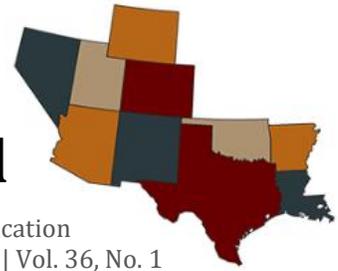


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Commenter and News Source Credibility: Roles of News Media Literacy, Comment Argument Strength, and Civility

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Many news websites allow for audience comments, but there is concern, especially when these comments are negative or low-quality, that the comments could negatively influence how readers perceive the corresponding news story. This experiment explores whether quality characteristics of comments – argument strength and civility – could help improve the perceived credibility of news content. Further, the study looks at whether quality characteristics of audience members, like their level of news media literacy, might reduce the negative influence of low-quality comments on someone’s perception of the credibility of the story. The findings reveal that higher quality comments lead to improved perceptions of the credibility of the news source, even when the comments criticize the journalist. Additionally, the study finds that individuals with higher levels of news media literacy are more capable of distinguishing the quality of journalist content from user-generated content, suggesting that more news media literate readers are not just more familiar with news media production processes, but also recognize specific content qualities.

Keywords: journalism, online comments, civility, media literacy, source credibility

Many news websites rely on reader comments as a fundamental form of audience participation. While journalists are often dismissive of comments, they represent audience opinion and could shift the perception of news content and the news source. This study seeks to understand how considerations of quality online comments could influence the effect of comments on the perception of the news source and considers whether individual-level characteristics of the reader might help explain why certain readers are more likely than others to be influenced by negative comments. Acknowledging the prevalence and importance of online comments, Shi, Messaris and Cappella (2014) note that it “is no longer possible to consider the influence of news or other messages in the public information environment apart from the comments which follow them” (p. 988). Understanding comments’ influence also requires a consideration of the effects of individual differences between audience members and the quality of comments. This study thus investigates the effects of online comment quality – either comment civility or comment argument strength – and an assessment of individual difference – news media literacy – on news receivers’ credibility perceptions.

Through understanding the impacts of online comments, specifically low-quality comments on news consumers with low levels of news media literacy, we could develop more effective forms of news media literacy intervention, build online forums that encourage higher-quality comments, and train journalists to more effectively moderate conversations and promote quality discussion.

LITERATURE REVIEW

Comments have developed as a useful tool for audience interaction because they allow the audience to provide feedback, give journalists an idea of how the audience understands and interprets news (Hermida, 2011), and promote journalism’s role to provide a forum for discourse (Braun & Gillespie, 2011). Journalists often look at comments negatively because they rarely meet professional expectations for quality discourse (Santana, 2011) and commenters frequently engage in vitriol and incivility (Santana, 2014). The presence of unedited comments alongside professional news stories has generated questions about the former’s effects on the latter.

Communication scholars have investigated the effects of comments on news receivers’ perceptions, attitudes and behaviors pertaining to the media product eliciting the comments (e.g., Walther, DeAndrea, Kim, & Anthony, 2010; Lee & Jang, 2010; von Sikorski & Hänelt, 2016; Winter, Brückner, & Krämer, 2015). The majority of studies tend to show online comments impact news receivers’ perceptions about the associated news content (e.g., Lee, 2012; Shi, Messaris, & Cappella, 2014; Lee & Jang, 2010).

This paper focuses on negative comments’ effects, as that has attracted more attention and also given news agencies more reasons for concern. Negative comments express a negative sentiment toward the media product and, while there are some exceptions, generally lead to lower evaluations of the associated media content (e.g., Shi, Messaris, & Cappella, 2014; Walther et al., 2010; Winter, Brückner, & Krämer, 2015).

Scholars have also investigated the roles of several moderating variables including message factors, such as tone/civility (e.g., Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2014; Prochazka, Weber, & Schweiger, 2018; Rösner, Winter, & Kramer, 2016; Shi, Messaris, & Cappella, 2014), media content quality (e.g., Shi, Messaris, & Cappella, 2014) and comment quality (e.g., Prochazka et al. 2018;

Winter, Brückner, & Krämer, 2015), as well as individual difference variables, such as sensation-seeking, identification with commenters (Walther et al., 2010), need for cognition (Lee & Jang, 2010) and involvement (Lee, 2012). Most of these factors tend to influence comment effects.

Scholars have made some progress in understanding online comments' effects and how certain variables can moderate those effects. However, one important individual difference variable that remains to be examined is news media literacy. News media literacy could provide valuable insight on the potentially different impacts of negative comments on different types of audience members. Additionally, it becomes important to look at news media literacy in the context of two additional independent variables of comment quality: argument strength and civility. This will help better situate the study in the online comments literature.

Source Credibility

Source credibility refers to the degree to which an information source can be believed (Hovland & Weiss, 1951) and is especially important for assessing the quality of user-generated content online because consumers frequently use the information to make decisions, and online information often lacks some of the traditional credibility cues of offline information (Metzger & Flanagin, 2008). Users can be seen as having experiential credibility (Flanagin & Metzger, 2008) when they express personal experience that shows expertise. Source credibility can be used to assess the credibility of both the news source and the commenter. Since news stories' influence cannot be separated from their comments (Shi et al., 2014), it is important to understand the story's source credibility in relation to the source credibility of the comments. Few studies have considered comments' overall effects on credibility perceptions of both news and comment sources. The current study takes a relative approach (i.e., news vs. comments source credibility difference) to understand the effects of the study's IVs on the source credibility of the media messages. Given the study's comments stimuli all have a negative valence (i.e., critical toward the news source), the study will hypothesize the IVs' effects on source credibility difference between the news source and the comment source. This approach may give scholars a more thorough understanding of comments' overall effects. The study will also consider the effects on specific news story credibility and comments source credibility as needed for clarity.

News Media Literacy

News media literacy is part of a broader field of understanding how digital literacy, information literacy and news literacy interact (Hobbs, 2008). It considers how media texts are created and how meaning is embedded within those texts (Reese, 2012). It comes from focusing on the "social, political, and economic environments that shape and influence media products" (Ashley, Maksl, & Craft, 2013, p. 8). This includes considerations of active democratic citizenship (Hobbs & Jensen, 2009), knowledge and skills (Potter, 2004), and how individuals apply knowledge and analyze content (Martens, 2010). Milhailidis (2014) defines five concepts of media literacy that represent how content is created and used: media content is constructed and helps in the construction of reality, there are commercial implications to media content, there are political and ideological implications of media content, the form and content of a medium are related and come with unique characteristics, and receivers of media content negotiate the meaning of messages. Skills are critical to news media literacy, as skills represent the tools people use for "information processing, especially filtering and meaning construction" (Potter, 2004, p. 117). Understanding media literacy in terms of skills places the focus on the consumer's ability to interpret

news content, rather than teaching individuals the difference between what is “good” and “bad” about content (Potter, 2004).

Because news media literacy is focused on the reader’s understanding of media production and dissemination, it is measured as an individual characteristic of the reader. Higher levels of news media literacy have been associated with higher levels of motivation to consume news, more knowledge about current events, more skepticism of news content (Maksl, Ashley, & Craft, 2015), and more critical processing of news information (Lai Ku, Kong, Song, Deng, Kang, & Hu, in press). Those with higher news media literacy also have higher levels of internal political efficacy and lower levels of trust in politics (Ashley, Maksl, & Craft, 2017). Tully, Vraga, and Smithson (in press) found that while news consumers with higher news media literacy are able to recognize bias and identify how frames are used to present information, most were less adept at recognizing their own personal biases.

Some scholars have tested interventions aimed at improving an individual’s news media literacy. The results show that exposing a person to news media literacy information before a message decreased the participant’s perception of the bias of the news story (Vraga, Tully, & Rojas, 2009) and increased the perception of story credibility and trust in the media to cover both sides (Vraga, Tully, Akin, & Rojas, 2012). In other types of interventions, a short video PSA about news media literacy was shown to increase an individual’s political efficacy (Tully & Vraga, 2018), however interventions on social media using individual messages were less effective at changing people’s perceptions about misinformation and news media literacy. Instead, the message needed to come in the form of a long-term campaign of multiple messages (Tully, Vraga, & Bode, in press). Further, digital media literacy education programs that focus on teaching individuals how to assess the quality of information online can lead to long-term increases in civic and political engagement online (Kahne, Lee, & Feezell, 2012). While most results show only short-term effects for news media literacy interventions, comprehensive media literacy education programs can promote long-term positive information seeking and processing, especially in terms of knowledge about media practices (Jeong, Cho, & Hwang, 2012).

Comment Quality

Much of the research on the influence of UGC considers individual message characteristics. Two approaches to conceptualizing comment quality are assessing the strength of the commenter’s argument (Winter, Brückner, & Krämer, 2015) and the comment’s civility (Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2014). Argument strength focuses more on the validity of the author’s claims and civility considers the extent to which the commenter followed acceptable social norms. Both might be valuable for understanding quality, but each might explain differently how comments can influence a reader’s perception of the news source.

Argument strength. Argument strength refers to the extent to which the message is built upon logical conclusions and evidence to support its statement (Areni & Lutz, 1988). A weak argument is characterized by specious information, the lack of sources, and information that is low in credibility; while a strong argument uses a credible source, references statistics and facts, and is built upon very specific information (Rains, 2007). It is reasonable to expect stronger arguments to persuade people with higher news media literacy more as they are more critical in assessing content. Based on dual process theories (e.g., Elaboration Likelihood Model, Heuristic-Systematic Model), some scholars (Prochazka, Weber, & Schweiger, 2018) have treated reasoning or arguments in user comments as potential heuristic cues to allow quick assessment of the article. Comments are short and easy to evaluate, and thus the

reasoning or arguments presented could serve as cues to make snap judgments (Prochazka et al., 2018). Lack of reasoning in comments (e.g. weak arguments) can lower the perception of the accompanying news story's informational quality, especially for unknown news sources (Prochazka et al. 2018).

We can expect negative comments with strong arguments to improve the credibility of the comment, and lower the news source credibility, thus resulting in a net decrease in the difference between news source credibility and comment source credibility ("source credibility difference"). We thus propose the following hypothesis:

H1: Comments with strong arguments will decrease the source credibility difference (i.e., the difference between news source and commenter source credibility).

Civility. Civility is represented by avoiding problematic behavior like hostility, name-calling, and ad-hominem attacks (Ksiazek, Peer, & Zivic, 2015). While argument strength considers the quality of the argument and content, civility is more concerned with acceptable social norms. Civility represents a form of democratic public discourse (Papacharissi, 2004) where individuals seek common ground through the negotiation of ideas and perspectives (Meyer, 2000). The goal is to treat all participants with interpersonal respect (Orwin, 1991), but also recognize the need for passionate disagreement (Herbst, 2010).

Many in journalism believe that comment incivility is a serious problem, especially on forums about controversial topics (Santana, 2015). Research suggests that negative and uncivil comments can influence how a reader perceives the news story, potentially causing a polarizing effect by reinforcing previously held beliefs (Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2014; Lee & Jang, 2010). Further research shows that negative and uncivil comments can increase a reader's perception of the news story's bias (Anderson, Yeo, Brossard, Scheufele, & Xenos, 2016). Uncivil comments have also been found to reduce the reader's perception of the formal quality of the news article (comprehensibility and the journalist's compliance with ethical standards) (Prochazka et al. 2018). When a reader is exposed to incivility, they report lower expectations of discourse (Hwang, Kim, & Huh, 2014). They also perceive the commenter who was uncivil less favorably, which causes further disagreement (Hwang, Kim, & Kim, 2018). The reader will also report lower levels of trust in information from an uncivil commenter (Graf, Erba, & Harn, 2017). And uncivil comments can also socialize readers to engage in uncivil behavior as well, worsening the situation (Chen & Lu, 2017; Hmielowski, Hutchens, & Cicchirillo, 2014). There is a need for further research that examines the individual differences of readers and whether these influences of negative and uncivil comments are unique to specific readers. Negative uncivil comments may reduce both news story credibility and commenter credibility while civil comments may improve perceptions of commenter credibility. However, one study showed civil comments may not have much positive effect on the perception of the news story (Prochazka, et al., 2018), even when both positive and negative comments are used. There is a possibility that civil comments will have a negative effect on news story credibility and could possibly reduce source credibility difference. Given the potential ambiguity of civility's influence, this issue was examined as a research question:

RQ1: How does civility moderate the difference between news story and comment source credibility (source credibility difference)?

Civil comments are likely to enhance the effects of argument strength on the difference between news and comment source credibility, as civil comments are expected to increase credibility ratings of

comment source but decrease that of the news source (given negative comments possibly become stronger). Similarly, weak arguments combined with uncivil comments are likely to further damage comment source credibility. However, in order to more deeply examine the potential interaction between argument strength and civility, and the magnitude of their relative effects on the credibility of the two different sources, the potential interaction relationship is examined via a research question:

RQ2: How does civility moderate argument strength's effects on the difference between perceived news and commenter source credibility (source credibility difference)?

People with high news media literacy are likely to be more attentive to source differences and content quality. People with higher news media literacy will likely follow a systematic way of processing information (due to their more comprehensive engagement with news). Based on the dual process models, Prochazka et al. (2018) treated comment arguments as potential heuristic cues for making snap judgments of quality. However, the same dual process models would posit that individuals with higher motivation would be more likely to follow a more elaborated way (i.e., allocating more cognitive resources) of processing information to make judgments (Schumann, Kotowski, Ahn, & Haugtvedt, 2012). Since those with higher news media literacy have higher motivation to consume the news, it is highly likely they will follow an elaborated way of processing information when judging both news and comment sources. Given elaborated (or systematic) ways of processing information means allocation of more cognitive resources to process information (Schumann et al., 2012), we can expect higher news media literacy to be associated with higher ratings of source credibility for the news source and higher propensity to be persuaded by quality comments. News literate people are likely to also know traditional news sources traditionally engage in rigorous gatekeeping and editing, but that the same cannot be said about comment sources. Thus, in effect: Individuals with increased levels of news media literacy will likely rate news stories as more credible and have decreased levels of commenter source credibility. Based on these expectations, we propose the following hypothesis:

H2: Individuals with increased levels of news media literacy will have higher source credibility difference between news source and the comment source.

Similarly, news media literacy can also potentially moderate the effects of argument strength and incivility on source credibility perceptions. First, higher news literacy — given the higher understanding about comments' potential for counter narrative — can lead to higher value for negative comments with stronger arguments, and stronger negative effects on news stories, and, consequently, stronger decline in difference between news and commenter source credibility for strong arguments. Thus, we posit:

H3: News media literacy will moderate the effect of comment argument strength on news vs. comment source credibility difference such that increased levels of news media literacy will lead to decreased source credibility difference for strong argument comments.

News media literate people are likely to more clearly discern between the comment and news sources and negative uncivil comments are likely to influence those with high news media literacy less than those with low news media literacy. This means higher news media literacy should reduce the negative impact of uncivil comments on news source credibility while continuing to further decrease credibility of comment sources. It is reasonable to expect an increase in news media literacy to enhance source credibility difference for uncivil comments.

H4: News media literacy will moderate civility's effects on (news vs. comment) source credibility difference, such that news media literacy will significantly increase the source credibility difference for uncivil comments compared with civil comments.

To examine a potential three-way interaction — between news media literacy, argument strength and civility — we posit a research question. People with high news media literacy are likely more attentive and more likely to systematically process argument strength and civility. This means news media literacy may likely accentuate the civility X argument strength interaction effects. However, following the same rationale for argument strength X civility two-way interaction: since the relative magnitude of the interaction effect on news source vs. comment source credibility is difficult to ascertain, a research question is helpful to understand the impacts of the three variables together on the source credibility difference.

RQ3: Does news media literacy moderate argument strength's interaction with civility on the source credibility difference (news vs. commenter source credibility difference)?

METHOD

The study used a 2 (argument strength: weak/strong) X 2 (civility: civil/uncivil) X 2 (topic: climate change/marijuana) experimental design, whereby topic was manipulated as within-subjects, and argument strength and civility were manipulated as between-subjects. News media literacy was measured. The stories were purloined (Bardac, 1986) from websites related to science news. From those websites, we downloaded stories that dealt with the topics of climate change and marijuana. We then modified the stories to make them similar in length and to suit our study purposes. Choosing actual published stories lends a small degree of ecological validity. The two stories we used were thus similar in length and both relied on information about new scientific research related to the associated topic. Three negative comments appeared below each story. In a similar approach to Prochazka et al. (2018), we chose relatively polarizing topics for replication purposes in the study. The topic of marijuana (e.g., Prochazka et al. 2018; Walther et al. 2010) has been used in past online comment effects studies, and climate change is an important topic that tends to attract a strong number of commenters challenging climate change (Kraker, Kuijs, Corvers, & Offermans, 2014; Walter, Bruggemann & Engesser, 2018). These comments/commenters are present across country lines, (Walter et al. 2018) and can potentially influence opinions of the general public and even policy makers (Kraker et al. 2014), so the topic of climate change is important to examine. We also expected news media literacy to play a potentially strong significant role in assessment of comments of such polarizing topics.

Measures

Participants completed a news media literacy survey consisting of 15 questions (See Appendix A) about how they analyze news content, believe how news is developed, and use news (Ashley, Maksl, & Craft, 2013). This scale measures news media literacy as an individual characteristic and addresses the extent to which an individual recognizes the economic system for media production, how messages are constructed by media producers, that messages will be interpreted differently by individual audience members, and that production techniques can be used to influence audience attitudes and behaviors (Ashley, Maksl, & Craft, 2013).

Argument strength was considered as either strong or weak. To ensure a clearer manipulation for the final study, the researchers conducted a pretest on Amazon M-Turk and asked participants to

individually rate several comments using a Likert scale on how much they agreed whether each comment met three criteria: that the statement contained facts, cited sources and included concrete information (Rains, 2007). Similarly, messages were considered to be either civil or uncivil and the researchers asked pre-test participants to rate their agreement with two statements: “This comment is civil” and “This comment is impolite” (Anderson, et al., 2016). Both civility and argument strength were measured in order to determine the quality of the manipulation. A pretest (n = 31) using the above respective items for argument strength as well as civility was conducted on Amazon M-Turk. The pretest included a number of validity questions to ensure quality responses. The pretest sample average age was 40 and more male (male = 18, female = 13). The messages rated strongest and weakest and most civil and least civil were chosen for the final study. In other words, for the strong argument civil comments condition, we chose from the pool of tested comments the comments that scored highest overall in argument strength and civility. Similarly, for the strong argument uncivil comment condition, we chose the comments that scored the best combination of high argument strength and low civility ratings. There was also a manipulation check in the final study to make sure the manipulation worked as expected. Participants were asked to rate news and commenter source credibility using five attributes: believable, accurate, trustworthy, reliable, and unbiased (adapted from Flanagin & Metzger, 2007). Source credibility difference was calculated as the difference between news and commenter source credibility scores (news source credibility score – commenter source credibility score). All questions for news media literacy, argument strength, civility, and source credibility were asked on a 5-point Likert scale from strongly agree to strongly disagree.

Participants and Procedure

Participants were recruited using Amazon M-Turk. In order to overcome potential validity issues, the researchers included five additional screening measures. First, researchers asked for only participants in the U.S. and removed any participants who self-reported living elsewhere. Second, researchers asked the respondents a question and told them to respond with an incorrect answer. Anyone who responded differently was removed for not following directions. Third, researchers asked a basic fact question and removed any respondent who answered incorrectly. Fourth, researchers asked a basic question and included multiple fake options. Anyone who selected a fake option was removed. Finally, the researchers removed any participant who answered the survey faster than 2 standard deviations from the average response time. Participants were given an informed consent form and randomly assigned to a treatment condition. Each participant rated their personal relevance with the news topics and then read one news story for each topic and three accompanying negative comments. After each story, the participant was asked to separately rate the source credibility of the commenter and the story. At the end participants answered news media literacy questions and other demographic questions.

The main dataset consisted of N=264. The age of the participants ranged from 21 to 81 years (mean = 37; median = 34; mode = 30). Roughly half of the participants (n = 137) had a college or bachelor’s degree, and another 52 participants had completed high school. The rest of the 75 participants had master’s degree or equivalent (n = 46), doctorate (n=11), received some university education, but not a degree (n=15), or did not complete high school (n=3). Most of the participants were White/Caucasian (n=213, 80.68%). The rest were Asian (n=16, 6.06%), Hispanic or Latino (n=9, 3.4%), Black or African American (n=20, 7.57%), American Indian or Alaska Native (n=3, 1.13%) and “other”

or refuse to answer” ($n=3$, 1.13%). There were more male participants ($n=142$, 53.78%) compared with female ($n=122$, 46.21%).

RESULTS

Based on univariate outlier analysis using SPSS, we identified and deleted an outlier case ($n=1$). News media literacy had high skewness and kurtosis (skewness = -1.30 and kurtosis = 1.43), and an exponential transformation reduced the skewness (to .049) and kurtosis (to -.949), and the histogram also looked more normal. The analysis proceeded using the transformed news media literacy data. To understand main/direct effects, we ran an OLS regression with all three variables in a single analysis. Process (Hayes, 2013), a regression-based analytical platform, was used to better understand moderation/conditional effects. For testing interaction involving two variables, we used Model 1 in Process, whereas for testing three-way interactions we chose Model 3. Process is a robust and widely used platform to test moderation and mediation effects (see Hayes, 2013). As we tested individual source credibility effects on news vs. comment source credibility, we have categorized the results by the specific dependent variable whose variations we wanted to explain, starting with hypotheses tests and then research questions.

Direct Effects

For source credibility difference, we used the model with all three variables, as this model had the best explanatory power ($R^2_{adj} = .038$, $F(3,259) = 4.41$, $p = .005$). H1 posited comments with strong arguments would decrease source credibility difference between news commenter source credibility. The hypothesis was not supported ($p = .15$). For RQ1, we considered whether or not the civility of the comments with the news stories would moderate source credibility difference. There was no moderation ($p = .517$), which answered our question. Next, H2 posited that individuals with higher (vs. lower) levels of news media literacy would have increased source credibility difference. This hypothesis was supported, although the unstandardized coefficient was very small, $B = .003(.001)$, $t = 3.18$, $p = .002$. To further understand the direct effects, we also considered whether any variables had a direct influence on commenter and news source credibility individually.

In the OLS regression, for commenter source credibility the model with only argument strength and civility was chosen as it had the best R^2_{adj} (.069) and explained about 7% of the variance, ($p = .001$). We found evidence that strong arguments increase commenter source credibility, $B = .339(.11)$, $t = 3.06$, $p = .002$. Similarly, civil comments significantly increased commenter source credibility, $B = .374(.11)$, $t = 3.37$, $p = .001$. However, there was not support for a relationship between news media literacy and commenter source credibility.

For news source credibility, we chose the second model with only argument strength and civility as predictors, as including NML did not cause a substantial change in R^2_{adj} (change = .01) and also no significant change in F value ($F_{change} = 2.98$, $p = .085$). The selected model had an $R^2_{adj} = .063$, $p < .001$. Through the analysis, we found that strong comments increased news source credibility, $B = .21(.09)$, $t = 2.28$, $p = .023$. We also found that increased civility caused an increase in news source credibility, $B = .34(.09)$, $t = 3.74$, $p < .001$. This finding meant incivility was associated with decreased news source credibility. Our further analysis showed, though, that news media literacy, when considered with both argument strength and civility, did not have a relationship with news source credibility ($p = .085$).

Moderation effects

Source credibility difference

We hypothesized news media literacy would moderate effects of argument strength on source credibility difference, such that news media literacy would lower source credibility difference for strong argument comments. H3 was not supported. We further hypothesized that news media literacy would moderate the effects of civility on source credibility difference. In this case we posited that news media literacy would significantly increase the credibility difference for uncivil comments as compared with civil comments. H4 was not supported. RQ2 asked whether there was any interaction between civility and argument strength on source credibility difference and RQ3 asked about a three-way (argument strength, NML and civility) interaction effect on source credibility difference. None of them were significant. To better understand the moderation effects, we also considered whether any variables had an influence on commenter and news source credibility.

Commenter credibility

For commenter credibility, we conducted a Process (Hayes, 2013) analysis and found that there was no significant interaction between news media literacy and argument strength on commenter credibility ($p = .76$), meaning that there was a non-significant difference between people with low and high news media literacy in how they considered argument strength in evaluating commenter source credibility. Deeper analysis, however, revealed the effect of argument strength did not increase commenter credibility at only low levels of news media literacy¹ but did significantly increase commenter credibility at medium ($effect = .34(.11)$, $t = 3.03$, $p = .0027$, $LLCI = .1209$, $ULCI = .5679$) and high levels of news media literacy ($effect = .45 (.16)$, $t = 2.77$, $p = .006$, $LLCI = .1291$, $ULCI = .7616$). Thus, the above findings are interesting because they do suggest that news media literacy influences argument strength's effects on commenter source credibility.

We also considered whether there was an interaction between news media literacy and civility on commenter source credibility. However, the interaction was not significant ($p = .76$), showing no significant difference between people with low and high news media literacy in how they considered civility in evaluating commenter source credibility. However, a deeper analysis revealed commenter credibility remained positive for civility at all three levels (low, medium and high) of news media literacy. It was significant at low ($effect = .36(.16)$, $t = 2.23$, $p = .0267$, $LLCI = .0415$, $ULCI = .6708$), medium ($effect = .39(.11)$, $t = 3.46$, $p = .0006$, $LLCI = .1687$, $ULCI = .6142$) and high levels of news media literacy ($effect = .43(.16)$, $t = 2.66$, $p = .0083$, $LLCI = .1109$, $ULCI = .7425$). Although civility does not significantly affect commenter credibility differently at different levels of news media literacy, the variable does appear to have a positive effect at all the news media literacy levels. In other words, people tend to consider civility important no matter their level of news media literacy.

We further found that argument strength did not significantly interact with civility on commenter source credibility. However, a deeper analysis showed that argument strength had an effect on commenter credibility for uncivil comments ($effect = .38(.16)$, $t = 2.39$, $p = .0177$, $LLCI = .0668$, $ULCI = .6963$) but not (or at least not adequately confidently) for civil comments, $p = .0537$, $LLCI = -.0048$, $ULCI = .6031$. Since the zero value falls between the upper level confidence interval (ULCI) and lower level confidence interval (LLCI), the effect is deemed non-significant (see, Hayes, 2013).

¹ Process automatically segments the data into high, medium and low values for moderation analysis.

No significant three-way interaction between argument strength, civility and news media literacy on commenter credibility was found. Individual direct effects also became non-significant for all three variables when all of them were placed in the model. However, deeper analysis showed an interesting finding: comment argument strength has a significant positive effect on commenter credibility only when the individual has a) medium ($effect = .38(.16)$, $t = 2.31$, $p = .0215$, LLCI = .0560, ULCI = .6963) or high news media literacy ($effect = .49(.24)$, $t = 2.07$, $p = .0390$, LLCI = .0250, ULCI = .9586) together with b) uncivil comments. Except in those two cases, there was no effect of comment argument strength on commenter credibility at different levels of news media literacy and civility.

News source credibility

We considered whether news media literacy would moderate the effects of argument strength on journalist credibility, such that news media literacy would increase news credibility ratings for high argument strength. This was not supported, however ($p = .42$). This showed there was no significant difference between people with low and high news media literacy in how they considered argument strength in evaluating news source credibility. However, further observation revealed the effect of argument strength did not increase news source credibility at low levels of news media literacy but did increase news source credibility at medium ($effect = .23(.09)$, $t = 2.47$, $p = .0141$, LLCI = .0470, ULCI = .4147) and high news media literacy levels ($effect = .31(.13)$, $t = 2.33$, $p = .0208$, LLCI = .0470, ULCI = .5674). In other words, we found signs that news media literacy does help strengthen argument strength's effects on news source credibility perceptions. As can be seen above, the magnitude of argument strength on news source credibility was also highest at the highest levels of news media literacy.

We also examined the interaction between civility and news media literacy on news source credibility. The interaction was not significant. In fact, civility direct effects also did not become significant when we ran them together. However, upon closer inspection of the moderation effect, we noticed that civility's effect on journalistic credibility was indeed significant at medium ($effect = .34(.09)$, $t = 3.67$, $p = .0003$, LLCI = .1564, ULCI = .5192) and higher levels ($effect = .42(.13)$, $t = 3.22$, $p = .0014$, LLCI = .1641, ULCI = .6785) of news media literacy but not significant at the lowest levels. In other words, we found signs that news media literacy does help strengthen civility's effects on news source credibility perceptions.

Lastly, the interaction effect between argument strength and civility on news source credibility was not significant. There was also no significant three-way interaction on news source credibility. Individual direct effects were non-significant for all three variables when all were placed in the model. However, a deeper analysis showed an interesting finding: comment argument strength has a significant positive effect on news source credibility when there were a) high levels of news media literacy and b) uncivil comments ($effect = .39(.19)$, $t = 2.02$, $p = .045$, LLCI = .0088, ULCI = .7724). Except in that one case, there was no effect of comment argument strength on commenter credibility at different levels of news media literacy and civility.

DISCUSSION

This study sought to understand how certain types of online comments might influence perceptions of comment and news credibility, while also considering the reader's understanding of how journalism is produced. This study shows that online comments can help encourage quality engagement

with news content, but it takes having a unique combination of quality commentary and an informed and literate audience.

Promoting Quality Commentary

Both strong and civil comments had a positive influence on both commenter and news source credibility. This is intriguing because the comments were negative in valence, meaning that critical comments had the potential to improve the perception of the source. While the credibility of comments seemed to be assisted by an increase in quality, it did not have any negative impact on the perception of the journalism. Because both argument strength and civility have similar positive effects, it is difficult to identify a specific cause, except that increasing the quality of comments can improve credibility. While previous research shows that negative uncivil comments can polarize readers into reinforcing their previous beliefs (Anderson, Brossard, Scheufele, Xenos, & Ladwig, 2014) and can even cause someone to perceive the news story as more biased (Anderson, Yeo, Brossard, Scheufele, & Xenos, 2016), this research suggests that civil comments can have a positive impact on credibility and the strength of the commenter's argument can have a similar influence. That incivility is associated with lower news source credibility perception is consistent with some past findings (Prochazka et al. 2018). Further, this study introduces the potential individual-level influence of news media literacy as a tool for explaining why certain readers may be influenced more by comments than others.

These findings only increase the need for higher quality comments because uncivil or weak comments can lead to lower perceived credibility of news content. It is crucial to encourage stronger arguments and more civility to protect the credibility of content and the important democratic role of public discourse. News organizations have an obligation to help promote higher quality contributions from readers and to build online discussion systems that encourage using rational discourse, making evidence-based claims, and showing mutual respect. This could be done in many ways, including using AI tools like Perspective from Jigsaw to review comments before publishing, encouraging users to review their comment before publishing if it includes certain flagged words or phrases, prompting commenters to consider the standards for quality comments before publishing, and adopting more active forms of moderation focused on promoting quality participation to highlight what you want emulated, rather than simply removing the worst comments.

The Potential of News Media Literacy

The interaction effects show that argument strength and civility are most effective at influencing perceptions of commenter and news source credibility for those with high or medium levels of news media literacy. This suggests that those who are most aware of the news production process are most likely to be affected by higher quality comments. These readers are not just more familiar with journalistic practices but appear to be more cautious about how they read content and look for specific indicators of quality.

For those with a higher level of news media literacy, there was also a greater recognition of the credibility gap between commenters and news sources. We know that those with higher levels of news media literacy are more motivated to consume news, are more knowledgeable about current events, are more skeptical of news content (Maksl, Ashley, & Craft, 2015) and are more critical in how they process news information (Lai Ku, Kong, Song, Deng, Kang, & Hu, in press), so the current findings seem to align with previous research since they show that high news media literacy is related to more informed and skeptical news consumers. This suggests that only those most knowledgeable about journalistic

practices can distinguish the quality characteristics that separate user-generated content from professional news content. With the growing prevalence of user-generated and social media content, this raises serious concerns about how the public verifies information, trusts sources, and acknowledges quality journalism.

While news media literacy was developed as an index to measure one's knowledge of the media production process, it can also provide interesting insight in terms of one's ability to recognize differences between professional and amateur content, especially between high-quality and low-quality content. This suggests that news organizations should do more to become involved in the movement to train and educate readers through media literacy interventions. This could be as simple as adopting a practice of frequently explaining newsroom decisions as part of the news process, but also could include more formalized literacy initiatives to help educate readers about important issues like spotting misinformation and how to know whether to trust a news source.

The above finding is also consistent with Elaboration Likelihood Model, as users with higher news media literacy likely had higher motivation to process the information and could more clearly note the news vs. comment source credibility difference in general.

The most concerning participants are those with low levels of news media literacy, who are unable to distinguish between the credibility of news content and commenter content, but also appear to be unpersuaded by strong arguments in terms of credibility. However, these readers appear to be able to recognize the potential detriments of uncivil comments. It could be that readers are more accustomed to weak arguments in comments and are less able to spot them at first glance, while uncivil comments typically stand out more because they typically involve a violation of social norms.

The Interaction of Civility and Argument Strength

A further interesting finding is that strong arguments seemed to reduce the negative influence of uncivil comments for those with high levels of news media literacy. Whatever potential decrease in credibility that came from uncivil comments was cancelled out by strong arguments. However, it was not the case that civil arguments reduced the negative influence of weak arguments. This seems to support the idea that a strong argument is effective at influencing an individual's perception of the commenter and the news source. While uncivil comments have shown to be influential in a negative sense, strong arguments have a similar positive influence that may be even stronger toward influencing perceptions. Overall, it seems that while argument strength and civility, broadly, might each have some influence over how one perceives the credibility of the commenter and the news source, it could be that incivility and strong arguments are more influential than weak arguments and civil comments.

This study contributes to the growing research showing that certain quality characteristics of online comments content (including argument strength and civility) can impact how readers perceive associated news content and that journalists need to take their approach to this content more seriously. But this study further shows that certain individual differences, like news media literacy, can help overcome the potential negative effects of incivility. The problem of civility might be the most difficult among the issues of improving news media literacy, improving comment argument strength, and encouraging civility. But this study helps to show that if we treat the problem as a triad, we can approach encouraging higher quality arguments and improving news media literacy as alternative solutions to helping to decrease the influence of incivility.

CONCLUSION

This project sought to understand whether certain quality characteristics of online comments could potentially help explain how readers perceive the credibility of news sources. It also considered whether certain quality characteristics of audience members could help explain why some readers struggle with distinguishing the differences in credibility between user-generated content and journalist content. This study shows that improving the quality of online comments – whether by improving the arguments that commenters make or encouraging more civil behavior – leads to an improvement in the perception of the credibility of the news source – even when the comments are critical of journalists. Further, this study shows that an individual’s level of news media literacy can impact whether an individual is persuaded by higher quality comments and potentially whether the individual can effectively distinguish between the credibility of user-generated content and journalist content. The relative approach we took to understanding source credibility (seeing the difference in news vs. comment source credibility) provided a useful perspective to know comments’ overall effects. However, as seen above, it is still very useful to complement the above approach with an analysis of effects on comment source and news source individually.

This study raises further questions about the way that online conversations are prompted and moderated, but also about how journalists should potentially do more to encourage higher quality discussions with their audience members. It is not enough to simply leave a forum open without taking responsibility for how it is used. Journalists, who are often concerned about critical commentary from audience members, should be aware that negative and critical comments about journalists and their news content do not necessarily harm the credibility of the news content. However, it appears that low quality negative comments – like incivility or poorly structured arguments – can have an adverse effect.

Limitations and Future research

Further research should consider how to promote stronger arguments and civil interaction but also to better understand the characteristics of readers who are better at recognizing quality content from low-quality content. This also means we need more research that attempts to understand news media literacy in terms of interventions aimed at promoting news media literacy. Future research should also consider whether certain aspects of argument strength and civility are more influential than others. For instance, this study showed some evidence that incivility and strong arguments were more influential on perceptions of credibility than civility and weak arguments.

For limitations, this study only looked at negative comments in relation to stories about specific science and health topics, but future research could consider how this might work in a political context and other controversial issues. This study was conducted with Amazon M-Turk, which can raise questions about validity. However, the researchers included a number of validity questions and removed any data that appeared suspect. Lastly, being an experiment, the study’s generalizability is limited. Also, the study’s sample was predominantly White/Caucasian, which is common in mass communication research. Such a convenience sample, although not ideal, can still allow us to test relationships between variables (Basil et al., 2002). Having said that, the sample characteristics and the study’s experimental design do limit the study’s generalizability to the larger population. Hence, we need more studies with participants from various demographics to further strengthen the study’s conclusions. Also, in line with the above points, replication in different contexts can help test the generalizability of the findings.

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Appendix A: News Media Literacy Scale

1. The owner of a media company influences the content that is produced.
2. News companies choose stories based on what will attract the biggest audience.
3. Individuals can find news sources that reflect their own political values.
4. People pay more attention to news that fits with their beliefs than news that doesn't.
5. Two people might see the same news story and get different information from it.
6. People are influenced by news whether they realize it or not.
7. News coverage of a political candidate will influence people's opinions.
8. News is designed to attract an audience's attention.
9. Lighting is used to make certain people in the news look good or bad.
10. Production techniques can be used to influence a viewer's perception.
11. When taking pictures, photographers decide what is most important.
12. News makes things more dramatic than they really are.
13. A news story that has good pictures is more likely to show up in the news.
14. A story about conflict is more likely to be featured prominently.
15. A journalist's first obligation is to the truth.

Appendix B: Story and Comments #1

Sea levels could rise twice as fast as previously predicted

Antarctica's meltdown could spur sea level rise well beyond current predictions. A new simulation of the continent's thawing ice suggests that Antarctic melting alone will raise global sea levels by about 64 to 114 centimeters by 2100, scientists report in the March 31 *Nature*.

Adding Antarctic melt to other sources of sea level rise, such as the expansion of warming seawater and melting Greenland ice, the scientists predict that sea levels will rise 1.5 to 2.1 meters by the end of the century.

Predicting future sea level rise requires understanding how the oceans rose in the past. Scientists often glean ancient sea level rise by reconstructing the locations of ancient coastlines. But these coastlines can be a slippery target: Forces such as tectonic activity can cause Earth's surface to rise and fall, obscuring the effects of past sea level rise.

A separate study also highlights the challenges of factoring changing coastlines into sea level rise predictions. Researchers estimate that groundwater depletion has caused the coasts of California and India to rebound upward, counteracting sea level rise in those regions by about 0.4 millimeters per year.

Two warm periods, one about 125,000 years ago and another about 3 million years ago, shrank Earth's ice sheets and boosted sea levels by several meters. Pollard and DeConto used these sea level records to fine-tune a computer simulation of how climate change affects the Antarctic ice sheet. The researchers then applied their calibrated simulation to current climate conditions and projected sea level rise thousands of years into the future.

Strong and Civil Comments

Tanner Davis: I'm curious why didn't the author consider the causes of climate change in the release of greenhouse gases. The U.S. government believes greenhouse gas emissions have increased 7 percent since 1990, a significant increase. This should be mentioned.

Ash Jones: What about contradictory findings? I'm concerned that the author ignored published research from Harvard and Yale that suggests that the sea levels will rise significantly less in the next 100 years, probably by only 10-20 cm.

Addison Anderson: I would like to hear more about where this author got his or her information. I'm a grad student in oceanography and there is plenty of research that shows that sea levels have been rising about .3 cm a year for more than three decades.

Strong and Uncivil Comments

Casey Baker: Did this dumb author do any research before writing this? Have they thought about the bigger issues facing society like desalination? The United Nations says the population of deserts is growing at 18.5% worldwide and we don't have adequate water supplies to support all these people. We have to look to the oceans for water.

Harper White: This idiot needs to go back to school to study science! I have a masters in geology and research from Stanford has shown that the continents move about 1 inch per year, causing the seas to shift and rising sea levels. It isn't just the warming of the planet.

Taylor Brown: This stupid author barely mentions the thermal expansion of water. Researchers in the Netherlands proved that thermal expansion explains 50% of the rise in sea levels, far more than the melting of the ice caps.

Weak and Civil Comments

Dakota Samuels: I'd like to know how scientists make findings based on historical data from so long ago. I don't think these scientists really know what happened with the sea levels. The Earth will go back to cooling, just as it always has.

Ainsley Smith: Could the author explain more about where they got their data from? I read somewhere that the ocean levels are actually starting to drop and we should be more concerned about that. So much for a "warm period."

Stevie Miles: Why should we believe computer models about future sea levels rising when the Earth has always had warm and cold periods? Who is to say that the Earth won't cool down soon?

Weak and Uncivil Comments

Peyton Wilson: This article is a complete joke. It is natural for ice sheets and glaciers to melt. This is just a natural process that the Earth goes through. I am not worried at all. What liberal bull shit.

Frankie Taylor: I just wasted my time on another bullshit liberal conspiracy theory. We are supposed to freak out over a couple centimeters over a lifetime? I think this author should focus on more important issues rather than trying to persuade people about the “theory” of climate change.

Corey Johnson: What an idiotic article! How stupid do they think we are? Maybe the sea levels are rising, but how does that affect us? We should be investing in new ideas and just get over the fact that the sea levels are rising.

Appendix C: Story and Comments #2

A minute of secondhand marijuana smoke may damage blood vessels

Rats' blood vessels took at least three times longer to recover function after only a minute of breathing secondhand marijuana smoke, compared to recovery after a minute of breathing secondhand tobacco smoke, according to new research in *Journal of the American Heart Association*, the *Open Access Journal of the American Heart Association/American Stroke Association*.

When rats inhaled secondhand marijuana smoke for one minute, their arteries carried blood less efficiently for at least 90 minutes, whereas similar exposure to secondhand tobacco smoke caused blood vessel impairment that recovered within 30 minutes.

"While the effect is temporary for both cigarette and marijuana smoke, these temporary problems can turn into long-term problems if exposures occur often enough and may increase the chances of developing hardened and clogged arteries," said Matthew Springer, Ph.D., study senior author and professor of medicine at the University of California, San Francisco's Division of Cardiology.

Blood vessel function was examined in rats before and after exposure to secondhand marijuana smoke at levels similar to real-world secondhand tobacco smoke.

"Arteries of rats and humans are similar in how they respond to secondhand tobacco smoke, so the response of rat arteries to secondhand marijuana smoke is likely to reflect how human arteries might respond," Springer said.

Researchers also found the mere burning of the plant material appears responsible for the impaired blood vessels, not chemicals like nicotine and tetrahydrocannabinol (THC), the psychoactive ingredient in marijuana, nor rolling paper.

"There is widespread belief that, unlike tobacco smoke, marijuana smoke is benign," Springer said.

Strong and Civil Comments

Spencer Peterson: The author should focus more on putting the blame on burning plant materials and not just the THC or nicotine. It is no wonder that 53% of fire deaths are from smoke inhalation.

Jesse Hall: This article doesn't mention that more than 60% of marijuana studies show an impact on adolescents, but fail to find the same kinds of effects on adults. Can studies in rats show the same kinds of differences between teens and adults? If not, maybe they should stop this kind of research.

Charlie Miller: What about all the other potential cognitive and behavioral risks to marijuana? This author seems to focus so much on secondhand smoke, but there is also research to suggest that marijuana impairs cognitive development and impulse control by more than 30%. This author should focus on the harmful effects more broadly.

Strong and Uncivil Comments

Ricky Butler: Who decided to publish this piece of trash?! Previous research shows asthma can reduce lung function by 20%. The author doesn't even say if they controlled for pre-existing breathing issues like asthma or COPD. Unbelievably dumb.

Stacey Coleman: This idiot journalist didn't tell the whole story! While there is a 20% decrease in effectiveness, it is short-term and returns to 100% of function soon after. The efficiency of blood vessels is not a valid indicator of lung function. The American Lung Association doesn't measure lung function that way. Stupid people shouldn't write about health news!

Jamie Nelson: How stupid does this author think we are? As a researcher myself, I expected details about how pulmonologists and researchers define what it means to "recover function." Use the standards from the experts in the field to explain critical issues with smoking and marijuana, otherwise, this is just another piece of trash fake news.

Weak and Civil Comments

Alex Scott: I don't need a study or a news article to tell me that smoking marijuana is bad for you. I've seen it over and over again in friends who puff. I could have told you that marijuana is an unhealthy fad.

Bobbie Thompson: I appreciate that researchers are looking into this problem, but this is just one research article criticizing secondhand marijuana smoke. I still think it is better than smoking tobacco. It hasn't harmed me yet!!!

Rudy Dawson: I have to respectfully disagree with the author. I smoke marijuana a few times a week and I've had no health problems. I think this is probably just another attempt to belittle the marijuana industry.

Weak and Uncivil Comments

Aubrey Camden: Fake news! This journalist is full of crap! I had a pet rat once and if I gave him marijuana I bet he'd freak out! Rats aren't like humans and shouldn't be used as guinea pigs. Idiots!

Morgan Young: Wow, this author was too stupid to do his homework. They only looked at short-term effects of smoking? Of course I have short term effects... I'm stoned! The "journalist" should have known better than to hype this.

Hayden Robinson: What a dumb article! Who hired this dunce?! I have trouble breathing after climbing a set of stairs, should I stop doing that too? I think we already know smoking is bad for us. Thanks for nothing!

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