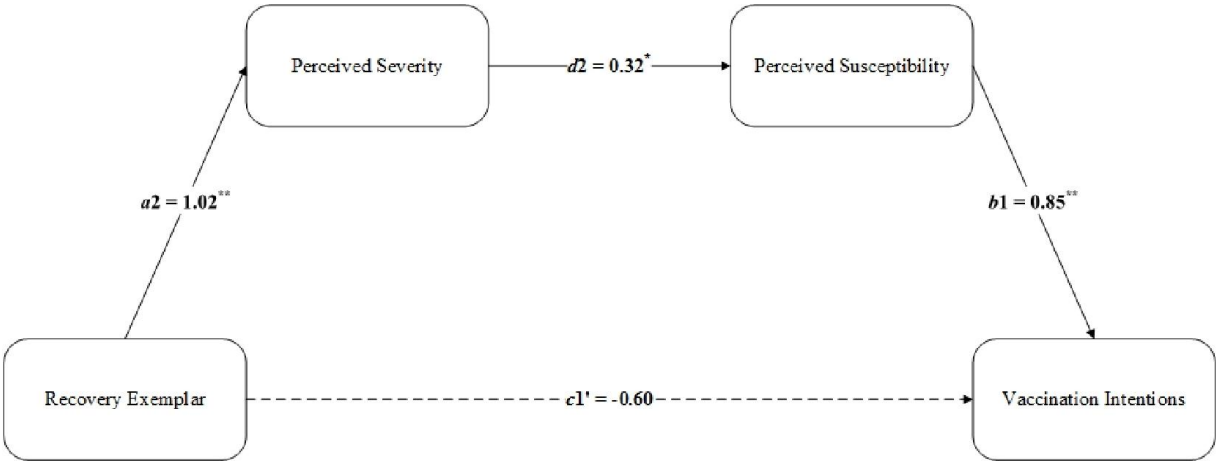
b2 Perceived severity → Vaccination intentions

d1Perceived susceptibility → Perceived severity

d2 Perceived severity → Perceived susceptibility

One indirect mediation path emerged where recovery exemplars positively affected self-report vaccination intentions for high-prevalence risks (Table 2). Recovery (vs. no) exemplars indirectly affected vaccination intentions through a severity-to-susceptibility serial path (*a*2*d*2*b*1= 0.28, SE= 0.22, 95% CI: 0.01–0.94). Participants exposed to a recovery exemplar had higher perceived severity (*a*2= 1.02), which increased perceived susceptibility (*d*2= 0.32), which, in turn, increased influenza vaccination intentions (*b*1= .85) (Figure 1). Although this indirect effect was modest, 95% confidence intervals with 100,000 bootstrap samples did not saddle the zero, which was deemed statistically significant.

Figure 1 *Serial mediation model for effects of recovery exemplars on self-report vaccination intentions through perceived severity and susceptibility for influenza*



Note: Solid line represents a significant indirect path

In sum, mediation analyses showed that participants who were exposed to recovery exemplars – whereby the character in the news story contracted the disease and got ill, but survived – amplified their perceived severity of the disease, which then increased their perceived susceptibility, and in turn, strengthened their intention to get an influenza vaccination.

Discussion

Exemplars have long been considered persuasive health promotion tools (Green, 2006). We examined whether perceived susceptibility, severity, and vaccination intentions differed as a function of exemplar type and risk prevalence. Further, we examined whether perceived susceptibility and severity mediated the relationship between exemplar type and vaccination intentions. Results showed that exposure to recovery (vs. no) exemplars led to higher perceived severity. Risk prevalence affected both perceived susceptibility and severity where exposure to stories about a high-prevalence risk (i.e., influenza) led to higher perceived susceptibility but lower perceived severity (and vice versa for low-prevalence risks such as meningitis). Perceived severity and susceptibility mediated the relationship between recovery exemplars and influenza vaccination intentions.

Recovery exemplars were superior to no exemplars in triggering perceptions of severity, whereas death exemplars were not. These results align with other exemplification studies that show assimilation effects from a moderate exemplar on the perception of risk for oneself and others (Gibson & Zillmann, 1994; Holman & McKeever, 2016; Zillmann & Gan, 1996). The literature on optimistic bias and mortality salience provides explanations for the null effects of death exemplars. People tend to think that bad things happen to others but not to themselves (Weinstein, 1989a, Keller & Lehmann, 2008). Moreover, when reminded of death, people unconsciously resort to positive emotions and assurances as a coping mechanism (DeWall & Baumeister, 2007). Exposure to death exemplars could have triggered such mechanisms because our news stories featured ordinary people dying from health risks, individuals with whom audiences are likely to identify (Walter, Littlewood, & Pickering, 1995).

Another line of research that could explain our results is the extended parallel process model (EPPM) (Witte, 1992). According to EPPM, exposure to death exemplars could have piloted participants to engage in fear control processes, which resulted in rejection of the message, whereas exposure to recovery exemplars could have piloted participants to engage in danger control processes, which resulted in acceptance of the message. Other studies have cautioned against the use of fear appeals (Hastings, Stead, & Webb, 2004; Ruiter, Abraham, & Kok, 2001) in health messaging. It is noteworthy that, although we draw on EPPM to explain the effects of exemplar type, our news stories did not test the core constructs of EPPM (e.g., perceived susceptibility) as independent variables. Rather we manipulated exemplars (and risk prevalence) and tested their effects on perceived susceptibility and severity. Research is needed to further understand the effects of death and recovery exemplars on risk perceptions and behavioral intentions and the conditions under which their effects occur.

Consistent with previous research (El-Toukhy, 2015), perceived risk prevalence affected perceived susceptibility and severity. Regardless of exemplar type, influenza was perceived as a high-susceptibility/low-severity disease, whereas meningitis was perceived as a low-susceptibility/high-severity disease. These results indicate that well-learned risk perceptions that are associated with certain diseases override health messages suggesting otherwise. This result could be attributed to chronically accessible mental representations of influenza and meningitis (Bargh, 1987). Chronic accessibility supersedes accessibility based on recent activation such as exposure to experimental manipulation (Zillmann, 2006). This highlights the need to consider the underlying attributes of diseases/health conditions (e.g., involuntariness) in designing health messages (Slovic et al., 1982) and how audiences' mental representations of diseases interact with message elements to affect risk perceptions.

Exemplar type did not directly affect self-report or behavioral vaccination intentions. These results are consistent with studies that show that prevention-focused messages (e.g., getting vaccinated to avoid diseases) are associated with low behavioral intentions (Keller & Lehmann, 2008). Further, studies also show multiple exposures are more effective in changing behaviors than a single exposure (Keller & Lehmann, 2008). By examining parallel and serial mediation effects of health messages on behavioral intentions through perceived risk (Holman & McKeever, 2016; Krieger & Sarge, 2015), we found that exemplars indirectly affected vaccination intentions and that these mediation paths differed by risk prevalence. Recovery exemplars had positive indirect effects on influenza vaccination intentions via perceived severity-to-susceptibility serial path. The serial mediation through severity – susceptibility is consistent with the conceptualization of EPPM where a certain threshold of severity must be met before a person considers her own susceptibility (Witte, 1992). Studies should manipulate the temporal order of presenting susceptibility and severity information to fully understand the relationship between the two constructs.

Is this relationship fixed or does it differ by health conditions and how? In other words, is severity always a precondition to susceptibility or is it dependent on the health condition in question? Are risk perceptions a one-time assessment or an iterative process? In what way do health messages affect the nature of personal risk assessment? Further, research is needed to understand the risk perceptions – behavior link. There are three hypotheses in the literature: (a) a behavior motivation hypothesis where risk perceptions cause protective behaviors, (b) a risk reappraisal hypothesis where engagement in protective behaviors lowers risk perceptions, and (c) an accuracy hypothesis where risk perceptions reflect actual risky behaviors (Brewer et al., 2004). Studies should examine whether certain hypotheses are true of specific behaviors (e.g., voluntary vs. state-mandated vaccination) (Ball et al., 1998).

Past vaccination predicted behavioral intentions, which highlights the importance of habitual vaccination behaviors (Quellette & Wood, 1998). Worry predicted risk perceptions and vaccination intentions (Chapman & Coups, 2006). Consistent effects of worry warrant investigating its role in exemplar effects and risk assessment. Personal experience with a disease had significant effects on perceived severity. These results call for a closer look at risk attributes that could affect risk perceptions and vaccination intentions.

Limitations

Participants were college-aged individuals whose risk perceptions (Cohn, Macfarlane, Yanez, & Imai, 1995) and immunization decisions (Humiston & Rosenthal, 2005) differ from older populations. The cross-sectional nature of the study limited causal inferences on the perceived risk–behavioral intentions link. Longitudinal studies, where the temporal order of measures is given more consideration, would better capture causal relationships between perceived susceptibility, severity, and behavioral intentions.

We measured immediate effects of a single exposure to news stories. Non-laboratory longitudinal studies would capture delayed, long-term effects of multiple exposures to news stories on risk perceptions and vaccination intentions (Jensen, Bernat, Wilson, & Goonewardene, 2011). Perceived risk is one of many factors affecting behavioral intentions. Such factors (e.g., health insurance) could have affected intentions (Humiston & Rosenthal, 2005) and should be included in future studies.

Conclusion

The use of exemplars in health messages is an established journalistic practice (Viswanath et al., 2008). We advanced health communication literature by examining the effects of exemplar type, risk prevalence, and their interplay on perceived susceptibility, severity, and vaccination intentions. We provided evidence of exemplar type and risk prevalence effects on risk perceptions and vaccination intentions, presented results of mediation analyses that governed the exposure–vaccination intentions link, and revealed risk attributes that predicted perceived risk and intentions to get vaccinated.

With a surge in the anti-vaccine movement (Dubé, Vivion, & MacDonald, 2015), it is important to improve receptivity and avoid rejection of risk communication messages. Audiences selectively expose themselves to stories featuring exemplars more than to those with factual information (Hastall & Knobloch-Westerwick, 2013). As such, health communicators should feature recovery exemplars for their effectiveness in triggering perceptions of severity and vaccination intentions. However, news reports on health risks-related deaths are inevitable. Thus, reporters should include elements to promote self- and response-efficacy to increase behavioral intentions (Krieger & Sarge, 2013). This recommendation is particularly important because the health risk featured in any given news story affects audiences' risk perceptions and behavioral intentions. Further, communicators should use graphs to improve overall message comprehension, particularly information on vaccine effectiveness (Smerecnik et al., 2010). For non-news health messages (e.g., campaigns), formative research is needed to understand public perceptions of the health risk in question to tailor messages accordingly (Keller & Lehmann, 2008).

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