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Data Visualizations:

Investigating their Effects on the Perception

of Solutions Journalism

Master's Thesis

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Abstract

In recent years, solutions journalism has received increasing interest — from both practicing journalists and researchers – as the genre aims to balance out the prevailing news negativity. Several studies have found that solutions-oriented stories impact the audience differently than traditional problem-centric stories. For one, this study aimed to continue the existing line of research. This study also examined whether data visualizations that highlight the effectiveness of the solutions, a key element of solutions journalism, would have an additional impact on the perception of the story. A controlled experiment ($N = 706$) has been conducted to compare seven different story versions: a non-solutions story, a solutions story with textual evidence and five solution stories with an additional visualization: a table, a doughnut chart, a bar chart, a pictorial chart, and an infographic. Findings indeed indicated that readers of a solutions story had an increase in positive affect, better attitudes toward the story, and the proposed solution as well as a higher perceived knowledge gain in comparison to those who read the non-solutions story. Analyses also showed that results are consistent across gender and party identification. Except for the evaluation of journalistic standards, which yielded somewhat better results for the table, the doughnut chart, and the pictorial chart, no differences in effect were found among solutions stories with and without visualizations. These findings are discussed in light of the academic and professional expansion of solutions journalism. Potentials are seen in solutions journalism strengthening the trust in the news media and fostering civic engagement.

Key Words: solutions journalism, data visualizations, news negativity, audience perception, controlled experiment

Introduction

According to the news, the world has become more negative over the last decades. From the 1970s until today, the emotional tone of news coverage has become steadily more adverse (Leetaru, 2011). *If it bleeds, it leads* might be an old trope; at the same time, it captures well the hierarchy of newsworthiness. The landmark study "The structure of foreign news" recognized "reference to something negative" as an earmark of news reporting (Galtung & Ruge, 1965: 71). The newsworthiness of negativity has been taught as essential to journalism ever since, yet it was never meant to be a guideline – but a warning for journalists, as one of the authors recently stated (Haagerup, 2019). The fallout is a gross misperception of the state of the world. Generally, quality of life is improving: Hunger and extreme poverty are decreasing, child labor is declining, life expectancy is rising and child mortality sinking (Matthews, 2018). Yet many think life on earth is getting worse (Ipsos, 2017). The news' bias toward negativity does not go unnoticed with its audience: Surveys among U.S.-Americans (Patterson, 2000) and Germans (Hein, 2015) have shown that news is perceived as too problem- and conflict-ridden by citizens.

But there are emerging genres that aim to balance out the prevailing negativity. One of them is solutions journalism, which is "rigorous and compelling reporting about responses to social problems" (Solutions Journalism Network, 2017a, para. 1). Systematic research on the impact of solutions journalism is still in the early stages. First experiments that have been conducted showed that reporting on an effective solution could "soften the blow of negative-conflict based news" (McIntyre, 2019, p. 31), with the audience being more positive toward the news article as well as the presented solution. The study at hand aims to build on the existing research and additionally focuses on two elements: the perceived *effectiveness* of a response and the way it is being *presented*.

"Visuals show and don't just tell", summarizes visualization communications researcher Nicole Dahmen, as they "can easily capture and convey massive amounts of complex information" (2015a, p.1). Data journalism and visualizations are at the forefront in the media sphere (Duenes, 2016), but the role they play in solutions journalism is still subject to study. Data, in the form of evidence of the effectiveness of the solution, is inherent to solutions stories. The stories should cover the numerical and anecdotal evidence that shows how well a response is working. On the one hand, the evidence offers teachable insights in what way and to what extent a solution is working. And on the other hand, it marks the crucial difference between uncompromising reporting and advocacy, as journalists are *not* suggesting what an effective solution could be but let the available data speak for how well a response is working (Solutions Journalism Network, 2017b).

The question that I pose for this study is the following: *To what extent does the visualization of evidence of the effectiveness of the solution influence audience perception of the solutions story?* To answer this question, a controlled experiment has been conducted in which I have compared a non-solutions story with different versions of a solutions story. One version included the evidence of the effectiveness of the solutions only in textual form, while five stories had an additional visualization of the evidence, namely a table, a doughnut chart, a bar chart, a pictorial chart, and an infographic. The following section establishes the theoretical background with a literature review about the research of solutions journalism that has been done thus far, an assessment of the role that evidence plays in solutions reporting as well as the potential effects data visualization can catalyze.

Theoretical background

The Impact of Solutions Journalism

While negativity is prevalent in the news, journalists increasingly also cover how people are responding to social problems. These efforts are for example highlighted in the

Solutions Story Tracker, a curated database that contains solutions stories of all media formats; over 6,200 from 870 news outlets in 160 countries as of May 2019 ("Solutions Story Tracker," n.d.). The Story Tracker is provided by the Solutions Journalism Network (SJN), a U.S-American non-profit organization founded in 2013 that dedicates its work to spread the practice of solutions journalism. Stories in the database are being curated based on the criteria SJN has defined as being essential to solutions journalism: "in-depth reporting on how a response to a specific problem works in meaningful detail, focus on effectiveness by presenting the evidence available, a discussion of the limitations of an approach, and insights that others can use" (Solutions Journalism Network, 2017a, para. 1). While SJN has been working on spreading the practice of solutions journalism, it did not invent it: Already by the end of the 1990s, an increase in solutions-focused reporting by different U.S.-American television and newspapers had been discussed. Benesch defines solutions journalism as "reporting on efforts that seem to succeed at solving particular social problems" (1998, p. 37). Similar definitions can be found in recent academic literature: McIntyre states that journalists who are doing solutions journalism "do not suggest specific solutions to a social problem; they highlight existing solutions in an attempt to improve society" (2015, p. 16).

Newsrooms have reported anecdotal success in implementing solutions journalism. Empirical research is yet in its beginnings. Most academic literature on solutions journalism and its related genre constructive journalism, has been published within the past five years. Constructive and solutions journalism share the same objective of not only covering wrongdoings. But constructive journalism expands the strict definition of solutions journalism

and does not only explore already implemented responses and the corresponding evidence but also covers what *might* be a potential solution to a problem (Meier, 2018). [1]

A first quasi-experiment was conducted by Curry and Hammonds (2014), in which they posted the question of how citizens are responding to solutions journalism. The study showed that the audience's perceived knowledge and sense of efficacy were heightened, the connection between audience and news organization was strengthened and potential engagement on an issue could be fostered. While these results were significant, participants who failed the manipulation check and did not recognize a solutions story had been excluded from the experiment. Taking all participants into consideration, the findings were more moderate yet still significant. A follow-up study by Curry, Stroud, and McGregor (2016) that moved beyond self-reported data and also tracked the behaviors of readers on a mock news site, found certain benefits for newsrooms and readers. While solutions journalism could not be considered a cure-all for audience engagement, their findings showed participants spent more time on the news site; self-efficacy and optimism were also greater. But it also surfaced that reader of solutions stories left the website more frequently and that their social media engagement with these stories was similar to the behavior of participants who read a non-solutions story. McIntyre (2015) researched the effects of solutions information in the news in her doctoral thesis, which she later published in a revised version (2019), where she concluded that while solutions information in news stories had impact on the audience's attitude and feelings, it did not affect intentions of social media engagement or other behaviors that would contribute to the implementation of a solution. Comparing the effects of shock media and solutions journalism, McIntyre and Sobel (2017) found that solutions

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[1] For more on constructive journalism, see for example Haagerup (2017) or Hermans and Gyldensted (2019).

journalism might to some extent be more engaging, as the audience indicated that they felt better and were more likely to read similar stories. Yet there was no significant difference in terms of empathy, knowledge increase, and desire to share or act.

The overarching findings are leaning toward the same direction: Solutions journalism has a positive impact on affect, yet the findings on the rational and behavioral level are still ambiguous. One limitation inherent to all studies discussed is the issue variety. Between one and three topics were used in each study as stimulus material, and they vary across the different studies. Thus, it is unclear whether certain findings are intrinsic to specific topics. McIntyre and Sobel (2017) for example discussed that the issue of sex trafficking, core to their research, might have been too highly stigmatized and that other, less sensitive cases might yield different findings. Furthermore, McIntyre and Lough (2019) critically address that while all studies worked with the same underlying definition of solutions journalism, it has not been operationalized the same way in all stimulus materials.

Further, the influence of images on solutions journalism has been investigated in a few studies. Literature shows that visuals are impacting the audience, but that the relationship between text and visual components is a complex one. McIntyre, Lough, and Manzanares (2018) tested the effects of text-image congruence versus text-imagine incongruence. Their findings indicate that a conflict-oriented photo paired with a solutions story made them feel bad –thus moderated the positive effects of the solutions story – whereas a solutions-oriented photo enhanced positive feelings, and a neutral photo enhanced behavioral intentions. In the most recent study regarding this issue, Dahmen, Thier, and Walth (2019) tested the isolated effects of solutions photojournalism on audience engagement, with the conclusion that solutions visual reporting on average gauged more engagement, which lead to more positive outcomes in terms of interest, self-efficacy, and behavioral intentions. In the current study, I am aiming to build on this line of research. Findings on the impact of solutions journalism are

still in an early stage and should, therefore, be tested again. Additionally, the study assesses the specific role of one element that is key to solutions journalism: the evidence of the effectiveness of the solution – presented in both textual and visual form – and whether it could leverage the effects of solutions journalism.

The Role of Evidence

Reporting on how people are responding to social problems is what defines solutions journalism. One of the key elements of covering these responses is the focus on "effectiveness, not good intentions, [by] presenting available evidence of results" (Solutions Journalism Network, 2017a, para. 1). Evidence in a solutions story can come in different shapes and sizes; it can be soft evidence, such as anecdotes or personal observations, or hard evidence like empirical studies. Due to the nature of journalism, as it is often time-sensitive, it is in many cases not possible to wait until the most rigorous evidence is available. Thus, it is described as pivotal for transparency to communicate the level of evidence and its strength (Solutions Journalism Network, 2017b). Tina Rosenberg, co-founder of the SJN and co-author of the weekly New York Times solutions series "Fixes", states that the aim of evidence is to show what is working and what is not working about a response. "You can say that the evidence shows that it works in big cities, but it doesn't work in small towns. It gives you more of the pros and cons of what is working and what is not working" (T. Rosenberg, personal communication, March 4, 2019).

From a scientific perspective, Reynolds and Reynolds (2002) describe evidence as data that is presented to prove an assertion. This can be facts or opinions. For evidence to work, it must be recognized as such, cognitively processed as well as perceived as legitimate. Evidence also enhances credibility. People who back up their arguments with evidence were found to be more credible than those who did not (Bostrom & Tucker, 1969).

The Power of Data Visualizations

While the content itself and audience predispositions play a role in the perception of evidence, another important factor is the way evidence is being presented. Aside from presenting it in textual form, numerical evidence – data – can also be presented visually. According to Edward Tufte, "[d]ata graphics visually display measured quantities by means of the combined use of points, lines, a coordinate system, symbols, words, shading, and color" (1983, p. 7). Following Andy Kirk, data visualizations are "[t]he representation and presentation of data to facilitate understanding" (2016, p. 16). Kirk's definition does not only tell us what data visualizations are, but it also defines their goals. In more specific terms, Kirk explains that data refers to the critical raw material – because, without data, there is no visualization. The act of data representation means showing data in different, visual forms in order to derive understanding from it. And lastly, the presentation of data describes all other visual design choices that make up the overall visual anatomy. Dahmen (2015b) places data visualizations into the realm of visual reporting. Research has shown that visuals craft more effective stories: They are more effective attention grabbers than text (Adam, Quinn, & Edmonds, 2007) and perceptually efficient, as the visual canal is the best to carry information to the brain; vision is the sense with the largest bandwidth (Kerren, Stasko, Fekete, & North, 2008). The meaning of images can be detected as fast as in 13 milliseconds (Potter, Wyble, Hagmann, & McCourt, 2014). Visuals also contribute to an increase in recollection in comparison to words (Paivio, Rogers, & Smythe, 1968). Despite this, visualizations are not free of limitations. Dahmen argues that people producing media "must have a thorough understanding of the content and message to be presented, as well as the available forms and technologies of data visualizations" (2015b, p. 278) and the audience needs sufficient visual literacy.

From a solutions journalism perspective, Tina Rosenberg (SJN) describes that visualizations are a way for the audience to better comprehend what is working and what is not working about a solution. But it has to be obvious at first sight what the chart is about, as one does not want to take too much time to figure it out. At the same time, there is a risk of oversimplification: "I think the dangers are the same for any kind of data visualization. It's hard to include nuances sometimes" (T. Rosenberg, personal communication, March 4, 2019). Thus, the success of data visualization in a solutions story is characterized by how effective a user perceives and processes the enclosed information about the effectiveness of the presented solution.

As many as 60 chart types have been identified across news outlets (Kennedy & Kirk, 2016). Choosing the most appropriate type is influenced by two factors: the data available and the message that is supposed to be conveyed. Types of visualization do not work interchangeably – thus it is important that the visualization represents the full story and not only certain aspects of it (Dahmen, 2015b). While designer and data journalists show a frequent preference for graphical displays, research shows conflicting findings on which chart type performs best. Meyer, Shamo, and Gopher (1999) conclude that the relative efficacy of a visualization is based on specific tasks – and the choice of which one is the best depends on which task should be performed in relation to the data at hand. One feature specific to visualizations is the comprehension and extraction of data. Tables seem to have an advantage over graphs when asked to do point comparisons. Graphs, on the other hand, work better for analyzing trends (Meyer et al., 1999). The choice of visualization can also have an impact on how persuasive the message is that should be conveyed (Pandey, Manivannan, Nov, Satterthwaite, & Bertini, 2014). In terms of actively correcting misperception, studies have found that visually presented information can increase the accuracy of people's beliefs (Nyhan & Reifler, 2012). Furthermore, visualizations are intrinsically memorable. Those that

resemble natural scenes are remembered best. Unique visualizations, such as pictorials, grids, trees, networks, and diagrams show a higher recall than more common visualizations that people are exposed to since early school days, meaning circles, bars, areas, points, and lines. How well a visualization is recognized and recalled depends on the redundancy of data and message, since people can better comprehend the main trends and messages when information is shown repeatedly (Borkin et al., 2016).

Audience Perception: Sub-Research Questions

Building on the existing research, audience perception tested in this study concerned the following areas: attitudes toward the story and the evaluation of journalistic standards, attitudes toward the proposed solution, self-efficacy, perceived knowledge increase, and behavior. Additionally, I assessed recall and attitudes toward the visualizations. Since there is only *some* evidence of the effects of solutions journalism thus far and findings are to some extent ambiguous, I refrained from formulating hypotheses and instead posed sub-research questions to explore the influence solutions stories with and without visualizations have on the readers.

Affect. Curry and Hammonds (2014) corroborated that readers of solutions stories were more likely to *feel* better. Curry, Stroud, and McGregor (2016) found that they were more optimistic. McIntyre and Sobel (2017) noted that participants felt more positively but did not feel more empathetic about the issue and McIntyre (2019) found that participants reading solutions stories were less negative. Thinking about the inclusion of visualizations, there are no clear cut findings whether they elicit emotions (Boy et al., 2017). I, therefore, propose *Sub-RQ1: Does the story version impact affect?*

Attitudes toward the story and the journalistic standards. The core of solutions journalism is that the *problem-solving* instead of the problem is central to the reporting – which makes its content inherently different from traditional reporting (Solutions Journalism

Network, 2017b). McIntyre (2019) found that readers of solutions stories felt more favorable toward the news article than those who read a non-solutions story. This leads to *Sub-RQ2a: Does the story version impact the attitudes toward the article?*

Research shows that gender can play a role in the attitudes toward news media, for example in the way information is sought out and consumed, the amount of news consumption, and topic preferences, with the overarching finding that women are less engaging with news, especially politics and current affairs (Toff & Palmer, 2018). Therefore, I propose *Sub-RQ2b: Does gender moderate the relationship between story version and attitudes toward the article?*

Solutions journalism is a genre considered to be divergent from the traditional, passive and representative "watchdog" journalism (Bro, 2008). Both scholars and practitioners engage in the question of how solutions journalism fits into the core principles of journalism. This leads *to Sub-RQ3a: Does the story version impact the evaluation of journalistic standards?*

Research shows that political preference also determines media habits and trust in news outlets; there is little overlap in the news outlets conservatives and liberals consume and trust (Pew Research Center, 2014). Therefore, I *propose Sub-RQ3b: Does party identification moderate the relationship between story version and evaluation of journalistic standards?*

Attitudes toward the solution. Solutions journalism is supposed to show people a way forward by deploying insights and meaningful details of how people are responding to social problems. And since the visualizations highlight the evidence of the effectiveness of the solutions, it can be assumed that they, therefore, impact the attitudes toward the solution as evidence works as proof of an assertion (Reynolds & Reynolds, 2002). This leads to *Sub-RQ4: Does the story version impact the attitudes toward the solution?*

Perceived knowledge. Curry and Hammonds (2014) found that readers of solutions stories perceived a higher increase in knowledge. McIntyre and Sobel (2017) could not find

any differences in terms of greater understanding of the issue. Considering visualizations, data extraction and comprehension are supposed to be facilitated by them (Meyer et al., 1999). Thus, I propose *Sub-RQ5: Does the story version impact the perceived knowledge gain?*

Recall. So far, research has not tested the memorability of solutions stories – a factor that is intrinsic to visualization research. Studies have shown that data and message redundancy provided through data visualizations can increase memorability (Borkin et al., 2016). This leads to *Sub-RQ6: Does the story version impact recall?*

Self-efficacy. Previous research showed that reading solutions stories resulted in a higher sense of self-efficacy than reading non-solutions stories (Curry & Hammonds, 2014; Curry et al., 2016). Therefore, I pose *Sub-RQ7a: Does the story type impact self-efficacy?*

Expanding on this, in the realm of social behavior and cognitive processes, it has been found that positive affect can lead to more thorough, open-minded, and flexible thinking, and to problem-solving (Estrada, Isen, & Young, 1997). Thus, I propose *Sub-RQ7b: Does positive affect mediate the relationship between story type and self-efficacy?*

Behavior. Existing research is ambiguous whether solutions journalism leads to a change in behavior. While Curry and Hammonds (2014) found that participants reading a solutions story were *more likely* to potentially become engaged on the issue discussed, the study by Curry, Stroud, and McGregor (2016) yielded similar results for readers of solutions and non-solutions stories. Neither McIntyre and Sobel (2017) nor McIntyre (2019) could find an increased desire to share the issue or increased desire to act upon it. McIntyre and Sobel (2017) found that readers of solutions stories were more likely to read similar stories. That is why I pose *Sub-RQ8a: Does the story type impact behavior?*

As stated before, positive affect impacts social behavior and cognition; motives such as kindness, helpfulness, generosity, and fairness are facilitated (Isen, 2012). Thus, I propose *Sub-RQ8b: Does positive affect mediate the relationship between story type and behavior?*

Attitudes toward the visualizations. The efficiency of visualizations depends on two factors: the data at hand and the message that they should bring across. While Meyer, Shamo, and Gopher (1999) conclude that the efficacy is task-dependent, research is conflicted about what visualization works best in a given context. Therefore, I *propose Sub-RQ9a: Is there a difference in attitudes toward the individual visualizations?*

Kennedy and Kirk (2016) specify that the effects of visualizations depend on how visual literate the participants are. This leads to *Sub-RQ9b: Does visualization literacy moderate the relationship between the visualization type and attitudes toward the visualization?*

Method

Design

To measure the effects of data visualizations on the perception of solutions journalism, the research has been designed as a controlled experiment. The independent variables were the solutions story and the data visualizations, which resulted in the following conditions: a non-solutions story, a solutions story with evidence in textual form, and a solutions story with the evidence in textual form *and* an additional table, one with a bar chart, one with a pictorial chart and one with a infographic.[2] For one, this experimental design allowed for testing how a non-solutions story compared to the different solutions stories. Furthermore, it could be explored whether there was a difference between the different versions of the solutions story. In other words, the study could assess whether the solutions stories with or without an additional visualization differed in their impact.

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[2] A pilot study ($n = 26$) tested two different versions of the pictorial charts and infographics in order to help selection. Each set of versions scored similar results in terms of their perception by participants; It thus made no difference which version to select.

Participants

The sample was originally made up of 708 participants from 49 US states. Two cases were removed because they did not consent to participate, therefore $N = 706$. While 25 participants are considered necessary per cell, more participants cell yield more statistical power (Reinard, 2006). The participants were 52.7% male and 68.4% white. The age ranged from 18 to 75 years, with a mean of 22.12 years ($SD = 11.97$).

Procedure

The subjects were recruited through Amazon Mechanical Turk (MTurk), a crowdsourcing marketplace that has been increasingly used in recent years and established as a channel to conduct scientific research (Buhrmester, Talaifar, & Gosling, 2018). Three conditions had to be met to participate: an approval rate of HITs (Human Intelligence Tasks; jobs to complete on MTurk) of 95% or greater, having already participated in 1000 or more HITs and being a resident of the United States. Participants received $1 for the study. The survey was administered through *Qualtrics* (see Appendix A). People who chose to participate in the study first responded to question measuring potential moderating factors. Later, they were randomly assigned to one of seven different conditions to minimize the influence of confounding variables (Reinard, 2006), and then asked to read the story carefully. Next, they were asked to answer questions to measure the dependent variables of this study. Three questions on the perception of the visualization were only presented to those in the respective conditions including a visualization. Before submitting the survey, participants were debriefed and thanked for their participation.

Stimulus Material

The stimulus material consisted of an online news story, which had been designed by using the online layout program *Canva.* All news stories included a title, an author and the publishing date as well as icons for social sharing and bookmarking. The stories differed in

their headlines, the body text (non-solutions story vs solutions story), and the visualizations. All stories were between 394 and 411 words long. The issue area of the stimulus was chronic absenteeism in U.S. schools. Education is a topic that everyone can relate to but is not as polarizing as others. As research shows, previously held beliefs and attitudes impact information processing (Pandey et al., 2014). While there are partisan differences on how to tackle issues in education, it has been an area where policy changes are made across the aisle; the past federal education laws received unusual broad bipartisan support in Congress (Meckler, 2018; Saad, 2016).

Independent Variables

Solutions Story. Each participant in the treatment conditions was shown a solutions story. The Solutions Journalism Network has defined a set of criteria to define a solutions story (Solutions Journalism Network, 2017b). While these criteria are valuable for professional journalists, guidelines for how to measure solutions journalism in research had been missing. McIntyre and Lough (2019) have recently suggested the first guidelines for a solutions journalism story in scholarly literature. Derived from qualitative interviews, Lough and McIntyre suggest nine criteria that a solutions story should contain. I have operationalized these by translating them into a set of yes/no questions. For example, "The story should include the cause(s) of a social problem, but should be framed in a way that gives more weight to a response to that problem" (McIntyre & Lough, 2019, p. 11) is operationalized as (a) "Does the story include the cause of a social problem?" and (b) "Does the story include more paragraphs on the solution than the problem?" For the complete operationalization see Appendix B. In order to establish the independent variable, all questions need to be answered with *yes*.

One key element of a solutions story is the evidence of the effectiveness of the solution. According to McIntyre and Lough (2019, p. 11), "[t]he story should include hard

evidence of the impact of the response. Hard evidence means reliable data, not anecdotal information." The proposed solution in this study is the introduction of washing machines on school grounds to reduce chronic absenteeism. Chronic absenteeism is often linked to poverty and families not being able to provide for basic needs, such as clean clothes, which results in children being ashamed and not attending school (Balfanz & Byrnes, 2016). The solutions story provided in this study is based on a real example that was recently published in The New York Times (Rueb, 2019). The evidence of the effectiveness of the solution is the school attendance before and after the introduction of the washing machine in school. A non-solutions story is the control group, which only focused on the problem of chronic absenteeism.[3]

Data Visualization. The operationalization of the second independent variable follows Kirk's definition, which describes data visualization as "the representation and presentation of data to facilitate understanding" (Kirk, 2016, p. 19). The visualized data is the evidence of the effectiveness of the solution, in other words school attendance before and after the introduction of the washing machine. There were five visual *representations* of the evidence – each added to the solutions story with the evidence in textual form. The displays were based on the most commonly used data visualizations (Yau, 2015) and created with *Infogram.* The first visualization was a table, which organizes and displays information in rows and columns. Information is conveyed through text by using words and numbers ("Do You Know When to Use Tables vs. Charts?," n.d.). The second one was a doughnut chart, which represents parts of a whole. While it is similar to a pie chart, the doughnut chart is

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[3] Initially, the study also tested whether it would make a difference if one of the solutions stories did not include the data on the effectiveness of the solution. Findings did not yield any significant effects. Results were omitted from this paper.

easier to comprehend with our visual perception (Robert, n.d.). The third one was a bar graph

that uses bars with proportional lengths to compare data among categories. Bar charts work

well when visualizing nominal variables and they are highly effective because the eyes can

quickly compare lengths and judge distances, making them both simple and effective

(Krystian, 2018a). The fourth one was a pictorial chart, which uses the repetition of icons

(symbols) to represent the data. They are effective because icons are the most common form

of visual communication around the world and can convey messages instantly (Krystian,

2018b). The fifth one was an infographic that focuses on the flow of different visual elements

("What is an infographic?," n.d.). Lastly, following Kirk's definition, it needs to be defined

what other design choices were made to *present* the data: The visualizations in the stimulus

were static. They consisted of a contrasting color scheme with red and green and nuances of

gray. The font, its size and the amount of text were held constant across the visualizations,

with slightly more text on the infographic, which is inherent to this type of visualization.

Moderators

      Party identification. Participants rated their party identification on a seven-point

scale from strong Democrat to independent to strong Republican, adapted from Goren (2005).

      Visualization literacy. Adapted from the visual literacy standards by Hattwig,

Bussert, Medaille, and Burgess (2013), visualization literacy was measured with five

statements, rated on a seven-point scale (1 = strongly disagree to 7 = strongly agree): the

participants' ability to name and evaluate a chart, identify its subject, and describe and

evaluate the aesthetic elements of it. Items were averaged and merged to a composite variable

(Cronbach's α = .84). Higher mean values indicated higher visualization literacy.

Dependent Variables

      Affect. Affect was measured with twelve-element battery on a seven-point scale (1=

not intense at all to 7 = extremely intense) following Schuck (2019). Participants rated how

intense they felt negative affect while reading, measured as anxiety, shame, guilt, frustration, anger, irritation, and concern. Positive affect was measured with hope, empathy, reassurance, pride, relief, and enthusiasm. For the composite variables, the six items measuring positive affect (Cronbach's α = .92) and negative affect (Cronbach's α = .9) were averaged. Higher mean values indicated a more intense affect.

Attitudes toward the story and the journalistic standards. A twelve-item battery of semantic differentials on a seven-point scale was presented to gauge the participants' attitudes toward the article, such as useless/useful, unappealing/appealing or irrelevant/relevant. These twelve items constitute a composite variable (Cronbach's α = .89). The evaluation of journalistic standards was measured on a seven-point scale (1 = strongly disagree to 7 = strongly agree) according to the core principles of journalism, relating to truth and accuracy, independence, fairness, impartiality, and humanity ("The 5 Principles of Ethical Journalism," n.d.). They were merged and averaged as a composite variable (Cronbach's α = .71). Higher mean values indicated more favorable attitudes and evaluations.

Attitudes toward the solution. The attitude toward the issue was measured through a seven-item battery of semantic differentials adapted from McIntyre (2019) and averaged for a composite variable (Cronbach's α = .97). Participants were asked whether they considered the introduction of a washing machine on school grounds not needed/needed, bad/good, unfavorable/favorable, unacceptable/acceptable, foolish/wise, ineffective/effective, wrong/right. Higher mean values indicated more favorable attitudes.

Perceived knowledge. Participants were asked to rate their agreement on a seven-point scale (1 = strongly disagree to 7 = strongly agree) with whether the article has contributed to them feeling better informed about the problem and solution and whether they feel like the article as increased their knowledge on the issue. The four items were averaged

and merged for a composite variable (Cronbach's α = .87). Higher mean values indicated a higher perceived knowledge gain.

Recall. Three questions were included that assess memorability. Two questions asked for the distribution of students in those with required attendance and chronic absentees before and after the introduction of the solution, and one asked for the location of the school. Results of the three questions were merged to an additive scale with zero meaning "no recall" and three "high recall".

Self-Efficacy. Self-efficacy was assessed with a battery of statements which participants have to rate their agreement with one a seven-point scale (1 = strongly disagree to 7 = strongly agree), adapted from Curry and Hammonds (2014) and Schuck (2019), averaged into a single scale (Cronbach's α = .81). Higher mean values indicated a higher sense of efficacy.

Behavior. As in McIntyre (2019), intentions to engage were measured following Oliver, Hartmann, and Woolley (2012). Participants were asked to rate their intentions to engage on social media and volunteer their time to help address the issue. Following Schuck (2019), behaviors were measured by asking participants if they would donate to support the solution, if they would read an additional article and if they would like to sign up for a newsletter. Intentions and actual behaviors were merged into an additive scale, with zero meaning "no engagement" and three meaning "high engagement" (Cronbach's α = .87).

Attitudes toward the visualizations. The attitudes toward the visualizations were measured with a twelve-item battery of semantic differentials on a seven-point scale in terms such as useless/useful, unappealing/appealing, irrelevant/relevant. All items were averaged and merged into a composite variable (Cronbach's α = .88). Higher mean values indicated more positive attitudes.

Results

Manipulation Checks

Four manipulation checks were included to make sure the conditions were perceived

as intended. All of them indicated the manipulations were successful. The results of a one-

way ANOVA showed that there was a significant relationship between the story version the

participants read and the extent to which they perceived it to be solution-focused, $F(3, 702) =$

.54, $p = < 0.001$.[i] Results of the second check revealed that there was a significant relationship

between having evidence of the success of a response in a story and the extent participants

indicated that it was mentioned, $F(3, 702) = 24.26$, $p = < 0.001$.[ii] It also showed a significant

relationship between being exposed to a solutions story with a visualization and indicating

that it contained a visualization $F(3, 702) = 68.03$, $p > 0.001$.[iii] Lastly, there was a significant

and strong association between being exposed to a visualization and identifying the

visualization, Chi-squared (16, N = 427) = 844.95, $p = < .001$, $V = 0.7$. The results revealed

that participants in all visualization conditions could successfully identify the type of

visualization they have been exposed to more than not.

Main Effects

Sub-RQ1 asked whether the story version would impact affect. Participants who read a

non-solutions story indicated the least positive affect ($M =3.4$, $SD = 1.44$), while those who

read a solutions story with an infographic indicated the highest ($M = 4.47$, $SD = 1.58$). The

other conditions scored in between.[iv] A one-way ANOVA was carried out with a significant,

but moderate effect, $F(7, 698) = 7.73$, $p < .001$, Eta-squared = .07. (for a summary of the

ANOVA results see Appendix C).[v] Bonferroni *post hoc* comparison indicated that significant

differences were found between participants who read a non-solutions story and those who

saw a solutions story with textual evidence ($M_{difference} = -1.41$, $p <.001$), table ($M_{difference} = -$

1.13, $p <.001$), doughnut chart ($M_{difference} = -1.27$, $p <.001$), bar chart ($M_{difference} = -.94$, $p =$

.003), pictorial chart ($M_{difference}$ = -1.37, p <.001), and an infographic ($M_{difference}$ = -1.44 , p

<.001). Ultimately, the story version does impact affect, with participants who read a

solutions story indicating significantly higher positive affect than those who read a non-

solutions story.[vi]

　　　　Sub-RQ2a asked whether the story version impacts the attitudes toward the article.

Participants who read a non-solutions story indicated the least favorable attitudes (M = 4.9,

SD = 1.0), while those who read a solutions story with a pictorial chart felt most favorable (M

= 5.8, SD = .86). The other conditions scored in between.[vii] A one-way ANOVA was carried

out and findings were moderately significant, $F(7,698)$ = 7.54, p > 0.001, Eta-squared = .07 .

Bonferroni *post hoc* comparison indicated a significant difference between participants who

read a non-solutions story and those who read a solutions story with textual evidence

($M_{difference}$ = -.77, p > .001), table ($M_{difference}$ = -.75, p > .001), doughnut chart ($M_{difference}$ = -.84,

p > .001), bar chart ($M_{difference}$ = -.63, p = .001), pictorial chart ($M_{difference}$ = -.91, p > .001) and

infographic ($M_{difference}$ = .67, p > .001). In other words, participants have significantly more

favorable attitudes toward solutions stories in comparison to the non-solutions story.[viii]

　　　　Sub-RQ3a asks whether the story version impacts the evaluation of journalistic

standards. Participants who read a non-solutions story indicated the most negative evaluation

of journalistic standards (M = 5.24, SD = 1.78), while those who read a solutions story with a

doughnut chart indicated the most positive (M = 5.86, SD = 1.22). The other conditions

scored in between.[ix] A one-way ANOVA was carried out and a significant, but weak effect

was found, $F(7,698)$ = 3.21, p = 0.002, Eta-squared = .03. Bonferroni *post hoc* comparison

indicated a significant difference between participants who read a non-solutions story and

those who read a solutions story with a table ($M_{difference}$ = -.58, p = .027), a doughnut chart

($M_{difference}$ = -.62, p = .013) and a pictorial chart ($M_{difference}$ = -.56, p = .042). In sum, the story

version does impact the evaluation of journalistic standards; three of the solutions stories with

an additional visualization were significantly better evaluated than the non-solutions story.[x]

     Sub-RQ4 asked whether the story version impacts attitudes toward the solution.

Participants who read a non-solutions story indicated the least positive attitudes ($M = 5.23$,

$SD = 1.81$), while participants who saw a pictorial chart the most positive ($M = 6.02$, $SD =$

1.23). The other conditions scored in between.[xi] A one-way ANOVA was carried out,

showing a significant, but weak effect, $F(7,698) = 2.84$, $p = 0.006$, Eta-squared = .03.

Bonferroni *post hoc* comparison indicated that significant differences were found between

participants who read a non-solutions story and those who saw a solutions with a table

($M_{difference} = -.72$, $p = .021$), a doughnut chart ($M_{difference} = -.72$, $p = .022$) and a pictorial chart

($M_{difference} = -.78$, $p = .007$). In other words, participants who read a solutions story were more

favorable toward the solution than those who read a non-solutions story.[xii]

     Sub-RQ5 asked whether the story version impacts the perceived knowledge gain.

Participants who read a non-solutions story indicated the lowest increase in knowledge ($M =$

4.38, $SD = 1.3$), while those who read a solutions story with a pictorial chart indicated the

highest ($M = 5.65$, $SD = 0.98$). The other conditions scored in between.[xiii] A one-way

ANOVA was carried out showing a significant, yet moderate effect, $F(7, 698) = 8.71$, $p <$

0.001, Eta-squared = .08. Bonferroni *post hoc* comparison indicated that significant

differences were found between participants who read a non-solutions story and those who

saw a solutions story with textual evidence ($M_{difference} = -1.00$, $p < .001$), table ($M_{difference} = -$

1.16, $p < .001$), doughnut chart ($M_{difference} = -1.1$, $p < .001$), bar chart ($M_{difference} = -0.9$, p

$< .001$), pictorial chart ($M_{difference} = -1.13$, $p < .001$) and infographic ($M_{difference} = -1.00$, p

$< .001$). In other words, participants who read a solutions story indicated a significantly higher

knowledge gain than those who read a non-solutions story.[xiv]

Sub-RQ6 asked whether the story version impacted recall. Recall was the lowest for participants who read a solutions story with textual evidence ($M = 1.82$, $SD = 1.1$), while it was highest for participants who read a solutions story with a bar chart ($M = 2.1$, $SD = .96$). The other conditions scored in between.[xv] A one-way ANOVA did not yield any significant findings, $F(5,522) = .688$, $p = .63$. While the mean values point in the direction that visualizations lead to a higher recall, these differences are not statistically significant.

Sub-RQ7a asked whether the story version impacted self-efficacy. Participants who read a solutions story with a bar chart indicated the lowest sense of self-efficacy ($M = 4.7$, $SD = 1.34$), while those who read a solutions story with a doughnut chart indicated the highest ($M = 5.16$, $SD = 1.23$). The other conditions scored in between.[xvi] A one-way ANOVA was conduct which did not confirm a significant difference, $F(7,698) = 1.54$, $p = .151$. Therefore, I cannot conclude that the story version has a significant impact on self-efficacy.[xvii]

Sub-RQ8a asked whether story version impacted behavior. The least engagement was indicated by participants who read a solutions story with a bar char ($M = 1.35$, $SD = .69$), while the highest was indicated by those who read a solutions story with textual evidence ($M = 1.43$, $SD = .54$). The other conditions scored in between.[xviii] A one-way ANOVA was conducted, but the result was not statistically significant, $F(7,698) = 1.051$, $p = .394$. Thus, the story version does not have an influence over behavior.[xix]

Sub-RQ9a asked whether there is a difference in attitudes toward the individual visualizations, in other words perception of relevance, appeal or usefulness. Participants who read a solutions story with an infographic had the least favorable attitudes ($M = 5.26$, $SD = .91$), while those who read a solutions story with a pictorial chart had the most favorable ($M = 5.7$, $SD = .74$). The other visualizations scored in between.[xx] A one-way ANOVA was conducted with a significant, but weak result, $F(4, 439) = 3.28$, $p = .012$, Eta-squared = .03.[xxi] Bonferroni *post hoc* comparison indicated that the difference between the infographic and the

pictorial chart is statistically significant. ($M_{\text{difference}} = -.47$, $p = .014$). Thus, attitudes toward the visualizations are only different when comparing the infographic with the pictorial chart.

Moderation and Mediation

Sub-RQ2b asked whether gender impacts attitudes toward the article. A PROCESS model-1 test showed no significant effect, contrasting non-solutions stories and solutions, $b = -.06$, $SE = .23$, $p = .8$. Thus, gender does not have an effect on attitudes toward the news article when contrasting solutions stories with non-solutions stories.

Sub-RQ3b asked whether party identification moderates the evaluation of journalistic standards, contrasting non-solutions and solutions stories. A PROCESS model-1 test yielded no significance for any of the interaction effects that reflect the categorical moderator variable party identification: $b_{\text{int\_1}} = -.18$, $SE = .43$, $p = .68$, $b_{\text{int\_2}} = -.11$, $SE = .4$, $p = .8$, $b_{\text{int\_3}} = -.09$, $SE = .38$, $p = .8$, $b_{\text{int\_4}} = -.43$, $SE = .5$, $p = .35$, $b_{\text{int\_5}} = .38$, $SE = .44$, $p = .39$, $b_{\text{int\_6}} = -.02$, $SE = .36$, $p = 1$. Thus, party identification does not have an effect on the evaluation of journalistic standards when comparing non-solutions and solutions stories.

Sub-RQ7b asked whether positive affect mediates the relationship between story version and self-efficacy, which was tested with a PROCESS model-4 test. The 'A' path between reading a solutions story and increased positive affect proved significant, $b = 1.25$, $SE = .18$, $p < .001$, 95% CI: [.9;1.6]. The 'B' path between increased positive affect and increased self-efficacy is significant as well, $b = .43$, $SE = .24$, $p < .001$, 95% CI: [.4;.48]. The total indirect effects of solutions stories on self-efficacy is significant, $b = .54$, $SE = .09$, 95% CI: [.38;.71]. Therefore, positive affect *does* mediate the relationship, as reading a solutions story lead to increased positive affect and increased positive affect leads to increased self-efficacy.

Sub-RQ8b asked whether positive affect mediates the relationship between story type and behavior. A PROCESS model-4 test has been applied to test the effects of solutions story

contrasted with the non-solutions story on behavior with positive affect as the mediator. The 'A' path between reading a solutions story and increased positive affect proved significant, $b = 1.25$, $SE = .18$, $p < .001$, 95% CI: [.9;1.6]. The 'B' path between increased positive affect and increased behavior is significant as well, $b = .24$, $SE = .01$, $p < .001$, 95% CI: [.22;.26]. The total indirect effects of solutions stories on behavior is significant, $b = .3$, $SE = .05$, 95% CI: [.36;.66]. Thus, positive affect *does* mediate the relationship, as reading a solutions story lead to increased positive affect and increased positive affect leads to increased behavior.

Sub-RQ9b asked whether visualization literacy moderates the relationship between visualization and attitudes toward it, contrasting each individual visualization with the other visualizations grouped. Neither of the PROCESS model-1 tests yielded a significant finding: $b_{table} = -.02$, $SE = .09$, $p = .82$, $b_{doughnut\ chart} = .06$, $SE = .09$, $p = .47$, $b_{bar\ chart} = -.07$, $SE = .11$, $p = .54$, $b_{pictorial\ chart} = -.1$, $SE = .1$, $p = .27$, $b_{infographic} = .01$, $SE = .11$, $p = .93$. The findings revealed that visualization literacy is not interacting with attitudes toward the visualizations for either type.

Discussion and Conclusion

The current study aimed to add to the growing body of work researching the effects of solutions journalism. For one, it continued this line of research, assessing the impact of solutions journalism on audience perception, given that existing findings are still ambiguous. Additionally, it sought to set the focus on a key element of solutions journalism: evidence of the effectiveness of the solution, both in textual and visual form.

The study indeed found differences in audience impact of solutions stories in comparison to non-solutions stories; many of them corroborate findings of previous research. Participants felt significantly more positive after reading a solutions story. This is in line with the findings by Curry and Hammonds (2014), Curry, Stroud, and McGregor (2016), McIntyre and Sobel (2017), and McIntyre (2019). Readers of a solutions story also had overall more

positive attitudes toward the article, which was also tested and found by Curry and

Hammonds (2014), Curry, Stroud, and McGregor (2016), and McIntyre (2019).

Furthermore, Participants sought to assess the solution more positively, as also found

by McIntyre (2019) and indicated a higher perceived knowledge gain, which was also

confirmed in the study by Curry and Hammonds (2014) These findings hold true for the

solutions stories with and without visualization in comparison to the non-solution story. To

answer the sub-research questions, in the areas of affect, positive attitudes toward the

solutions and the story as well as perceived knowledge gain, solutions stories do have a

positive impact.

Participants who read a solutions story with an additional table, doughnut chart or

pictorial chart indicated a significantly better evaluation of the adherence of story to

journalistic standards in comparison to the non-solutions story. This is important to consider

in terms of the legitimacy of solutions journalism. As solutions journalism is a more active

style of reporting than traditional journalism (Bro, 2008), chances are higher for coverage to

be considered advocacy, PR or hidden advertisement. The journalistic standards of the

different versions of the solutions story were *not* evaluated any worse than the non-solutions

story, but to some extent even better.

While previous research only focused on the effects on the overall population, this

study assessed two demographic factors, gender and party identification, and whether they

interact with the attitudes toward the article and the evaluation of journalistic standards.

Research indicates that there are differences between women and men in terms of media

consumption (Toff & Palmer, 2018). Data by SJN indicates that solutions journalism is

preferred by women: Across all social media channels, the followers – both journalists and

news consumers – are roughly two-thirds women and one-third men, according to the

network's Online Engagement Manager (A. Arthur, personal communication, May 4, 2019).

This is also supported by a study among US journalists, which concluded that female journalists are more in favor of solutions journalism (McIntyre, Dahmen, & Abdenour, 2016). Yet a moderation analysis on the impact of gender on the attitudes toward the story did not yield any significant differences, meaning that gender did *not* play a role in how the story was perceived.

Another demographic factor highly discussed in the media sphere is party identification. While research attests stark differences between conservatives and liberals in terms of what news sources they trust and consume (Pew Research Center, 2014), a moderation analysis on the impact of party identification on the evaluation of journalistic standards was not significant. Therefore, whether or not a solutions story was perceived to adhere to journalistic standards did *not* depend on the participant being a Republican, independent or Democrat.

The story version did not yield any differences when assessing self-efficacy or behavior. This is in line with the research by McIntyre and Sobel (2017) and McIntyre (2019), who also could not corroborate this, while Curry and Hammonds (2014) and Curry, Stroud, and McGregor (2016) did find a higher sense of self-efficacy and intentions to engage. Additionally, I also conducted two mediation analyses, testing whether positive affect mediates the relationship between solutions story and self-efficacy as well as behavior. The results of both analyses indicate a mediated relationship, and that solutions stories had an indirect effect on self-efficacy and behavior via positive affect.

This research further sought to test recall, as research indicates higher memorability intrinsic to visualizations. Contrary to the expectation, the findings revealed that the solutions stories with an additional visualization were not more memorable than the solutions story with only textual evidence. This is especially surprising for the infographic as it had the highest message and data redundancy, which positively impacts memorability. I also

measured the general attitudes toward the visualizations, in terms of for example usefulness, appeal and relevance: Findings showed that the pictorial chart was significantly better rated in comparison to the infographic. Participants did not indicate a significant preference for any of the other visualizations. A moderation analysis indicated that this relationship was *not* dependent on the readers' visualization literacy.

What does that mean for the main research question, which asked to what extent visualizations impact the perception of solutions journalism. Overall, visualizations only had *some* additional impact on the perception of solutions stories. With the exception of the evaluation of journalistic standards, there was no difference in the perception of a solutions story with or without visualization. While mean values often pointed in the direction that visualizations would amplify the effects of solutions journalism, across the other areas tested, the different versions of the solutions story did not yield any significant results. What can be drawn from these findings? First of all, none of the visualizations stood out for having any negative impact on the perception of a solutions journalism. The table, doughnut chart and pictorial chart even have a positive impact, but only on one of the outcome measures. As data visualizations increasingly find their way into newsrooms, these results indicate that the creation of visualizations should definitely undergo a cost-benefit calculation, as resources, especially when scarce, might be better invested in research and the writing process.

Despite, there ought to be a discussion of possible limitations. The sample deployed in the study was not representative. But it was conducted with over 700 participants, which speaks to high statistical power. Research has shown that findings with Amazon MTurk often show comparable causal effects and have a higher diversity than the typically used sample of undergraduate students. Yet it should be rather considered an empirical testing ground, than a replacement of a population-based study (Mullinix, Leeper, Druckman, & Freese, 2015).

Education is a topic with comparatively little polarization and the solution is a low investment for the general public. McIntyre and Sobel (2017) already discussed the issue that some findings might be intrinsic to a certain topic. A follow-up study might, therefore, recreate the methodological framework to test another topic.

While the visualizations are based on real-world data, the visualizations were solely created for the purpose of the study. For future research, it might be worth analyzing the effects of visualizations that were published in news articles, as for example in Borkin et al. (2013, 2016). While this study did not yield any major effects of visualizations on the perception, this research only looked at five different types. Popular and mainstream news outlets know as many as 60 different visualizations (Kennedy & Kirk, 2016), therefore, other visualizations could be assessed in future studies as well as modifications of the ones I tested. The choice should be made under consideration of the data available. The study at hand used four data points: the student distribution before and after the implementation of the solution. While a data set that small is still easy to comprehend, the power of data visualizations might come to light when the data set is more complex and for example, highlights developments over a longer period of time. And while for the visualizations tested in this study general visualization literacy did not influence the outcome, this should be still taken into consideration, especially when using less known and more complex visualizations.

Above all, these results might be applicable to written solutions stories – but the effects of visualizations in television or web-videos might lead to other outcomes, as research on information processing suggests (Fox et al., 2004)

All in all, this research did align with findings of previous studies and showed that solutions stories increase the emotional well-being and perceived knowledge gain, improve the attitudes toward the solution and the article itself and, to some extent, the visualizations even improve the evaluation of journalistic standards. These results are far-reaching for

several reasons: From a journalistic perspective, these are valuable findings, as solutions

journalism could potentially offer a way to *strengthen* the trust in the profession again

(Ingram, 2018). First demographic analyses also indicated that solutions journalism attracts

the audience *equally* across genders and party identifications. In terms of misconceptions, the

increase in knowledge and the improved emotional well-being speaks for solutions journalism

offsetting the prevalent news negativity and the sense of the state of the world getting worse

(Ipsos, 2017). As for civic engagement, the increase in knowledge and more positive attitudes

toward a solution are an important *first step*. Awareness is one half of the equation for social

change, which involves increasing knowledge, reshaping cultural norms and correcting false

perceptions (NRCDV, 2017). The second half of the equation is action. While this study

could not corroborate main effects of reading a solutions story on self-efficacy and behavior,

it showed that positive affect mediated the relationship, meaning that solutions stories had

indirect effects on self-efficacy and behavior. Future studies should continue and expand the

current line of research and seek to operationalize solutions journalism as done in this study

using the academic guidelines provided by McIntyre and Lough (2019) to guarantee the

comparability of results. Especially positive affect seems to be a powerful tool and has been

repeatedly measured as an effect of reading solutions stories. Research should seek to assess

the individual emotions caused by reading solutions stories, and further engage with their

impact. Potentially, effects of reading solutions stories should also be assessed through

psychophysiological measures, such as skin conductance, as they also capture implicit

attitudes. Similar research has been done to measure the prevalence of negative news (Soroka,

2019). All in all, solutions journalism seems to be a genre that leaves room for exploration for

both, researchers and professionals.

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Lisa Urlbauer works on a part-times basis of 40 hours per month as the European

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Appendix A

Qualtrics survey

Block 1 Introduction

Dear Sir or Madam,

I would like to invite you to participate in a study for the Amsterdam School of Communication Research (ASCoR) at the University of Amsterdam (The Netherlands). The study we are asking you to participate in is about getting insight into your perception of online news stories. This will take ca. 20 minutes. Everyone at and above the age of 18 can participate in this project.

As this research is being carried out under the responsibility of the ASCoR, University of Amsterdam, we can guarantee that:

1. Your anonymity will be safeguarded, we will not collect personal information such as names, addresses, IP-addresses, photos, videos etc. Fully anonymized research data can be shared with other researchers.

2. You can refuse to participate in the research or cut short your participation without having to give a reason for doing so. You also have up to 7 days after participating to withdraw your permission to allow your answers or data to be used in the research.

3. Participating in the research will not entail you being subjected to any appreciable risk or discomfort, and you will not be exposed to any explicitly offensive material.

For more information about the research and the invitation to participate, you can send an email to the project leader Andreas Schuck (a.r.t.schuck@uva.nl). Should you have any complaints or comments about the course of the research and the procedures it involves as a consequence of your participation in this research, you

can contact the designated member of the Ethics Committee representing ASCoR: ascor-secr-fmg@uva.nl. Any complaints or comments will be treated in the strictest confidence.

We hope that we have provided you with sufficient information. We would like to thank you in advance for your assistance with this research.

With kind regards,
Andreas Schuck

Block 2: Informed Consent

I hereby declare that I have been informed in a clear manner about the nature and method of the research.

I agree, fully and voluntarily, to participate in this research study. With this, I retain the right to withdraw my consent, without having to give a reason for doing so. I am aware that I may halt my participation in the experiment at any time.

If my research results are used in scientific publications or are made public in another way, this will be done such a way that my anonymity is completely safeguarded.

I have read and understood the above text and I:

○ Agree to participate in the research study
○ Do not wish to participate in the research study

Block 3: Transition 1

We are now going to start with some introductory questions. Please answer them as honestly as possible.

Important: Once you have moved onto the next question, you cannot go back to previous questions.

Block 4: Moderators

Please indicate your interest in the following issues:

	Not interested at all						Extremly interested
Sports	O	O	O	O	O	O	O
Stock markets	O	O	O	O	O	O	O
Education	O	O	O	O	O	O	O
Foreign affairs	O	O	O	O	O	O	O

Please indicate your disagreement or agreement with the following statements:

	Strongly disagree						Strongly agree
The state should intervene to increase school attendance.	O	O	O	O	O	O	O
To counter homelessness, cities should pursue an approach in which they first provide housing.	O	O	O	O	O	O	O
Schools should rely on the community in addition to government funding to expand the resources they can provide their students.	O	O	O	O	O	O	O
The United States should introduce a carbon tax on federal level.	O	O	O	O	O	O	O

Please indicate your disagreement or agreement with the following statements:

	Strongly disagree						Strongly agree
I believe I can succeed at any endeavor to which I set my mind.	O	O	O	O	O	O	O
I am confident that I can perform effectively on many different tasks.	O	O	O	O	O	O	O
In general, I think that I can obtain outcomes that are important to me.	O	O	O	O	O	O	O
Even when things are tough, I can perform quite well.	O	O	O	O	O	O	O
When facing difficult tasks, I am certain that I will accomplish them.	O	O	O	O	O	O	O
I will be able to successfully overcome many challenges.	O	O	O	O	O	O	O
I will be able to achieve most of the goals that I have set for myself.	O	O	O	O	O	O	O
Compared to other people, I can do most tasks very well.	O	O	O	O	O	O	O

Please indicate your disagreement or agreement with the following statements:

"When someone presents a visualization to me (like a chart or a table), I can... ."

	Strongly disagree						Strongly agree
name the type of chart	O	O	O	O	O	O	O
evaluate the use of aesthetic and design elements (e.g., use of color, composition, line, shape, contrast, repetition, style)	O	O	O	O	O	O	O

	Strongly disagree						Strongly agree
describe its pictorial, graphic, and aesthetic elements (e.g., color, composition, line, shape, contrast, repetition, style)	O	O	O	O	O	O	O
identify its subject	O	O	O	O	O	O	O
evaluate whether it is an appropriate representation of the data	O	O	O	O	O	O	O

Please indicate your disagreement or agreement with the following statements:

"*Right now, I feel...*"

	Strongly disagree						Strongly agree
Inspired	O	O	O	O	O	O	O
Afraid	O	O	O	O	O	O	O
Active	O	O	O	O	O	O	O
Hostile	O	O	O	O	O	O	O
Upset	O	O	O	O	O	O	O
Alert	O	O	O	O	O	O	O
Nervous	O	O	O	O	O	O	O
Ashamed	O	O	O	O	O	O	O
Determined	O	O	O	O	O	O	O
Attentive	O	O	O	O	O	O	O

Generally speaking, do you usually think of yourself as a Republican, a Democrat or an independent?

Strong Democrat	Weak Democrat	Lean Democrat	Independent	Lean Republican	Weak Republican	Strong Republican	I don't know	I don't want to disclose
O	O	O	O	O	O	O	O	O

Please indicate your disagreement or agreement with the following statements:

	Strongly disagree		Strongly agree

	Strongly disagree						Strongly agree
One of the big problems in this country is that we don't give everyone an equal chance.	O	O	O	O	O	O	O
If people were treated more equally in this country, we would have much fewer problems.	O	O	O	O	O	O	O
Our society should do whatever is necessary to make sure that everyone has an equal opportunity to succeed.	O	O	O	O	O	O	O

Of the following two statements, which one do you agree more with?

O There are more things the government should be doing.

O The less government the better.

Of the following two statements, which one do you agree more with?

O We need a strong government to handle today's complex economic problems.

O The free market can handle these problems without government being involved.

Of the following two statements, which one do you agree more with?

O Government has become bigger because the problems we face today have become bigger.

O The main reason government has become bigger over the years is because it has gotten involved in things that people should do for themselves.

Block 5: Transition 2

In the following section, you are going to read an online news story. Please take your time and read the article carefully, as you will not be able to go back to it. Once you are done with reading, please click on the button on the bottom of the page. We will then ask you a couple of questions about the text afterwards.

Important: The continue button on the bottom of the screen will appear after 20 seconds.

Block 6: Stimulus 1) Non-solutions story

Chronically Absent: How Dirty Clothes Keep Students Away from School

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By Joanne Miller, April 2, 2019

The first step to succeeding in education is actually showing up, but for many at-risk children, this is not such an easy thing. Dirty clothes are a barrier that many students face when wanting to attend school. This is part of a widespread problem: chronic absenteeism.

"If it's a choice between coming to school dirty, and have kids laugh at you or make fun of you, and staying home, they'll stay home," said Anne Johnson, the principal at East Side Elementary School in Kansas City, Missouri. Many of the school's families lacked access to detergent, washing machines and even electricity.

At East Side Elementary, only 46 percent of students are meeting the requirement to attend school 90 percent of the time. Not only do those who frequently miss school learn less, they also keep their classmates from moving forward with the learning material.

Absenteeism can impede a child's ability to learn how to read and can lead older students to fail courses and become more likely to drop out, studies have found. Dropping out of high school has been linked to poorer outcomes later in life, from poverty and diminished health, to involvement in the criminal justice system.

Chronic absenteeism predicts academic struggle. Achievement, especially in math, correlates with attendance, and absence of even two weeks during one school year matters. According to the Department of Education, approximately one out of six students was chronically absent during the 2015-16 school year, meaning they missed more than 15 days of school for any reason.

Research suggests that the reasons for chronic absenteeism vary, because they are deeply rooted in socioeconomic reality, reflecting complex and multilayered inequalities. Sickness is the number one factor driving absences. Logistical obstacles affecting families are the second largest factor. The lack of clean clothes has been repeatedly considered to be among the leading causes when schools investigate the underlying mechanisms of low student attendance.

Principals in some Kansas City schools have said they have observed a link between attendance and their students' ability to clean their clothes. This is especially true for schools in Kentucky, Missouri, New Jersey, Colorado and elsewhere across the country. Especially in states serving low-income populations.

The social and emotional stigma of unwashed clothing is a powerful deterrent to school attendance. "There are many families that take pride in how they look," said Carry Jonathan, the school's English teacher, "they don't want to send their children to school because they don't have clean clothes."

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Block 6: Stimulus 2 Solutions Story w/ Evidence

Chronically Absent: How Washing Machines Keep Students in School

By Joanne Miller, April 2, 2019

The first step to succeeding in education is actually showing up, but for many at-risk children, this is not such an easy thing. Dirty clothes are a barrier that many students face when wanting to attend school. This is part of a widespread problem: chronic absenteeism. A possible response: a washing machine on school grounds.

"If it's a choice between coming to school dirty, and have kids laugh at you or make fun of you, and staying home, they'll stay home," said Anne Johnson, the principal at East Side Elementary School in Kansas City, Missouri. Many of the school's families lacked access to detergent, washing machines and even electricity.

At East Side Elementary, before the installment of a washing machine only 46 percent of the 387 students were meeting the requirement to attend school 90 percent of the time. Mentors in a program for chronically absent students alerted the principal that dirty clothes were keeping students home. A Giving Tuesday campaign organized in 2016 raised $3,000 – enough funding to install a washer and dryer on-site. Since then, the number of students meeting the requirement jumped to 84 percent.

Absenteeism can impede a child's ability to learn how to read and can lead older students to fail courses and become more likely to drop out, studies have found. According to the Department of Education, approximately one out of six students was chronically absent during the 2015-16 school year, meaning they missed more than 15 days of school.

At East Side Elementary, students are given a mesh bag with a numbered identification tag (and soon, a more discreet backpack to carry the mesh bag). They can drop the bag off in the administrative office or in the laundry room, where the clothes will be washed and folded by an assistant, who is also on hand to give lessons. School officials were also able to incorporate the appliances into a life skills class and offer times for parents to come in to do laundry, eat lunch with their children, and visit the classroom while waiting for a load to finish.

Although there have been a few comments on the school's social media accounts saying this is overstepping, the response has been overwhelmingly positive.

"People from the community are randomly dropping off detergent," Anne Johnson said. "I think because it's a tangible good. People say, 'This is an opportunity for me to help and they want to be a part of it.'"

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Block 6: Stimulus 3 Solutions Story without Evidence

Chronically Absent: How Washing Machines Keep Students in School

By Joanne Miller, April 2, 2019

The first step to succeeding in education is actually showing up, but for many at-risk children, this is not such an easy thing. Dirty clothes are a barrier that many students face when wanting to attend school. This is part of a widespread problem: chronic absenteeism. A possible response: a washing machine on school grounds.

"If it's a choice between coming to school dirty, and have kids laugh at you or make fun of you, and staying home, they'll stay home," said Anne Johnson, the principal at East Side Elementary School in Kansas City, Missouri. Many of the school's families lacked access to detergent, washing machines and even electricity..

At East Side Elementary, before the installment of a washing machine less than half of the student population was meeting required attendance. Mentors in a program for chronically absent students alerted the principal that dirty clothes were keeping students home. A Giving Tuesday campaign organized raised enough funding to install a washer and dryer on-site. Since then, the number of students meeting the requirement jumped.

Absenteeism can impede a child's ability to learn how to read and can lead older students to fail courses and become more likely to drop out, studies have found. According to the Department of Education, approximately one out of six students was chronically absent during the 2015-16 school year, meaning they missed more than 15 days of school.

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Block 6: Stimulus 4 Solutions Story w/ Table

Chronically Absent: How Washing Machines Keep Students in School

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By Joanne Miller, April 2, 2019

The first step to succeeding in education is actually showing up, but for many at-risk children, this is not such an easy thing. Dirty clothes are a barrier that many students face when wanting to attend school. This is part of a widespread problem: chronic absenteeism. A possible response: a washing machine on school grounds.

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At East Side Elementary, before the installment of a washing machine only 46 percent of the 387 students were meeting the requirement to attend school 90 percent of the time. Mentors in a program for chronically absent students alerted the principal that dirty clothes were keeping students home. A Giving Tuesday campaign organized in 2016 raised $3,000 — enough funding to install a washer and dryer on-site. Since then, the number of students meeting the requirement jumped to 84 percent.

Washing machine drives school attendance up to 84%

The installation of a washing machine in an elementary school in Kansas City, Missouri has increased required school attendance of the 387 students from 46% to 84%.

	Students with required attendance	Chronic absentees
Without a school washing machine	178	325
With a school washing machine	209	62

Source: East Side Elementary School

Absenteeism can impede a child's ability to learn how to read and can lead older students to fail courses and become more likely to drop out, studies have found. According to the Department of Education, approximately one out of six students was chronically absent during the 2015-16 school year, meaning they missed more than 15 days of school.

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Block 6: Stimulus 5 Solutions Story w/ Doughnut Chart

Chronically Absent: How Washing Machines Keep Students in School

By Joanne Miller, April 2, 2019

The first step to succeeding in education is actually showing up, but for many at-risk children, this is not such an easy thing. Dirty clothes are a barrier that many students face when wanting to attend school. This is part of a widespread problem: chronic absenteeism. A possible response: a washing machine on school grounds.

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Without a school washing machine   **With a school washing machine**

Students with required attendance 178

Chronic absentees 62

Chronic absentees 209

Students with required attendance 325

● Students with required attendance ● Chronic absentees

● Students with required attendance ● Chronic absentees

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Block 6: Stimulus 6 Solutions Story w/ Bar Chart

Chronically Absent: How Washing Machines Keep Students in School

By Joanne Miller, April 2, 2019

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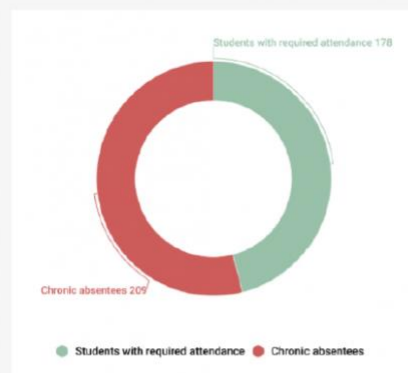
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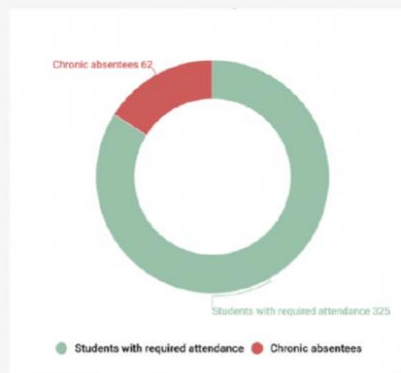
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"People from the community are randomly dropping off detergent," Anne Johnson said. "I think because it's a tangible good. People say, 'This is an opportunity for me to help and they want to be a part of it.'"

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Block 6: Stimulus 7 Solutions Story w/ Pictorial Chart

Chronically Absent: How Washing Machines Keep Students in School
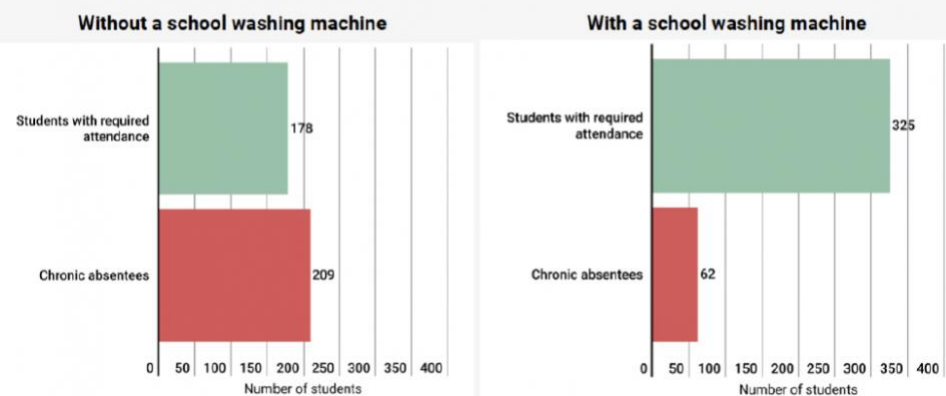
By Joanne Miller, April 2, 2019

The first step to succeeding in education is actually showing up, but for many at-risk children, this is not such an easy thing. Dirty clothes are a barrier that many students face when wanting to attend school. This is part of a widespread problem: chronic absenteeism. A possible response: a washing machine on school grounds.

"If it's a choice between coming to school dirty, and have kids laugh at you or make fun of you, and staying home, they'll stay home," said Anne Johnson, the principal at East Side Elementary School in Kansas City, Missouri. Many of the school's families lacked access to detergent, washing machines and even electricity.

At East Side Elementary, before the installment of a washing machine only 46 percent of the 387 students were meeting the requirement to attend school 90 percent of the time. Mentors in a program for chronically absent students alerted the principal that dirty clothes were keeping students home. A Giving Tuesday campaign organized in 2016 raised $3,000 – enough funding to install a washer and dryer on-site. Since then, the number of students meeting the requirement jumped to 84 percent.

Washing machine drives school attendance up to 84%

The installation of a washing machine in an elementary school in Kansas City, Missouri has increased required school attendance of the 387 students from 46% to 84%.

Source: East Side Elementary School

Absenteeism can impede a child's ability to learn how to read and can lead older students to fail courses and become more likely to drop out, studies have found. According to the Department of Education, approximately one out of six students was chronically absent during the 2015-16 school year, meaning they missed more than 15 days of school.

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Block 6: Stimulus 8 Solutions Story w/ Infographic Symbols

Chronically Absent: How Washing Machines Keep Students in School
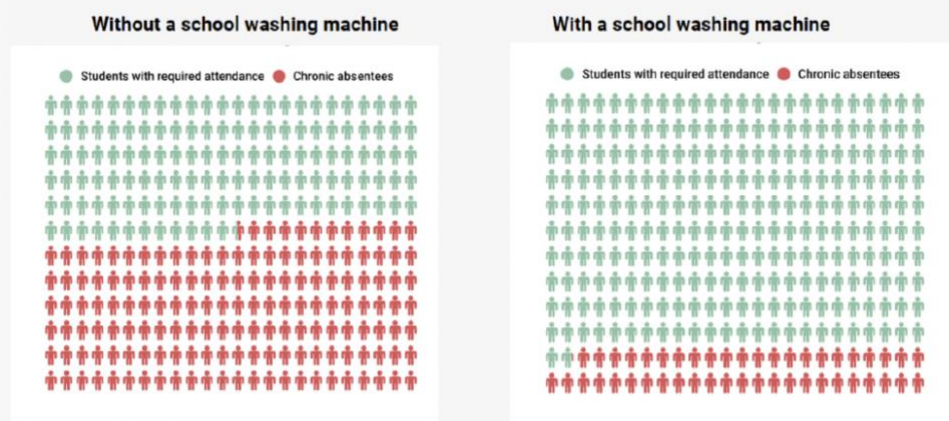
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Washing machine drives school attendance up to 84%

The installation of a washing machine in an elementary school in Kansas City, Missouri has increased required school attendance of the 387 students from 46% to 84%.

1. Problem
Chronic absentees dominate
Dirty clothes kept students from coming to school. Chronic absentees dominated with only 46% of students meeting required attendance*

2. Solution
Clean clothes in school
The elementary school received funding to install a washing machine.

3. Outcome
Number of required attendance jumps
The number of students with required attendance increases to 84%.
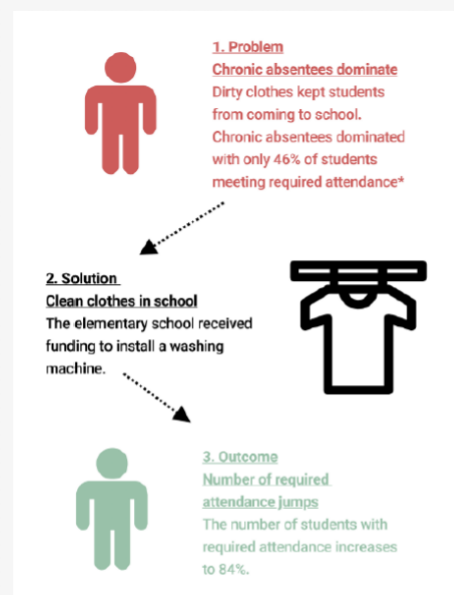
Source: East Side Elementary School

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Block 7: Thoughts about the article

Welcome back! We would now like to ask you some questions on the article you have just read.

First, we would like to know how you, personally, have perceived the article. Please write down all the thoughts – even if it is just a few words. What comes to your mind?

Block 8: Manipulation check

Think about the article you just read and answer the following questions:

"To me it seemed that the article... ."

contained a visualization	O O O O O O O	did not contain a visualization
mentioned data as evidence of the success of the response	O O O O O O O	did not mention data as evidence of the success of the response
was problem-focused	O O O O O O O	was solutions-focused

Block 8.1.: Manipulation Check II

What type of visualization did you see?

O A *doughnut chart* (values presented in a circular chart as parts of a whole)

O A *table* (values presented in columns and rows)

○ An *infographic* (combination of text and symbols/pictograms)

○ A *bar chart* (values presented as rectangular bars)

○ A *pictorial chart* (values presented as the repetition of icons)

○ I don't know

Block 9: Visualization Literacy

To what extent do you disagree or agree with the following statements:

	Strongly disagree						Strongly agree
I felt like I **had time** to read and understand the visualization presented in the article.	○	○	○	○	○	○	○
I felt like I could **evaluate** the use of aesthetic and design elements the visualization presented in the article (e.g., use of color, composition, line, shape, contrast, repetition, style).	○	○	○	○	○	○	○
I felt like I could **describe** the pictorial, graphic, and aesthetic elements the visualization presented in the article (e.g., color, composition, line, shape, contrast, repetition, style).	○	○	○	○	○	○	○
I felt like I could **identify** the subject of the visualization presented in the article.	○	○	○	○	○	○	○
I felt **confident** reading and understanding the visualization presented in the article.	○	○	○	○	○	○	○

Please read carefully and answer the following question:

"The <u>visualization</u> presented in the article seemed to me... ."

unquestioning	O O O O O O O	questioning
useless	O O O O O O O	useful
in need of explanation	O O O O O O O	understandable
predictable	O O O O O O O	suprising
demotivating	O O O O O O O	motivating
complicated	O O O O O O O	easy to understand
unappealing	O O O O O O O	appealing
problem-oriented	O O O O O O O	solutions-oriented
boring	O O O O O O O	interesting
devoid of hope	O O O O O O O	full of hope
untrustworthy	O O O O O O O	trustworthy
irrelevant	O O O O O O O	relevant

Block 10: Affect

How intense did you feel the following emotions while reading the article?

	Not insense at all						Extremely intense
Anxiety	O	O	O	O	O	O	O
Hope	O	O	O	O	O	O	O
Shame	O	O	O	O	O	O	O
Empathy	O	O	O	O	O	O	O
Guilt	O	O	O	O	O	O	O
Reassurance	O	O	O	O	O	O	O
Pride	O	O	O	O	O	O	O
Frustration	O	O	O	O	O	O	O
Relief	O	O	O	O	O	O	O
Enthusiasm	O	O	O	O	O	O	O
Anger	O	O	O	O	O	O	O
Irritation	O	O	O	O	O	O	O
Concern	O	O	O	O	O	O	O

	Not insense at all						Extremely intense
Encouragement	O	O	O	O	O	O	O

And which of the emotions have you felt the strongest while reading the article – and why?

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Block 11: Perception of story + journalistic standards

To what extent do you disagree or agree with the following statements:

	Strongly disagree						Strongly agree
The article I just read seemed harmful.	O	O	O	O	O	O	O
The article I just read seemed like it could contain hidden advertisement.	O	O	O	O	O	O	O
The article I just read seemed fair and impartial.	O	O	O	O	O	O	O
The article I just read seemed accurate and true.	O	O	O	O	O	O	O

Please read carefully and answer the following question:

"The _article_ I just read seemed to me... ."

complicated	O O O O O O	easy to understand
untrustworthy	O O O O O O	trustworthy
unappealing	O O O O O O	appealing
in need of explanation	O O O O O O	understandable

predictable	O O O O O O O	suprising
unquestioning	O O O O O O O	questioning
boring	O O O O O O O	interesting
demotivating	O O O O O O O	motivating
irrelevant	O O O O O O O	relevant
useless	O O O O O O O	useful
problem-oriented	O O O O O O O	solutions-oriented
devoid of hope	O O O O O O O	full of hope

Block 12: Interest and perceived knowledge

To what extent do you agree or disagree with the following statements:

"The article... ."

	Strongly disagree						Strongly agree
has contributed to me feeling **better informed** than before about **solutions** to the problem discussed.	O	O	O	O	O	O	O
has contributed to me feeling **better informed** than before about the **problem** discussed.	O	O	O	O	O	O	O

To what extent do you agree or disagree with the following statement:

"The article... ."

	Strongly disagree						Strongly agree
has increased my **knowledge** of the **problem** discussed.	O	O	O	O	O	O	O
has increased my **knowledge** of **solutions** to the problem discussed.	O	O	O	O	O	O	O

How much interest has the article evoked in you?

No interest at
all

A lot of
interest

○   ○   ○   ○   ○   ○   ○

Transition

In the following section, we are going to ask you some questions about the issue of chronic absenteeism in schools, which is discussed in the article.

Block 13: Agency and self-efficacy

To what extent do you disagree or agree with the following statements:

	Strongly disagree						Strongly agree
My own actions can contribute positively to solving the problem discussed.	○	○	○	○	○	○	○
I think I can contribute to a solution to the problem discussed.	○	○	○	○	○	○	○
I think there are ways to effectively address the problem discussed.	○	○	○	○	○	○	○
I think I know enough about the problem discussed to help friends to form a view on this issue.	○	○	○	○	○	○	○

Block 14: External Efficacy

To what extent do you disagree or agree with the followings statements:

	Strongly disagree	Strongly agree

	Strongly disagree						Strongly agree
I think the **government will eventually** find a way to effectively **address** the issue discussed in the article.	O	O	O	O	O	O	O
I think the **goverment is** effectively **addressing** the problem discussed in the article.	O	O	O	O	O	O	O

To what extent do you disagree or agree with the followings statements:

	Strongly disagree						Strongly agree
I think **schools are** effectively **addressing** the problem discussed in the article.	O	O	O	O	O	O	O
I think **schools will eventually** find a way to effectively **address** the issue discussed in the article.	O	O	O	O	O	O	O

Block 15: Issue opinion / Perception of solution

Please read carefully and answer the following questions:

"In my opinion, initiatives, such as introducing washing machines and driers at school are...."

not needed	O	O	O	O	O	O	O	needed
bad	O	O	O	O	O	O	O	good
unfavorable	O	O	O	O	O	O	O	favorable
unacceptable	O	O	O	O	O	O	O	acceptable
foolish	O	O	O	O	O	O	O	wise
ineffective	O	O	O	O	O	O	O	effective
wrong	O	O	O	O	O	O	O	right
	O	O	O	O	O	O	O	

negative   positive

"In my opinion, the problem of chronic absenteeism should be solved... ."

○ on federal level
○ by the parents
○ by schools individually
○ on state level

"The article influenced my opinion about the need to install washing machines in schools... ."

Very negatively	negatively	somewhat negatively	did not influence my opinion	somewhat positively	positively	very positively
○	○	○	○	○	○	○

Block 16: Intentions to engage

Please indicate how unlikely or likely it is for the following to happen:

	Extremely unlikely						Extremely likely
I would want to read more stories about the issue.	○	○	○	○	○	○	○
I would "like" the story on social media.	○	○	○	○	○	○	○
I would share the story on social media.	○	○	○	○	○	○	○
I would talk to friends or family about the issue.	○	○	○	○	○	○	○
I would volunteer my time to help address the issue.	○	○	○	○	○	○	○

Block 18: Actual behaviors

Would you like to donate to United Way, a non-profit organization that raises money to install washing machines at schools across the country? If you choose yes, you will be redirected to a donation page after finishing this survey. Your responses to this survey will remain anonymous.

○ Yes
○ No

Would you like to read an additional article on this issue? If you choose yes, you will be redirected to another article after finishing this survey. Your responses to this survey will remain anonymous.

○ Yes
○ No

Would you like to sign up for a newsletter that keeps you updated on this issue? If you choose yes, you will be redirected to a sign-up page after finishing this survey. Your responses to this survey will remain anonymous.

○ Yes
○ No

Block 19: Recall

What percent of the students met required attendance and how many were chronic absentees before introduction of a solution?

○ 46 % were students with required attendance and 54% were chronic absentees.
○ 71% were students with required attendance and 29% were chronic absentees.
○ 33% were students with required attendance and 67% were chronic absentees.
○ Not mentioned / None of the above

What percent of the students met required attendance and how many were chronic absentees after the introduction of a solution?

○ 84% were students with required attendance & 16% were chronic absentees.

○ 92% were students with required attendance & 8% were chronic absentees.

○ 60% were students with required attendance & 40% were chronic absentees.

○ Not mentioned / None of the above

Where is the school mentioned in the article located?

○ Mobile, Alabama

○ Newark, New Jersey

○ Austin, Texas

○ Kansas City, Missouri

○ Not mentioned / None of the above

Transition

Lastly, we would like to ask you some demographic questions. Please answer them as honestly as possible.

Block 20: Demographics

What is your age?

Please state how old you are.

[_____ ▲▼]

What is your gender?

Select all that apply

☐ Female

☐ Male

☐ Non-binary/third gender

☐ Prefer to self-ascribe: [_____]

☐ Prefer not to say

I identify as:

Select all that apply

☐ American Indian or Alaska Native

☐ Asian

☐ Black of African American

☐ Hispanic or Latinx

☐ Middle Eastern or North African

☐ Native Hawaiian or Other Pacific Islander

☐ White

☐ Some other race, ethnicity of origin: [_____]

☐ Prefer not to say

What is the highest degree or level of school you have completed?

(If you are currently enrolled in school, please indicate the highest degree you have *received*)

○ Less than a high school diploma

○ High school degree or equivalent (e.g. GED)

○ Some college, no degree

○ Associate degree (e.g. AA, AS)

○ Bachelor's degree (e.g. BA, BS)

○ Master's degree (e.g. MA, MS, MEd)

○ Professional degree (e.g. MD, DDS, DVM

○ Doctorate (e.g. PhD, EdD)

In which state do you currently reside?

[_____ ▲▼]

I participated in this survey on:

○ a desktop-computer

○ a laptop
○ a phone
○ a tablet
○ Other [   ]

Debriefing

Thank you for your participation in this study. Please read the following section thoroughly AND CLICK ON THE BUTTON AT THE BOTTOM OF THIS PAGE TO RECEIVE YOUR SURVEY CODE.

Communication scientists are interested in studying the impact of news sources on emotions, opinions and attitudes.

The questionnaire you completed was part of an experiment in which we tested how people would perceive a newspaper article on the topic of school and educational policies containing different presentations of a solution how to increase school attendance and whether the way these solutions were being presented had an impact on your opinion. As a participant in our experiment, you were randomly assigned to be exposed to one of eight different articles. The newspaper articles were constructed for this study, based on facts and figures from original newspaper articles. This means, while the factual information was correct, the articles never appeared in a newspaper in exactly this form.

If you would like to know more about the topic of school attendance and chronic absenteeism in US schools and receive official information, the US Department of Education presents the key points here. If you wish to learn more about the non-profit organization United Way, you can do that here.

If you have any questions or concerns, you are welcome to contact us at the Amsterdam School of Communication Research (ASCoR), University of Amsterdam: Andreas Schuck (a.r.t.schuck@uva.nl).

Many thanks!
Andreas Schuck

Block 21: Worker ID

Before you finish the study, please provide your Worker ID (top left corner of the Amazon MTurk site). Finalize the survey by clicking the button in the right bottom corner of this page and <u>then</u> enter your Worker ID under "Provide the survey code here" on the MTurk site.

<u>Important:</u> Please follow the steps, otherwise this survey cannot be considered as completed.

Worker ID:

Appendix B

Table B1

Operationalization of solutions journalism

Guidelines by McIntyre and Lough	Operationalization
"The story should include the cause(s) of a social problem, but should be framed in a way that gives more weight to a response to that problem [1]. In other words, the problem-solving process must be central to the narrative, meaning the story should include more information about the response than about the problem [2]."	[1] Does the story include the cause(s) of a social problem? [2] Does the story include more paragraphs on the solution than the problem?
"The response might be mentioned in the lead. If not, it is mentioned high up in the story so that readers know it is the focus of the story."	Is the solution mentioned in the lead or in the first two paragraphs?
"The response must be tangible, not hypothetical."	Has the response been implemented already?
"The story should be rigorous and comprehensive. To do so, it should include the 'who, what, when, where, why' elements [1], but should pay special attention to how the response is implemented [2]."	[1] Is the story answering the five W-questions? [2] Is how the response is implemented getting the most attention?
"The story should include hard evidence of the impact of the response. Hard evidence means reliable data, not anecdotal information."	Is the story including reliable data on the impact of the response?
"The story should explain the limitations of the response."	Does the story explain the limitations of the response?
"The story should include mobilizing information, or information audiences can use, and specifically information about how audiences can contribute to the solution or otherwise act in a way that supports social change"	Does the story include information that is useful for the audience to take action?"

Note. The operational guidelines are from McIntyre and Lough . The operationalization I derived myself.

Appendix C

Table C1

ANOVA results of dependent variables

	F	df_1	df_2	*MSE*	η^2
Positive Affect	7.73***	7	698	2.57	0.07
Negative Affect	7.41***	7	698	1.83	0.07
Attitudes toward Article	7.54***	7	698	.95	0.07
Evaluation of journalistic standards	3.21**	7	698	1.37	0.03
Attitudes toward solution	2.84**	7	698	2	0.03
Perceived knowledge gain	8.71***	7	698	1.62	0.08
Recall	.63	5	522	1.1	0.01
Self-Efficacy	1.54	7	698	1.56	0.02
External Efficacy	1.54	7	698	1.55	0.02
Behavior	1.1	7	698	.36	0.01
Attitudes toward visualizations	3.3*	4	439	.84	0.03
Engagement with visualizations	3.3*	4	439	1.25	0.03

Notes. MSE = error mean sum of squares

*p < 0.05, **p < 0.01, ***p < 0.001.

Footnotes

[i] Participants who read a non-solutions story were less likely to perceive it as solution-focused ($M = 2.86$, $SD = 1.87$) than those who read a solutions story with textual evidence ($M = 5.05$, $SD = 1.88$) or with a visualization ($M = 5.33$, $SD = 1.75$).

[ii] Participants who read a non-solutions story ($M = 3.76$, $SD = 1.92$) were more likely to indicate that the story did not mention evidence of success than those who read a solutions story with textual evidence ($M = 2.9$, $SD = 1.85$) and with a visualization ($M = 2.27$, $SD = 1.74$).

[iii] Participants who read a solutions story with textual evidence ($M = 4.42$, $SD = 2.17$) and a non-solutions story ($M = 4.2$, $SD = 2.16$) were more likely to indicate that the story did not contain a visualization than participants who read a solutions story with a visualization ($M = 2.31$, $SD = 1.81$).

[iv] Bar chart ($M = 3.97$, $SD = 1.67$), table ($M = 4.17$, $SD = 1.52$), doughnut chart ($M = 4.31$, $SD = 1.66$), pictorial chart ($M = 4.4$, $SD = 1.55$) and solutions story with textual evidence ($M = 4.44$, $SD = 1.68$).

[v] When testing for negative instead of positive affect, the one-way ANOVA indicates the same statistically significant moderate effect, $F(7,698) = 7.41$, $p < .001$, Eta-squared = .07.

[vi] Additionally, a one-way ANOVA was carried out to assess the difference between solutions stories with and without visualization, but the findings were not significant, $F(6,609) = 1.055$, $p = .39$.

[vii] Bar chart ($M = 5.5$, $SD = 1.1$), infographic ($M = 5.53$, $SD = .93$), table ($M = 5.6$, $SD = .96$), solutions story with textual evidence ($M = 5.62$, $SD = .99$) and doughnut chart ($M = 5.7$, $SD = .93$).

[viii] Comparing only the different types of solutions stories, there was no statistically significant difference between them, $F(6,609) = 2.01$ $p = .53$.

[ix] Infographic ($M = 5.39$, $SD = 1.53$), solutions story with textual evidence ($M = 5.5$, $SD = 1.26$), bar chart ($M = 5.7$, $SD = 1.28$), pictorial chart ($M = 5.8$, $SD = 1.06$) and table ($M = 5.83$, $SD = 1.23$).

[x] The comparison of the solutions story with textual evidence and with a visualization yielded no significant result, $F(6,609) = 2.01$, $p = .06$.

[xi] . Bar chart ($M = 5.74$, $SD = 1.56$), infographic ($M = 5.75$, $SD = 1.48$), solutions story with textual evidence ($M = 5.86$, $SD = 1.42$), table ($M = 5.97$, $SD = 1.23$) and doughnut chart ($M = 5.97$, $SD = 1.34$).

[xii] The comparison of only the solutions stories did not yield any significant effect, $F(6,609) = .64$, $p = .7$.

[xiii] Solutions story with a bar chart ($M = 5.29$, $SD = 1.38$), solutions story with evidence ($M = 5.38$, $SD = 1.21$), infographic ($M = 5.39$, $SD = 1.28$), doughnut chart ($M = 5.52$, $SD = 1.35$) and table ($M = 5.58$, $SD = 1.74$).

[xiv] The comparison of only the solutions stories did not yield any significant effect, $F(6,609) = 1.46$, $p = .19$.

[xv] Infographic ($M = 2$, $SD = 1.05$), doughnut chart ($M = 2$, $SD = 1.1$), table ($M = 2.01$, $SD = 1.03$) and pictorial chart ($M = 2.02$, $SD = 1.05$).

[xvi] Solutions story with an infographic ($M = 4.85$, $SD = 1.25$), non-solutions story ($M = 4.91$, $SD = 1.26$), pictorial chart ($M = 5.00$, $SD = 1.12$) and table ($M = 5.01$, $SD = 1.18$).

[xvii] I also tested the effects of external efficacy, but a one-way ANOVA did not yield any significant results, $F(7.698) = 1.54$, $p = .15$.

xviii Non-solutions story ($M = 1.31$, $SD = .6$), table ($M = 1.32$, $SD = .54$), pictorial chart ($M = 1.35$, $SD = .57$) and doughnut chart ($M = 1.42$, $SD = .6$).

xix Analyzing behavior individually as intentions to engage and actual engagement did not yield any significant findings either: $F(7,698) = .87$, $p = .53$ (intentions to engage), $F(7,698) = 1.64$, $p = .12$ (actual engagement).

xx Table ($M = 5.36$, $SD = 1.03$), bar chart ($M = 5.41$, $SD = .94$) and doughnut chart ($M = 5.57$).

xxi I also measured whether there was a difference in engagement between the visualizations, in other words the perceived ability to describe and evaluate the visualizations. Findings yielded in the same direction as the attitudes toward the visualization, showing a significant difference in engagement between infographic (least engagement) and pictorial chart (most engagement), $F(4,439) = 3.29$, $p = .011$.