Enhancing the Effectiveness of Narratives Among Vaccine-Skeptical Parents

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ABSTRACT

Vaccine skeptics do not trust immunization recommendations and cause problems for public health. Using negatively framed anecdotal messages, we test how adding information about the protagonists' vaccine skepticism affects message effectiveness. Among skeptics, a narrative that portrayed vaccine-skeptical protagonists in a positive way proved most effective. Our findings are easy to implement.

INTRODUCTION

In many countries, vaccine-preventable diseases, for example, measles, cause a significant number of unnecessary deaths because immunization levels in the population remain lower than required (Kabra and Lodhra 2013). While immunization programs successfully reach the majority of the population, some parents are concerned about potential adverse effects of vaccines for children and decide against immunization (Nyhan et al. 2014). Such parents do not trust the immunization recommendations provided by public authorities (Gershoff and Koehler 2011; Healy 2009).

Because immunization levels are lower than required, measles outbreaks have recurred in many western countries, for instance, the US, Great Britain, and Germany (e.g., Centers for Disease Control and Prevention, 2018). Outbreaks of the disease inevitably place others (who are innocent because they did not decide against the vaccine) at risk because infants younger than 12 months cannot be vaccinated and are most likely to experience severe complications when infected. Thus, vaccine-skeptical parents may cause a problem for public health, and persuading them to have their children vaccinated is a relevant public health issue (Nyhan et al. 2014; Horne et al. 2015).

Research suggests that providing vaccine-skeptical parents with information that directly addresses their concerns about the potential adverse effects of the vaccine by explaining the lack of evidence for such effects is less effective than drawing parents' attention to the negative consequences of not vaccinating their child (Horne et al. 2015). One problem with directly addressing the existing concerns is that the message repeats them, thereby potentially strengthening recipients' associations between the concern and the vaccine (Lewandowsky et al. 2012; see also the study on rumors by Tybout et al. 1981). Another problem is that it seems impossible to provide evidence for a complete absence of risk (Gershoff and Koehler 2011; Popper 2014). In regard to the question of how to draw parents' attention to the negative consequences of not vaccinating their child, previous research demonstrates that statistical evidence, for example, information about how many deaths a disease causes (ideally graphically displayed; Gershoff and Koehler 2011), works for the general public (Slater and Rouner 1996). However, skeptical recipients tend to counterargue when provided with such facts (Slater and Rouner 1996; Nyhan and Reifler 2015). Thus, when targeting skeptical recipients, Slater and Rouner (1996, 229) recommend the use of anecdotal evidence because "the processing of narrative does circumvent the tendency to counterargue." Among alternative medical students who tend to have skeptical views of vaccinations, Wilson et al. (2004, 3012) report a small (insignificant) advantage of an anecdotal intervention compared to a presentation of facts with regard to message recipients' intention to vaccinate their own child. However, Nyhan et al. (2014) report that their anecdotal message (providing evidence of the negative consequences of not vaccinating a child against measles) did not increase skeptical parents' intent to vaccinate future children (neither did any of the other messages that the authors tested).

Because vaccine skeptics are a highly relevant target group for public health, and the literature suggests that anecdotal evidence is the most effective tool when targeting such audiences, we use the narrative by Nyhan et al. (2014) and test how information provided about the protagonists may increase its effectiveness. Previous research suggests that increasing the similarity between the recipient and the protagonist may be a way to improve message effectiveness (De Graaf 2014). This research focuses on similarity with regard to the recipient's skeptical mind-set and adds information about the protagonists' vaccine skepticism to the narrative. We are not aware of other studies that address recipients' skeptical mind-set by portraying a skeptical protagonist in a narrative.

THEORY

In the narrative by Nyhan et al. (2014), a mother tells about her and her partner's dramatic experience when their infant almost died of measles and how they suffered at the bedside of their child with fear of losing him. Furthermore, the narrative asks the target audience to have their children vaccinated. The narrative does not provide information about the parents' attitude towards the vaccine, nor does the target audience learn whether the parents decided for or against the vaccination.

For message recipients, the parents described in the narrative (protagonists) may represent potential identification figures, and the extent of identification with a protagonist affects message effectiveness (Slater and Rouner 2002; Igartua 2010). Thus, we attempt to increase message effectiveness among vaccine skeptics by stimulating their identification with the protagonists portrayed in the narrative. Identification is related to perceived similarity (Cohen 2001, De Graaf 2014) as well as to aspirational similarity, that is, the perceived valence of the information provided about the protagonist (Tal-Or and Cohen 2010).

Perceived similarity. Studies demonstrate that similarity between the recipient and the protagonist with regard to relevant characteristics increases the self-relevance of the message (McKeever 2015; Raghubir and Menon 1998) and message effectiveness (De Graf et al. 2012; Hoeken and Fikkers 2014). Construal level theory provides an explanation for the effects: Liviatan and Liberman (2008) demonstrate that interpersonal similarity reduces the social distance between individuals, and less social distance leads to more concrete thinking about the other person's experiences (Trope and Liberman 2010). Concrete thinking about potential negative life events leads to higher perceived risk (Wakslak and Trope 2009). Thus, if the protagonist is similar to the message recipients, the message recipients should perceive the negative event described in the narrative as more likely to happen and as more severe, thereby increasing message effectiveness (Murdock and Rajagopal 2017). Parents who are vaccine skeptics should perceive a protagonist who mentions that he/she had the same skeptical attitude and decided against the vaccine to be similar to themselves. Vaccine skeptics may recognize their own decision in the narrative, and the negative consequences described in the narrative may become more self-relevant to them thereby increasing message effectiveness.

Aspirational similarity. However, the target audience is more likely to identify with protagonists whom they see in a positive light (Tal-Or and Cohen 2010). Because this research uses negatively framed narratives (as recommended by Cox and Cox 2001), the narrative highlights the negative consequences of not getting the vaccine. Thus, message recipients may assign responsibility for the dramatic situation to the protagonists, and protagonists whom the message plainly describes as vaccine opponents may appear irresponsible or stubborn. Thus, even though a skeptical protagonist may be similar to the skeptical message recipient, aspirational similarity may be low.

Taken together, we argue that to increase message effectiveness among skeptics, the narrative should provide information about the protagonists' skepticism and, at the same time, should portray the skeptical protagonists in a positive way, for instance, by mentioning how hard they thought about their decision to not have their child vaccinated. In other words, vaccine-skeptical message recipients should be more likely to identify with a thoughtful, responsible vaccine skeptic than with a seemingly stubborn vaccine opponent. Thus, the former message should be more effective than the latter; that is, it should lead to higher perceived severity of the disease, more positive attitudes towards having children vaccinated, and a higher level of intention to have a future child vaccinated. We propose the following hypotheses:

Hypothesis 1a   *Among skeptical recipients: compared to the narrative by Nyhan et al. (2014), which does not provide information about the protagonists, the same narrative is more effective when it portrays the protagonists as thoughtful vaccine skeptics.*

Hypothesis 1b   *Among skeptical recipients: Compared to the narrative that portrays the protagonists as thoughtful vaccine skeptics (see hypothesis 1a), a narrative that portrays the protagonists as vaccine opponents is less effective.*

STUDY

Participants

We conducted the study in Germany and translated all items to German. Because our aim was to reach vaccine-skeptical parents, we collected our data on internet platforms on which parents discuss relevant health issues of their children, such as immunizations. We posted the invitation to participate in our study and the link to our online survey on the internet platform "Eltern.de" (a platform for parents) and on Facebook pages linked to alternative medicine. The sample consists of 370 respondents (who responded to all relevant questions); 95% were female, the mean age was 39 and 95% had children (respondents who neither had children nor planned to have children in the future were excluded). The very high proportion of females did not cause a problem for our sample because mothers usually make health care decisions for their children (Matoff-Stepp et al. 2014).

Measures and Procedure

We measured skepticism levels before the respondents observed the message. We used one item on immunizations in general and one addressing the specific vaccine ("I am concerned about serious adverse effects of vaccines" and "The risk for adverse effects from this vaccine is too great" 1 = fully disagree; 7 = fully agree, Freed et al.

2009). After the respondents had seen one of the messages (to which they were randomly assigned), we measured future intentions with the item (Nyhan et al. 2014) "If you had another child, how likely is it that you would give the child the MMR vaccine?" (1 = very unlikely, 7 = very likely). We measured respondents' attitude towards having children vaccinated against MMR with the item "Please indicate how reasonable you think it is to have children vaccinated against measles, mumps, and rubella" (1 = not reasonable, 7 = very reasonable). We measured the perceived severity of the disease with the item "How severe do you perceive an infection with the MMR diseases to be if a child did not get the vaccine?" (1 = very low severity, 7 = very high severity). Furthermore, we measured perceived similarity to and identification with the protagonists ("I think the parents in the narrative are similar to me" and "I could identify with the parents in the narrative", 1 = fully disagree, 7 = fully agree).

Stimuli

Participants observed one of the following messages:

Ad 1: the narrative by Nyhan et al. (2014) was presented with two minor adaptations. First, the narrator in the original narrative was a mother (Megan Campbell) telling about her and her partner's dramatic experience when their infant almost died of measles. We used a couple (parents) as narrators because we wanted to provide an identification figure for both female and male respondents. Second, instead of "Megan," we used names that are common in Germany (Anja and Christian).

Ad 2: the same narrative was presented but with the additional information that before the dramatic event, the parents were vaccine opponents and had deliberately decided against the immunization ("Protagonists: vaccine opponents"),

Ad 3: the narrative of group 1 was presented but with the additional information that before the dramatic event, the parents were vaccine skeptics who had thought very hard about their decision and had then decided against the immunization ("Protagonists: thoughtful vaccine skeptics").

All three narratives included the same appeal that parents should have their children vaccinated to avoid the severe disease.

Data Analyses and Findings

Vaccine skepticism in the sample. The immunization levels of approximately 80%-90% in most western countries demonstrate that the vast majority of the population holds positive attitudes toward vaccinations, and vaccine skeptics represent a minority. Thus, in our sample, only relatively few respondents were skeptical. We aggregated the two skepticism variables ($r = .59$), and the mean values represent respondents' vaccine skepticism in this study. Figure 1 shows the frequency distribution of the aggregated variable.

We split the sample into three skepticism-groups: "no skepticism" (variable vaccination skepticism = 1, N = 102); "slight skepticism" (1 < vaccination skepticism ≤ 2.5, N = 178); "skepticism" (vaccination skepticism ≥ 3, N = 90). Nyhan et al. (2014) split their groups by tercile. We did the same for "no skepticism" and "slight skepticism." However, we assigned respondents with vaccination skepticism ≥ 3 to the skeptical group (the tercile was 2.5) because on the 7-point scale, 2.5 is still very low.

Test of the hypotheses. Table 1 shows the mean values of the three dependent variables across the different messages and across the three skepticism groups. We tested hypotheses 1a and 1b with pairwise t-tests among the skeptical respondents. Table 1 also reports
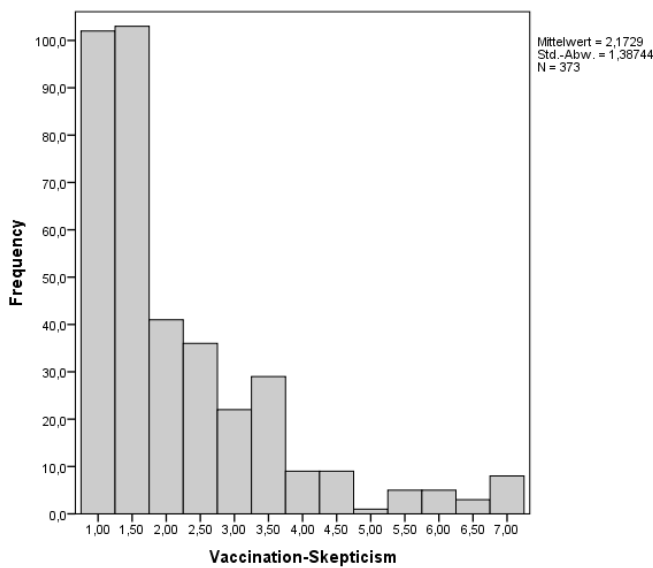
Figure 1: Frequency distribution of the aggregated variable "vaccination skepticism" in the sample

the t-test results. The findings support hypothesis 1a for each of the dependent variables (attitude $t = -3.07$, $p < .01$; severity $t = -1.71$, $p < .05$; intention $t = -1.61$, $p < .10$). Among vaccine skeptics, the narrative portraying skeptical but thoughtful protagonists (Ad 3) proved to be more effective than the narrative by Nyhan et al. (Ad 1).

The findings also support hypothesis 1b for the dependent variables attitude ($t = -2.64$, $p < .01$) and the intention to have a future child vaccinated ($t = -1.41$, $p < .10$). Among vaccine skeptics, Ad 3 proved to be more effective than the narrative that merely described the protagonists as vaccine-opponents (Ad 2). With regard to the perceived severity of the disease, Ad 2 and Ad 3 did not differ significantly ($p > .10$).

Among nonskeptical respondents, the effectiveness of the three messages did not differ. This finding makes sense because Slater and Rouner (1996) argue that value-affirmative recipients employ a central-processing strategy. Thus, the additional information about the protagonists should not affect their attitudes and intentions. Among respondents who were slightly skeptical, only two pairs of mean values differed significantly. Perceived severity was higher when slightly skeptical respondents had seen Ad 3 compared to Ad 1 ($t = -1.51$, $p < .10$) and when they had seen Ad 3 compared to Ad 2 ($t = -1.46$, $p < .10$).

Additional Analyses. To test the robustness of our findings, we estimated PROCESS model 1 (Hayes 2018), including recipient skepticism as a metric moderator variable. Ads (Ad 1, Ad 2, and Ad 3) was the multicategorical independent variable of the model (with indicator coding), and message effectiveness was the dependent variable (Hayes and Montoya 2017). Because Cronbach Alpha of the three effectiveness measures (intention, attitude, and perceived severity) was .70, we used an aggregated message effectiveness index for this analysis.

While recipient skepticism has a negative main effect on the dependent variable, ad type has no main effect. Thus, overall, the effects of the three ads do not differ. However, as expected, with increasing recipient skepticism, Ad 3 is more effective than Ad 1 (coefficient of Ad 3 x skepticism interaction: .28, $t = 2.52$, $p < .05$). In line with the mean values of Table 1, the conditional effects of Ad 3 at increasing values of the moderator that PROCESS estimates demonstrate that among nonskeptical and slightly skeptical respondents, ad

type does not affect message effectiveness. However, among skeptical respondents (the moderator value that PROCESS uses is the 84th percentile: 3.5), Ad 3 is significantly more effective than Ad 1 (coefficient: .63, $t = 3.04$, $p < .01$). This finding is in line with the above t-test findings among skeptical respondents and again provides support for H 1a. Among skeptical respondents, Ad 2 also proves more effective than Ad 1 (coefficient: .27, $t = 1.85$, $p < .10$), but we did not propose a hypothesis for this comparison.

When we conduct the same analysis separately for the three dependent variables, the effect of the skepticism x Ad 3 interaction is significant at 1% on attitude and at 10% on perceived severity but insignificant ($p > 10\%$) on intention. However, the t-test findings (Table 1) support hypothesis 1a across the three dependent variables.

Perceived similarity and identification. Interestingly, the vaccine-skeptical respondents also perceived the protagonists of Ad 1 to be more similar to themselves than the protagonists described as vaccine opponents (Ad 2) and the protagonists described as thoughtful vaccine skeptics (Ad 3). Among skeptics, the mean values of perceived similarity with the protagonists were $M_{Ad 1} = 3.8$, $M_{Ad 2} = 2.8$, and $M_{Ad 3} = 2.5$ (the difference between $M_{Ad 1}$ and $M_{Ad 2}$ is significant at $p < .10$; the difference between $M_{Ad 1}$ and $M_{Ad 3}$ is significant at $p < .05$). With regard to identification, no significant differences showed, but again, skeptics tended to identify less with the skeptical protagonists (the mean values among skeptics were $M_{Ad 1} = 3.4$, $M_{Ad 2} = 2.7$, and $M_{Ad 3} = 2.6$). Thus, our data cannot show that perceived similarity or identification mediate the effect of the information provided about the protagonists' vaccine skepticism on message effectiveness among skeptical message recipients.
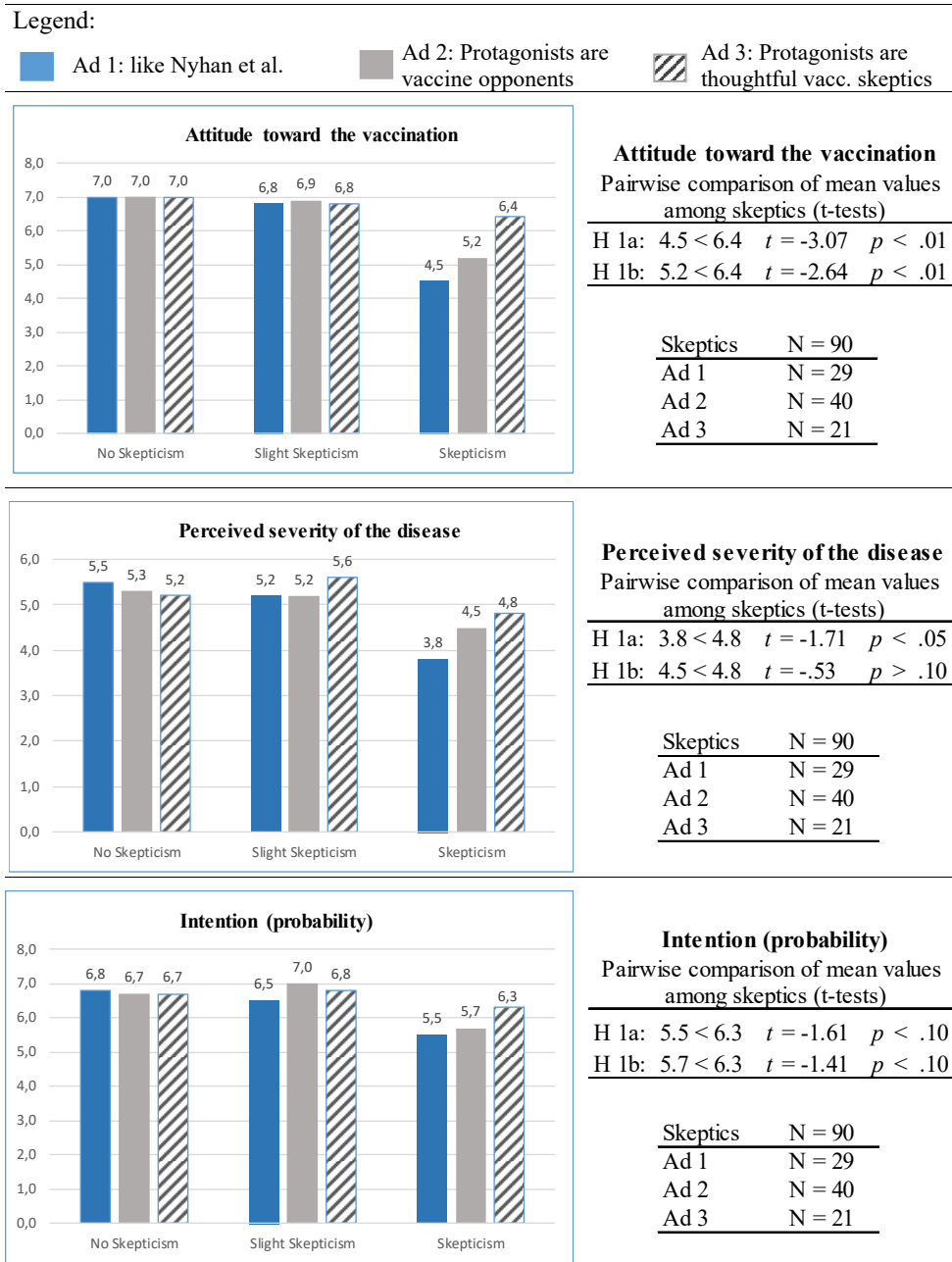
This finding poses the interesting question of why among vaccine skeptics, the message effectiveness of Ad 3 was higher than that of Ad 1 and Ad 2, but perceived similarity and identification were not. In contrast, the weakest message with regard to message effectiveness among skeptical respondents (Ad 1) was the strongest with regard to (reported) similarity and identification. The most likely explanation for this finding is our explicit measurement of similarity and identification. Research suggests that evaluations of risks rely on an automatic and quick process (Gershoff and Koehler 2011; Slovic and Peters 2006). We assume that the messages that mentioned the protagonists' skeptical mind-sets increased self-relevance and perceived risk among skeptical recipients (subconsciously), thereby increasing message effectiveness. However, when the questionnaire later asked respondents to express how similar they were to the protagonists and how strongly they identified with the protagonists, respondents might have wanted to differentiate themselves from the dramatic event and from protagonists whose decision almost caused their child to die. In line with this assumption, the mean values (see above) demonstrate relatively low levels of perceived similarity and identification (measured on 7-point scales). Implicit similarity and identification measures (instead of the explicit measures that we used) might be able to demonstrate the expected mediating effect.

DISCUSSION

Implications

In line with previous research, our study demonstrates that the effectiveness of narratives may depend on the information that the message provides about the protagonists (De Graaf 2014; Dillard and Maine 2012; Mc Keever 2015). We recommend that narratives addressing vaccine skeptics should present a protagonist who held similar skeptical views (before he/she experienced the negative consequences). In addition, the message should present the protagonist in a positive way, for example, as a thoughtful individual with

Table 1: Mean values of attitude toward the vaccination, severity of the disease, and intentions dependent on: Ad type (Ad 1, Ad 2, Ad 3) and recipients' vaccine skepticisms (no skepticism, slight skepticism, skepticism)

Legend:
Ad 1: like Nyhan et al.
Ad 2: Protagonists are vaccine opponents
Ad 3: Protagonists are thoughtful vacc. skeptics

Attitude toward the vaccination
Pairwise comparison of mean values among skeptics (t-tests)

H 1a: $4.5 < 6.4$ $t = -3.07$ $p < .01$
H 1b: $5.2 < 6.4$ $t = -2.64$ $p < .01$

Skeptics	N = 90
Ad 1	N = 29
Ad 2	N = 40
Ad 3	N = 21

Perceived severity of the disease
Pairwise comparison of mean values among skeptics (t-tests)

H 1a: $3.8 < 4.8$ $t = -1.71$ $p < .05$
H 1b: $4.5 < 4.8$ $t = -.53$ $p > .10$

Skeptics	N = 90
Ad 1	N = 29
Ad 2	N = 40
Ad 3	N = 21

Intention (probability)
Pairwise comparison of mean values among skeptics (t-tests)

H 1a: $5.5 < 6.3$ $t = -1.61$ $p < .10$
H 1b: $5.7 < 6.3$ $t = -1.41$ $p < .10$

Skeptics	N = 90
Ad 1	N = 29
Ad 2	N = 40
Ad 3	N = 21

Note: all reported *p*-values in Table 1 are one-tailed

a strong sense of responsibility. Our findings are useful for practice because providing information about the protagonists is easy to implement.

Limitations and Future Research

Based on the limitations of our study and on our findings, we make the following suggestions for future research. First, because vaccine skeptics are a minority, our skeptical message recipient group was relatively small. Future studies may test the effects with a larger sample. Second, because we aimed to compare different narratives, we did not include a control group in our study. This absence is a limitation because we are unable to demonstrate whether the narrative that we identified as superior (Ad 3) also worked in absolute terms. Future studies should test this issue. Third, our explicit similarity/identification measure was unable to demonstrate the expected mediating effect. Future studies may use implicit identification measures, particularly when the message framing is negative and the message recipients may wish to differentiate themselves from the protagonist. Fourth, we did not repeat the measurement of the dependent variables at a later point in time. Therefore, we do not

know how robust the advantage of Ad 3 over the two other messages is over time. Future studies may repeat the measurement of the dependent variables at a later point in time, as, for instance, did Frank et al. (2015).

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