The Scientist's (Social Media) Playbook: A Triangulated Approach to Understanding Scientists' Self-Presentation, Audience Norms, and the Public Communication of Science

by

Annie Li Zhang

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Communication)
in the University of Michigan
2025

Doctoral Committee:

Associate Professor Hang Lu, Chair
Professor Nicole Ellison
Professor Sol Hart
Associate Professor Ariel Hasell

Annie Li Zhang

annielz@umich.edu

ORCID iD: 0000-0002-6837-9833

© Annie Li Zhang 2025

Acknowledgements

This dissertation, quite literally, would not have been possible without the countless people who have supported me throughout the last five years, and certainly well before then. First, a heartfelt appreciation to my dissertation committee. I am eternally grateful to my advisor and chair, Hang Lu, for his steadfast support, mentorship, and faith in me. Thank you for deciding to take on a fresh-out-of-undergraduate chemistry student who didn't know much about communication as a field, but enough to know that it would probably be exciting and definitely be meaningful. Working with you has taught me so much about what it means to be a thoughtful and rigorous scholar, a supportive mentor, and a productive researcher. I was also extremely fortunate to have an incredible secondary advisor in Sol Hart. Thank you for taking me under your guidance, for always checking in on me and making sure I knew where I was headed, and of course, for all the Gildor updates and stickers. I am also very thankful to Ariel Hasell for her insights and encouragement throughout the last few years. Thank you for taking me into your lab as well, when I was still figuring out what research looked like, and modeling such kind mentorship and inspiring scholarship. Finally, I am very fortunate to have Nicole Ellison join as the cognate member of my committee. Thank you for your constructive feedback on my work, and for your invaluable guidance as I took on an entirely new method and analysis approach for this dissertation. I am very fortunate to have had you all as mentors.

This research was made possible thanks to institutional and financial resources provided by the Department of Communication and Media and the Rackham Graduate School. Additionally, Chapter 4 is based on work supported by the National Science Foundation (award no. 2343542). Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

I am also grateful to the many wonderful faculty and staff at the Department of Communication and Media who have made my time here so memorable and enjoyable. To Sonya Dal Cin, thank you for being an incredible ACGS and for letting those of us in MaPiEL conduct an experiment to determine which maple cookies are the best (I stand by Trader Joe's). To Kris Harrison, thank you for all the thoughtful conversations we had about research and beyond and for your steadfast support. To Josh Pasek, thank you for our insightful conversations about methods and perspectives on AI in these times of change. To Pranav Malhotra, thank you for all your valuable advice and encouragement as I navigated the dissertation and job market stage. To Jess Argiero, thank you for all your help in answering all my last-minute questions and keeping our program lively with all the cool swag. To Thea Bude, thank you for always knowing who could answer my many questions and pointing me to the right direction. To Kashmir Preston, thank you for your assistance and exciting energy that you always brought.

My research today has been fundamentally shaped by my time and experiences as an undergraduate at the University of Texas at Austin. To Lee Ann Kahlor and Keri Stephens, thank you for taking me under your guidance, for showing me this exciting world of communication, for supporting me as I applied to graduate school, and for doing so even now. I truly would not be where I am today with your mentorship. A major thank you, as well, to the 24 incredible scientists

who took the time out of their busy schedules to chat with me for this work. Thank you for sharing your experiences; this work would not be possible without you all.

Then, to my cohort: where do I even begin? We began this program behind Zoom tiles, and I instantly knew y'all were going to be my best friends. You all have brought so much joy and excitement to my life, and I'm grateful to be able to witness and celebrate each of y'alls academic and personal growth—we've come a long way. To Austin Hegland, thank you for always inviting me to try new recipes, and for roasting new Blackpink songs with me. To Alexis McCarroll, thank you for driving us everywhere so we could get Happy Meal toys and decorate our office with increasingly unhinged décor (looking at you, Connor McZhangWater). To Brianna Zichettella, thank you for being such an incredible and creative DM and for making the best pizzas for us (and a honorary thank you to Captain!). To Enrica Bridgewater, thank you for always letting me crash at your place and for being the glue that holds the rest of us together. There's so much I could write, but for now, TAACO forever.

I am also thankful to the so many wonderful fellow current and former graduate students in the department: Andrea Jacoby, Audrey Halversen, Gavin Ploger, Jessica Roden, Kristen Leer, Lauren Hahn, Lupita Madrigal, Matea Mustafaj, Mel Monier, Olivia Stowell. Thank you for your friendship and support. A special thanks to my first-year buddy, Soobin Choi: I would not have known how I would have gone through first year without your support. Thank you for your kindness, your support, and your encouragement, and for being such a fun co-author! And then to my own buddies: Yuhan Li and Kristen Zhang. It's been an honor to see how much you've grown as scholars in such a short amount of time. Y'all are incredible, and thank you for all our fun conversations.

To my friends outside the department and back home. Diya, thank you for your everlasting support and friendship since the day you sat next to me on the bus in middle school, even if I miss your calls at 6 pm because I went to sleep (sorry!). Sydney, thank you for your support of me since we were college roommates; I'm thankful each time we get to meet randomly meet up in different places and see you again! And then to Ann and Erika: y'all got me through high school, through college, and now you've got me through graduate school. Buckle up because we've got more coming!

And of course, I would not be here today without my family. I would like to thank my parents, Song Li and Renyi Zhang, who have believed in me and gave me unconditional love and support since the first day. Thank you for always pushing me to be a better person, and for knowing that I can. To my brother, Allen. Thank you for being the best bro, for keeping me grounded, and for being my automatic friend since, well, your first day. I love you guys so much.

Finally, to Michael. Thank you for that one day we were sitting in Merit Coffee, when you encouraged me to apply for that science communication job. You told me that you believed in me, so I figured I should too. And now we're here. You've changed my life in so many ways, and each for the better. Thank you for your unconditional love and support the last seven years; it has always been my source of strength. I love you forever plus one.

Table of Contents

Acknowledgements ..... **ii**

List of Tables ..... **ix**

List of Figures ..... **xi**

List of Appendices ..... **xii**

Abstract ..... **xiii**

Chapter 1: Science Communication in the Age of Social Media **1**

Science Communication: What It Is, and a Brief History of Its Evolution 3

Social Media & Its Role in Science Communication 7

Scientists on Social Media: The Current Landscape and the Case for Self-Presentation 10

A Shifting Contemporary Sociopolitical Context: Why This Moment Matters (A Brief Interlude) 13

Overview of the Dissertation Studies and Guiding Questions 17

Chapter 2: Performing "the Scientist," Credibly and Authentically: Understanding How Scientists Manage their Self-Presentation on Social Media **21**

Introduction **21**

Scientists' Self-Presentation and the (Imagined) Audience 23

Blurred Boundaries and Collapsed Contexts 27

Navigating (Professional) Norms and (Public) Expectations 30

Summary and Research Questions 33

Methods **34**

Participants and Recruitment 34

Interviews 36

Data Analysis 37

Results **38**

The Imagined Audience 38

Breaking out of the Ivory Tower, But Carefully 41

Authenticity as a Double-Edged Sword 46

Complexities of (STEM) Representation on Social Media 49

Scientists in the Court of Public Opinion: Navigating a Changing Science Communication Landscape 53

Discussion 57

Limitations & Future Directions 63

Chapter 3: How Science Observation on Social Media Shapes Normative Perceptions of Science Communication and Trust in Scientists 65

Introduction 65

Science Observation on Social Media: An Affordances Approach 67

Normative Perceptions of Scientists' Communication 72

Why Norms Matter: Trust and Willingness to be Vulnerable to Scientists 78

The Role of Political Ideology as a Moderator 81

Summary of Theoretical Expectations 83

Method 85

Data 85

Measures 86

Results 92

Discussion 98

Limitations & Future Directions 103

Chapter 4: How Scientists' Self-Presentation on Social Media Influences Public Perceptions, Support for Science, and Information Seeking Intentions 105

Introduction 105

Scientists' Self-Presentation on Social Media 108

Effects of Scientists' Self-Presentation Strategies on Public Perceptions 111

Testing Mechanisms: Expectancy Violation and Identification as Mediators 114

Why Perceptions Matter: From Perceptions to Persuasion 118

Methods 119

Participants 119

Experimental Design 120

Results 123

Main Effects: Perceptions of Scientists 123

Expectancy Violation and Identification as Mediators 124

Sequential Mediation 126

Discussion 129

Conclusion 133

Chapter 5: Summary and Conclusions 136

Summary **136**

(Re-Thinking) Science Communication in the Age of Social Media **139**

The Everyday Performance of Scientific Credibility 139

From Institutional to Individual 142

The Public Negotiation of Norms on Social Media 144

The Politics of Visibility in Science Communication 146

Social Media Platforms as Architectures of Participation 148

Practical Implications **149**

For Scientists and Science Communicators 150

For Institutions 150

For Platforms 152

Future Directions **152**

Who is the Audience? 152

What Counts as "Relatable"?: Relational Strategies and Their Boundaries 153

Who Gets to Be "Authentic"? The Role of Identity 154

Platforms as Mediating Structures 155

Longitudinal and Cross-Cultural Dynamics 156

Final Conclusion **157**

Appendices **158**

Bibliography **190**

List of Tables

Table 3.1 Items for each scale. 89

Table 3.2 Inter-item correlations between variables in the model (N = 878). 92

Table 3.3 Science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2). 93

Table 3.4 Interaction of political ideology and science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2). 94

Table 3.5 Normative perceptions of scientists' communication on social media predicting trust in scientists and willingness to be vulnerable to scientists (wave 2). 96

Table 4.1 Measures employed in the study 122

Table 4.2 Summary of Findings. 125

Table A.1 Participant demographic and social media information, arranged by date of interview. 164

Table B.1 Three sub-types of science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2). 168

Table B.2 Interaction of political ideology and the three subtypes of science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2). 169

Table B.3 Communalities for EFA of normative perceptions of scientists' communication on social media. 172

Table B.4 Factor Loadings from Rotated Component Matrix. 173

Table B.5 Factor Correlations for EFA analysis. 175

Table B.6 The associations of demographics, science observation on social media, and normative expectations with trust in scientists. 176

Table B.7 The associations of demographics, science observation on social media, and normative expectations with willingness to be vulnerable to scientists. 177

Table C.1 Overview of experimental conditions, as well as *n* for each condition..... 178

Table C.2 Ratings for the stimuli in the astronomy conditions. 184

Table C.3 Ratings for the stimuli in the geosciences conditions. 184

Table C.4 Indirect effects for support for science. 186

Table C.5 Indirect effects for science information-seeking intentions. 188

List of Figures

Figure 1.1 Roadmap of the three studies and key research questions guiding this dissertation. . 20

Figure 3.1 Full Conceptual Model 84

Figure 3.2 Effect of science observation media on normative perceptions towards scientists' use of warmth-oriented strategies 95

Figure 3.3. Full constructed model with unstandardized coefficients. All non-significant paths are not shown. *$p < .05$, **$p < .01$, ***$p < .001$. 97

Figure 4.1 Full Conceptual Model 107

Figure 4.2 Full model with unstandardized coefficients. 128

Figure B.1 Full constructed model with unstandardized coefficients 170

Figure B.2 Scree Plot 171

List of Appendices

Appendix A: Supplementary Materials for Chapter 2 158

Appendix B: Supplementary Materials for Chapter 3 166

B.1 Results Examining Different Content-Types of Science Observation Separately 166

B.2 Exploratory Factor Analysis 171

B.3 Loading Patterns 174

B.4 Factor Correlations 175

B.5 Direct Effects and Variance Explained 176

Appendix C: Supplementary Materials for Chapter 4 178

C.1 Main Study Stimuli 178

C.2 Sample X Profile (Main Study) 183

C.3 Pre-Test Results 184

C.4 Induction Check Results 185

C.5 Full Results for Indirect Effects 186

Abstract

Tensions between science, scientists, and the public have been brought to the forefront in recent decades, with increasing politicization and polarization around scientific issues (e.g., climate change, vaccines, and the COVID-19 pandemic) that have undermined expert consensus and prosocial behavior. Efforts to understand and address these tensions are thus critical for promoting a healthy, informed society. This dissertation argues that amidst our changing information environment and media landscape, social media have become pivotal spaces poised to impact these tensions and relationships more broadly, offering both new opportunities and challenges that have influenced our understanding of the public communication of science. As scientists, science communication actors, and public audiences increasingly engage with each other online, new questions have emerged about (scientific) credibility, identity, visibility, and audience engagement.

Two key phenomena undergird this work. First, individual scientists have emerged as key communicators in these spaces, creating and sharing content that often blends their scientific expertise with their personal identity and goals. Second, audiences are turning to social media more frequently to receive and engage with scientific information, and thus with scientists themselves. Yet the implications of these dynamics remain under-explored: How do scientists manage their public-facing identities on social media? What do audiences expect from scientists' online communication? And do these performances matter for public trust and engagement?

To address these questions, this dissertation presents data from a triangulated, mixed-methods approach, anchored against three key communication components from which these tensions might be addressed: the messenger, the audience, and the message. Study 1 draws on interviews with 24 highly visible scientists from the U.S., Canada, and Europe, across TikTok, Instagram, and X, to examine how they construct and manage their self-presentation on these platforms. Findings reveal how scientists strive for authenticity, manage competing norms, and strategically humanize themselves to build scientific trust and credibility. Study 2 analyzes a two-wave national panel survey (N = 878) to offer an exploratory examination into how audiences' observation of science content on social media might influence their normative expectations of scientists' communication behaviors and, in turn, their trust in and willingness to be vulnerable to scientists. Study 3 employs an online experiment (N = 1,843) to examine the effects of scientists' self-presentation strategies (e.g., sharing successes vs. failures) on audience perceptions and support for science.

Across all three studies, this dissertation foregrounds self-presentation as a central aspect of science communication on social media. In doing so, it contributes new insight into how social media are reshaping the relational work of science communication, therefore offering both a more nuanced understanding of the changing science communication landscape and a foundation forward for promoting stronger and more meaningful relationships between science, scientists, and society.

Chapter 1:

Science Communication in the Age of Social Media

The rise of social media platforms—and their sustained popularity—has revolutionized the way we communicate and engage with each other. These digital platforms have ushered in an era of increasingly individualized and personalized media use, but so too they have allowed for the diversification of who can create content, as well as what they can create (Valkenburg & Oliver, 2019). Mirroring these shifts in our media landscape are similar changes rippling across the field of science communication. While scientists have traditionally communicated with the public through outlets such as newspapers, academic journals, and television, social media and other digital platforms have now been positioned as additional, more interactive channels for science communication (Liang et al., 2014).

These shifts hold significant implications for science-in-society relationships (Schiele, 2008). Over the last few decades, tensions between science, scientists, and the public have become increasingly fraught, marked by the growing politicization and polarization of scientific issues like climate change, vaccines, and the more recent Covid-19 pandemic. The tensions have in turn undermined expert consensus and reduced widespread adoption of prosocial behaviors (Chinn et al., 2020; Hegland et al., 2022; Wang & Song, 2020). Understanding how to navigate and rebuild these relationships is therefore critical for promoting a healthy and informed society. It is within this context, my dissertation argues, that social media have become pivotal spaces where science

is increasingly made visible, and where relationships between science, scientists, and society are continually (re)shaped (Rainie et al., 2015; Saks & Tyson, 2022; Yeo, 2015).

In particular, this digital transformation has led to two key considerations that undergird this work. First, scientists have emerged as key (science) communicators in these spaces[1]. Take, for instance, the widespread social media presence of epidemiologists, infectious disease specialists, and medical experts during the Covid-19 pandemic: these scientists utilized Facebook, Twitter[2], TikTok, and more to share real-time research updates with public audiences, and to advocate for prosocial behaviors and policies (Fahy & Lewenstein, 2021). These spaces have offered individual scientists a unique and relatively new opportunity to bypass traditional mass media (e.g., newspapers, academic journals, and television) to directly reach wide and diverse audiences (Fahy & Lewenstein, 2021; Liang et al., 2014), and to present a version of themselves rooted in their own identities and perspectives (Jarreau et al., 2019; Zhang & Lu, 2024). Second, audiences are turning towards social media to receive and engage with scientific information. For example, nearly 50% of American adults reported getting "some or a lot" of Covid-19 information through social media (Mitchell & Liedke, 2021), underscoring the growing role these platforms have played in how the public obtains science, health, and environmental information (Brossard, 2013; Rains et al., 2015).

[1]This consideration reflects the idea of "visible scientists," first coined by Goodell (1977) to draw attention to select scientists who have achieved public visibility as educators of science (e.g., Richard Feynman, Carl Sagan, and more recently, Neil deGrasse Tyson). While not a new concept by any means, social media has now propelled scientists of different backgrounds and experiences into a level of public exposure and reach unprecedented in scale and speed.

[2]In July 2023, the social media platform Twitter officially changed its name to X. In this dissertation, I refer to the platform as "Twitter" when discussing research prior to this change, and as "X" when discussing the platform in the current context.

Yet, how these phenomena might impact public perceptions towards science and scientists and the broader role of social media in science communication still remain understudied and certainly complex. After all, while social media can provide spaces where scientists have increased agency in what they can showcase and share to the public, changing longstanding public perceptions of scientists, scientific attitudes and behaviors, and other tensions between science, scientists, and society is a more difficult endeavor (Fiske & Dupree, 2014).

My dissertation draws these considerations together in a triangulated, mixed-methods approach, anchored against three key communication components from which these tensions might be addressed: the messenger (Chapter 2), the audience (Chapter 3), and the message (Chapter 4). Across three studies, I explore (1) how scientists present themselves on social media to public audiences and the various factors influencing their self-presentation, (2) audiences' normative perceptions towards scientists' communication on these platforms, and (3) how those might come together to impact the ways in which audiences perceive scientists as communicators, evaluate and respond to their messages, or adopt certain scientific attitudes and behaviors.

In the following sections, the overall theoretical and empirical foundations of this research are discussed. First, an introduction to science communication and the emerging role of social media is provided. Then, the current landscape of scientists on social media is described, followed by a brief contextualization of this work within the contemporary sociopolitical landscape. Finally, a preview of the following chapters is introduced.

Science Communication: What It Is, and a Brief History of Its Evolution

The concept of "science communication" has become increasingly important in our current political and social environment, as scientists, science journalists, and stakeholders across various

industrial and governmental entities seek to influence discourse and establish themselves as communicators. But, *what is* science communication?

Perhaps not surprisingly, scholars do not agree upon a clear, shared definition. Burns et al. (2003) note the "meaning of science communication…has been plagued by an unfortunate lack of clarity" (p. 183). While some definitions are more restrictive and seek to offer a clear set of tasks that entail "science communication" (e.g., Fischhoff, 2013), some are oriented from an outcomes approach (Burns et al., 2003) and still others are even broader, emphasizing "the social conversation around science" (Bucchi & Trench, 2021, p. 6) or "the processes by which the culture and knowledge of science are absorbed into the culture of the wider community" (Bryant, 2003, p. 357). To an extent, this lack of clarity reflects the drastic rhetorical shift in research and models of science communication over the last fifty years. An exhaustive review is beyond the scope of this section, but I briefly describe next the evolution of key science communication models and highlight relevant strengths and limitations.

Early inquiries of science communication were driven by the "deficit" model; that is, a lack of scientific literacy was assumed to be a key reason for why broader society did not always accept or support scientific claims and policies (Bauer et al., 2007; Miller, 1983). Public audiences were "imagined as empty vessels needing to be educated with scientific knowledge" (Metcalfe, 2019, p. 384). From this rather didactic perspective, effective science communication entails addressing the knowledge gap by disseminating and educating the public in a one-way flow of information; the presumed increase in scientific literacy is thus expected to lead to greater public support for and legitimization of science (Meyer 2016; Schmid-Petri & Bürger, 2019). But since the early 1990s, scholars have criticized the deficit approach for its weak and inconsistent empirical support, primarily because such an approach assumes both rational reasoning and identical interpretation

of knowledge across all audiences (Simis et al., 2016). Instead, studies have shown that increased understanding or knowledge of certain issues can often have no effect, or even lead to attitude polarization, depending on a range of factors including personal values and predispositions (Brossard & Nisbet, 2007; Kahan et al., 2012, Hart & Nisbet, 2012).

As concerns towards the linear, top-down approach of the deficit model increased, more complex models have become positioned as alternatives (e.g., the "dialogue" or "public engagement with science" models). These models emphasize two-way communication between scientists and other stakeholders, as characterized by three main features: communication between scientists and these stakeholders to explain the science (Wynne, 2006), mutual learning between scientists and the public with respect to the latter's concerns and needs (McCallie et al., 2009; Zorn et al, 2012), and an acknowledgement that cultural and experiential forms of knowledge from the public can also be valuable in guiding scientific progress (Reincke et al., 2020). Such models thus reflect a shift from "public awareness of science to citizen engagement, from communication to dialogue, from science and society to science in society" (Bucchi & Trench, 2014, p. 4).

Yet, even dialogue models have been criticized for failing to effectively trace the various communication pathways across different actors. As Schmid-Petri & Bürger (2019) articulate, these models conceptualize communication as direct interactions between two distinct and homogeneous groups (scientists and non-experts). But this binary framing overlooks the fact that scientists themselves are also members of the public who hold diverse identities, social roles, and lived experiences beyond their disciplinary expertise, and who cannot be accounted for or represented by a single voice. Second, the authors argue that science communication (e.g., this direct communication between scientists and the public) (1) often is an exception rather than the norm for how people receive information about science and (2) therefore does not "directly shape

the realities of a majority of the population" as the dialogue model suggests (Schmid-Petri & Bürger, 2019, p. 111).

In light of these concerns, and alongside the rapid development of information and communication technologies, several other models have emerged. Broadly, these models move beyond the deficit-dialogue split to encompass a more participatory form of engagement, one in which public audiences are viewed as equals in knowledge dissemination, production, and decision-making (Brossard & Lewenstein, 2010; Miller et al., 2009). The networked-oriented perspective of science communication, for example, applies social network analysis to science communication processes in order to model relationships between heterogeneous groups of actors across different communication settings and contexts (Schmid-Petri & Bürger, 2019). Other (science) communication-in-context models seek to acknowledge political, ethical, and societal considerations from a wide variety of public stakeholders (Akin, 2017).

It is important to note, however, that this shift from deficit to dialogue and participatory models should neither be viewed as a linear nor complete progression. As Trench (2008) argues, these models often coexist, and science communicators may move between them depending on the context, topic, and communication goal(s). And despite their growing theoretical complexity, many of these models were developed with traditional forms of media in mind and often struggle to fully account for the realities of today's digital media environment. This is further complicated by the growing medialization of science, characterized by both increasing media attention towards scientific topics and a reciprocal orientation of science (and scientific actors) towards media visibility (Weingart, 1998; Rödder, 2009).

This section has provided an overview of science communication models from early linear, deficit approaches to more dialogic, engagement and networked perspectives, highlighting a few

of the ongoing tensions and limitations in how these models account for the complexity of science-society relationships. It is within this ongoing and evolving communication and theoretical landscape that my dissertation is situated. Rather than advancing a singular or prescriptive model of science communication here, this work seeks to critically examine how social media (re)shape key aspects of science communication by foregrounding the visibility and self-presentation of scientists, the normative expectations of audiences, and the relational consequences of such for science trust and engagement. In doing so, this research aims to explicate the extent to which these dynamics might align with or diverge from existing models of science communication, and to help inform future theoretical development of science communication frameworks. The next section turns to a more explicit discussion of the role of social media within these considerations.

Social Media & Its Role in Science Communication

Just as the definition of and research on science communication has evolved drastically over the last fifty years, so too has social media been similarly plagued by a lack of a stable, robust, and mutually agreed-upon definition (Effing et al., 2011; Kaplan & Haenlein, 2010). Carr & Hayes (2015) sought to put forth a definition that is at once broad and precise, one that this dissertation adopts: formally defined, social media are "internet-based, disentrained, and persistent channels of masspersonal communication facilitating perceptions of interactions among users, deriving value primarily from user-generated content" (Carr & Hayes, 2015, p. 49). In what they deem a more accessible version, the authors clarify social media as "Internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others" (Carr & Hayes, 2015, p. 50). Platforms like

Facebook, X, Instagram, TikTok, YouTube, and LinkedIn can therefore be considered "social media" under this conceptualization.

Such a definition underscores several elements that make social media particularly consequential for science communication. Social media's masspersonal nature, for example, allows users to simultaneously engage in mass and interpersonal communication (O'Sullivan, 2005). Scientists can use platforms like Facebook or X to broadcast messages to large yet interpersonal audiences in a multidirectional flow, where information can flow between individual users, from users to a mass audience, or between audiences (O'Sullivan, 1999). This very nature disrupts the foundational assumptions of the earlier science communication models, including both the unidirectional flow of the deficit model (from scientist to public), or even the still-constrained bidirectional flow of the dialogue model (between scientists and public) (Trench, 2008). Social media thus blurs these traditionally-fixed boundaries between sender and receiver, expert and lay audience, and mass and interpersonal communication.

Another key feature of social media is its perceived interactivity; a *social* medium, naturally, is one that ultimately fosters and maintains *social* interactions among its users (Carr & Hayes, 2015). Notably, this perception may not require actual interpersonal exchange, but can also be shaped by platform features, algorithms, or other digital agents that afford a sense of interactive engagement (Sundar, 2007). Similar to how social media may foster stronger parasocial interactions with politicians or celebrities in the absence of direct communication (Lueck, 2015; Parvati et al., 2020), users may too perceive interactivity with scientists on social media, which in turn can foster deeper or more personal relationships (like parasocial relationships) (Zhang & Lu, 2023). These dynamics can complicate critiques like those raised by Schmid-Pteri & Bürger (2019) in the above section: while direct, sustained interpersonal exchanges may indeed still remain

uncommon, the perceived interactivity of social media nonetheless might allow audiences to *perceive* engagement or social connectedness with scientists in ways that impact how audiences might experience science communication, or even what constitutes (science) engagement and dialogue.

Lastly, social media facilitates disentrained, asynchronous communication, meaning content posted on social media can be persistently available regardless of whether a user is active (Carr & Hayes, 2015; Walther, 1996). Persistence has been identified as a key social media affordance, such that communicative acts can have consequences far beyond their original posting (Treem & Leonardi, 2013). As I have argued elsewhere (Zhang & Lu, 2023, 2024), such persistence influences both how scientific messages are received and how scientists are evaluated. Specifically, audiences on social media rarely encounter scientific content in isolation; rather, they engage with it as part of a broader communication ecosystem that includes scientists' personal updates, political commentary, humor, advocacy, and more, which can remain persistent on profiles long after they were first posted.

Moreover, asynchronous channels afford greater opportunities for strategic self-presentation, as individuals can curate more carefully what they choose to share (which I explore further in the next section) (Walther, 1995). And while not typically considered "science communication" in existing models or perspectives (where science communication is broadly conceptualized as discrete, goal-directed interactions; Metcalfe, 2019), this persistent content (often informed by self-presentational goals) nonetheless becomes embedded in the ongoing "processes by which the culture and knowledge of science are absorbed into the culture of the wider community" (Bryant, 2003, p. 357).

In this section, I have sought to outline how features of social media, as defined by Carr and Hayes (2015), might challenge and extend current models of science communication. These features have introduced new considerations that remain understudied or still have yet to be fully accounted for, particularly with respect to how scientific messages and scientists are seen, evaluated, and engaged with by social media audiences. Of course, while Carr & Hayes's (2015) definition offers a clear explication of the core features that define social media, a substantial body of scholarship has also focused on the affordances these platforms enable (e.g., Fox & McEwan, 2017). This is explored further in Chapter 3. Next, I turn to a descriptive overview of the landscape of scientists on social media. After all, to even begin addressing the questions raised thus far, it is important to first understand: *just how are scientists actually using social media*?

Scientists on Social Media: The Current Landscape and the Case for Self-Presentation

Already, research has quite extensively sought to identify how scientists are using social media for science communication. A 2016 study examined how nearly 400 members of the American Association for the Advancement of Science prioritized five science communication objectives: (1) educating and (2) exciting audiences about science, (3) increasing perceptions of scientists as trustworthy, (4) framing messages to resonate with broad audiences, and (5) fighting against scientific misinformation (Dudo & Besley, 2016). Their results showed that scientists mostly prioritized the first and last objectives, in line with other research explicating how scientists personally view science communication (and their role in it).

These objectives carry over onto social media as well, where scientists predominately see science communication as a "one-way process of transmission and translation of scientific results and their impacts towards a lay audience…" (Nerghes et al., 2022, p. 19). As such, their social media use often reflects this approach (e.g., informative tweets directed at the public, lack of

dialogic communication between scientists and the public) (Lee & VanDyke, 2015; Su et al., 2017). This suggests that even on social media platforms that may facilitate more dialogic and participatory engagement, the knowledge deficit remains deeply entrenched (at least among scientists). As Simis et al. (2016) argue, this persistence stems from multiple structural and epistemological factors, including a rationalist view of audiences, limited training in public engagement, and institutional incentives that reinforce expert-driven communication (Simis et al., 2016). In this context, social media indeed reproduces traditional hierarchies of expertise and communication.

But while these attitudes are certainly important to acknowledge and address, this is an area where existing conceptualizations and models of science communication often fall short: if science communication goals are evaluated from this narrow lens (that is, understood only as discrete, goal-directed exchanges of scientific knowledge or information), we risk overlooking the full communication landscape of scientists' social media presence and its implications as I have argued above.

Indeed, scientists can (and do) employ these platforms for a variety of other purposes. For one, social media has offered scientists spaces in which they can engage in public discourse on current social and political events and publicize and make visible their positions on these issues (e.g., Jangh & Lee, 2018). Furthermore, in a survey of 587 scientists across different disciplines, Collins et al. (2016) found that scientists sought to establish a social media presence to increase their personal and scientific networks, to communicate with these networks to further their scientific endeavors, and to communicate with the public.

More recently, Jünger and Fähnrich (2019) offer a comprehensive typology of scientists' public engagement based on their social media messages. What's particularly unique about this

typology is that it does not confine scientists' engagement to participatory communication with a public audience related to scientific topics. Rather, they acknowledge the complexities of the different content and engagement types that often co-exist throughout scientists' social media presence. To this end, this typology differentiates along three dimensions to posit eight types of engagement: directions (directed inwards towards the scientific community or outwards towards the general public), topics (science or other), and modes (one-way or two-way). Through a content analysis of 1835 Twitter profiles of communication scholars, the authors found that these scholars possess diverse audiences, and while they predominately discuss scientific issues (34%), they often just as much employ these platforms to discuss other issues, such as those of a political and social nature (23%).

Recognizing this broader communication landscape, then, can enable us to position social media as a space where not only traditional models might still persist, but also a space that can facilitate new opportunities and forms of connection, identity performance, and public engagement. After all, scientists on social media are individuals with their scientific identity often at the forefront, but who are also using and operating in this social media environment similar to every other user on these sites. Put in other words, they are engaging as publicly-identifiable and visible scientists in an environment that is not exclusively meant for traditional, intentional science communication.

Thus, while the aforementioned studies offer a valuable starting point for understanding *how* scientists are using social media, what remains underexplored is the *why*: that is, the motivations and decisions that shape this landscape of content, identity, and engagement. How do scientists understand their roles in these spaces more broadly? How do they interpret and navigate audience expectations? How might they reconcile their multiple identities and goals as they curate

their online presence and ultimately negotiate what it means to be a visible scientist on social media?

This dissertation seeks to address that gap by focusing on scientists' self-presentation in these spaces. Of course, self-presentation has long been understood as an important aspect of everyday, interpersonal interaction; still, its relevance for science communication in the age of social media has received limited attention. I argue (in more detail in Chapter 2) that examining how scientists curate and perform their identities online is critical to understanding not only their science communication, but how they build trust and foster connection with audiences, and make science and themselves feel more accessible and human. This approach recognizes that public-facing scientists are never simply *just* sharing scientific information; rather, they are sharing a *strategic version of themselves* in environments where their content is persistent, searchable, and shaped by evolving social, platform, and algorithmic dynamics.

The three studies in this dissertation therefore take self-presentation as a central (if at times somewhat subtle) throughline, examining it from across different communication components to provide a more nuanced perspective of science communication on social media. In what follows, I provide an overview of each study and the guiding questions that shape them.

A Shifting Contemporary Sociopolitical Context: Why This Moment Matters (A Brief Interlude)

But before turning to the overview of my dissertation studies, I want to pause and acknowledge the elephant in the room: the current sociopolitical context (that is, May 2025 at the time of this writing). This dissertation and research was not conducted nor written in a vacuum, of course. Over the past few years (and particularly in the last few months), volatile shifts in the media environment and deepening societal divides have profoundly shaped the nature and stakes

of science communication. Here, I want to take a moment to document a few of these shifts and contexts that are just as much a part of the narrative while acknowledging their implications for this research.

Rising Anti-Science Sentiments & Falling Trust in Science

Over the last forty years, public trust in science and scientists in the U.S. had remained stable and relatively high (hovering around 40% of Americans who indicated a great deal of confidence in the scientific community; Krause et al., 2019). These trends held even among polarized and politicized contexts such as global warming and nuclear energy, although the same report revealed a notable increase in the partisan gap (39% of Republicans compared to 50% of Democrats, representing an increase of 6 points) from 2016 to 2018, corresponding to Donald Trump's first presidential term (Krause et al, 2019). This erosion of trust became drastically accelerated in the wake of the Covid-19 pandemic, which brought science into the center of public life at an unprecedented speed and scale. As scientists and public health experts stepped into public discourse to advise on policies such as masking or vaccinations, their scientific authority became marred with increasing politicization and polarization in the media and across political elites (Hegland et al., 2022). Today, high public confidence in scientists sits at a mere 26%, while 23% of Americans express no confidence at all in scientists (Tyson & Kennedy, 2024). So too has the ideological divide widened: 40% of Democrats express a great deal of confidence in scientists compared to only 12% of Republicans (Tyson & Kennedy, 2024).

At the same time, scientists are reckoning with anti-science attitudes and policies at the federal level. Within the first 100 days of Trump's second presidential term, millions of dollars in federal research grants have been suspended or cancelled, thousands of employees at scientific institutions have been terminated, key public databases on health and science have been deleted,

and scientists and universities have been framed as threats to national values and political agendas (McFarling, 2025). This attack on science and expertise has heightened the risks of visibility for scientists, especially those who communicate with the public online. As scientists navigate this increased scrutiny and risk of public engagement, many are forced to reconsider how, when, and whether to participate on these platforms at all, scientific communication or otherwise.

This particularly high-stakes environment has brought into stark relief questions of self-presentation, offering a critical vantage point from which to examine how scientists are navigating these challenges in real time, as well as potential insights for how scientists may continue to engage in science communication across future moments of crisis or heightened visibility. At the same time, I recognize and certainly do not take lightly that undergirding the research here are individuals who have and still are facing very real consequences for their public engagement, and who are making difficult, often deeply personal choices in an increasingly hostile environment. It is precisely because these stakes are so high that I believe their experiences should be brought to the forefront of these conversations, and ultimately may contribute to more thoughtful and responsive models grounded in the lived realities of public science communication.

A Tale of Two Platforms: TikTok and Twitter

In just a short few years, TikTok and Twitter have emerged—and fallen—as two of the most visible and culturally-impactful platforms for science communication (Costas et al., 2020; Rein, 2023). TikTok, widely embraced for its short-form video content, has given rise to a new generation of visible scientists who blend humor, storytelling, and education to reach wide audiences (Bunquin & Zhang, 2025; Zeng et al., 2021). But the platform's future and viability in the U.S. remain uncertain, as federal legislators threaten to ban the app over data privacy and national security concerns (Maheshwari & Holpuhc, 2025).

At the same time, Twitter has undergone a radical transformation since its acquisition by Elon Musk. Various policies, including the rollback of content moderation policies and amplification of anti-science rhetoric, have made the platform increasingly hostile to scientists (Vidal Valero, 2023). While some continue to engage on X, many have migrated to alternative platforms such as Mastodon and Bluesky. But these platforms, while growing, have yet to replicate the full extent of the cultural reach and influence that once made both platforms so central to public science communication (Quelle & Bovet, 2025; Sahneh et al., 2025).

These platform-specific shifts raise important questions about the sustainability and visibility of science communication in an increasingly-fragmented media landscape. Of course, some of the patterns and dynamics explored in this dissertation may indeed be more salient in particular platforms that are shaped by similar affordances, cultures, and audiences. That specificity matters, because it may help tailor engagement and better support scientists across distinct social media platforms. Simultaneously, these changes have significantly altered how some scientists use even the same platform across time. For example, practices observed in earlier research (e.g., pre-2020 data from Twitter) may not fully reflect the current conditions of hostility, fragmentation, and declining institutional trust that many scientists now navigate.

This dissertation takes the perspective that such shifts, whether political, technological, or platform-specific, are not disruptions that can or even necessarily should be controlled for, but viewed as part of the ongoing communication and sociotechnical processes that shape science communication today and beyond. In this way, these broader questions of how scientists make strategic decisions about self-presentation on social media and how those decisions influence public perceptions of scientists remain both relevant and urgent across platforms and sociopolitical contexts.

Overview of the Dissertation Studies and Guiding Questions

Thus far, I have briefly traced the evolution of science communication models across the last fifty years. I then introduced social media as a media environment that can complicate our current understanding of science communication, described the landscape of how scientists are using these platforms, and made the case for scientists' self-presentation as a critical yet underexplored aspect of science communication. Finally, I contextualized this work within the broader sociopolitical and media landscape. In this last section, I articulate a number of key questions that guide this work and offer an overview of the three studies that follow.

Chapter 2 begins with the overarching question: **how do scientists construct and manage their self-presentation on social media amid diverse expectations and norms**? While a growing body of empirical research has examined the content scientists post online, less is known about the self-presentational goals and pressures that shape their decisions about *how* to present themselves in these highly-visible social media environments. Given that scientists' self-presentation, even when not explicitly tied to their strategic science communication, can influence audience perceptions of trust and even downstream outcomes like support for science funding (Ophir et al., 2023; Zhang & Lu, 2023, 2024), understanding scientists' own perspectives on how they navigate their self-presentation on social media is particularly important. Drawing on semi-structured interviews with 24 scientists across TikTok, Instagram, and X, this work explores how scientists engage in strategic and identity-driven performances shaped by imagined audiences, context collapse, and platform and institutional norms. But while Chapter 2 centers the motivations and experiences of visible scientists on social media, it leaves open still the question of how scientists' self-presentation, as it manifests within their communication on social media, is actually received by lay audiences.

Chapter 3 therefore shifts attention from scientists to the audiences they seek to reach by asking, **what are audiences' normative expectations for how scientists should communicate on social media?** Informed by Chapter 2's findings (i.e., the ways in which scientists present themselves through expressions of warmth, competence, political expression, and public engagement), this study explores whether audiences view such behaviors as normative, and how these perceptions might be associated with public trust in scientists. After all, normative perceptions serve as "a highly important point of reference" that can provide insights into how scientists may try to adapt their self-presentation to curate certain impressions, to share certain content, and beyond (Loosen & Schmidt, 2012, p. 873).

And while lay audiences may not necessarily always be the explicit targets of scientists' self-presentation strategies, they are nonetheless exposed to and influenced by such performances (Zhang & Lu, 2024). This is especially important in light of social media affordances, which can structure the possibilities for how audiences observe science and scientists' communication (regardless of whether it is directed at them, or even constitute traditional conceptualizations of science communication). Thus, Chapter 3 adopts a social media affordances framework and draws upon a two-wave national panel survey (N = 878) conducted in February and March 2025 to test a theoretical model in which observation of science-related content on social media influences audiences' normative perceptions of how scientists should communicate, which in turn is associated with trust in scientists and willingness to be vulnerable to them.

Finally, while Chapter 2 explores how scientists construct their self-presentation and Chapter 3 examines audiences' normative expectations for how scientists should communicate (as informed by their self-presentational goals), Chapter 4 seeks to bring these elements together to ask: **what happens when audiences actually encounter scientists' self-presentation on social**

media? That is, beyond intentions and expectations, what are the persuasive consequences of scientists' self-presentation strategies in shaping public perceptions and key science communication outcomes?

In an online between-subjects experiment (N = 1,843), Chapter 4 experimentally investigates the effects of different self-presentation tactics on how scientists and science issues are perceived by the public. These tactics are drawn from Chapter 2 findings (e.g., sharing research successes and failures, or contextualizing their research process, to humanize scientists), and this work further builds upon Chapter 3's insights on normative perceptions and potential expectancy violations. By bridging impression management (scientists' self-presentation) with impression formation (audience perception), Chapter 4 aims to explore the downstream implications of scientists' self-presentation for (scientific) credibility, trust, and engagement.

Figure 1.1 provides a roadmap of the key research questions guiding this dissertation and highlights the conceptual and analytical threads across the three studies. Together, they aim to offer a more holistic understanding of scientists' self-presentation and science communication on social media.

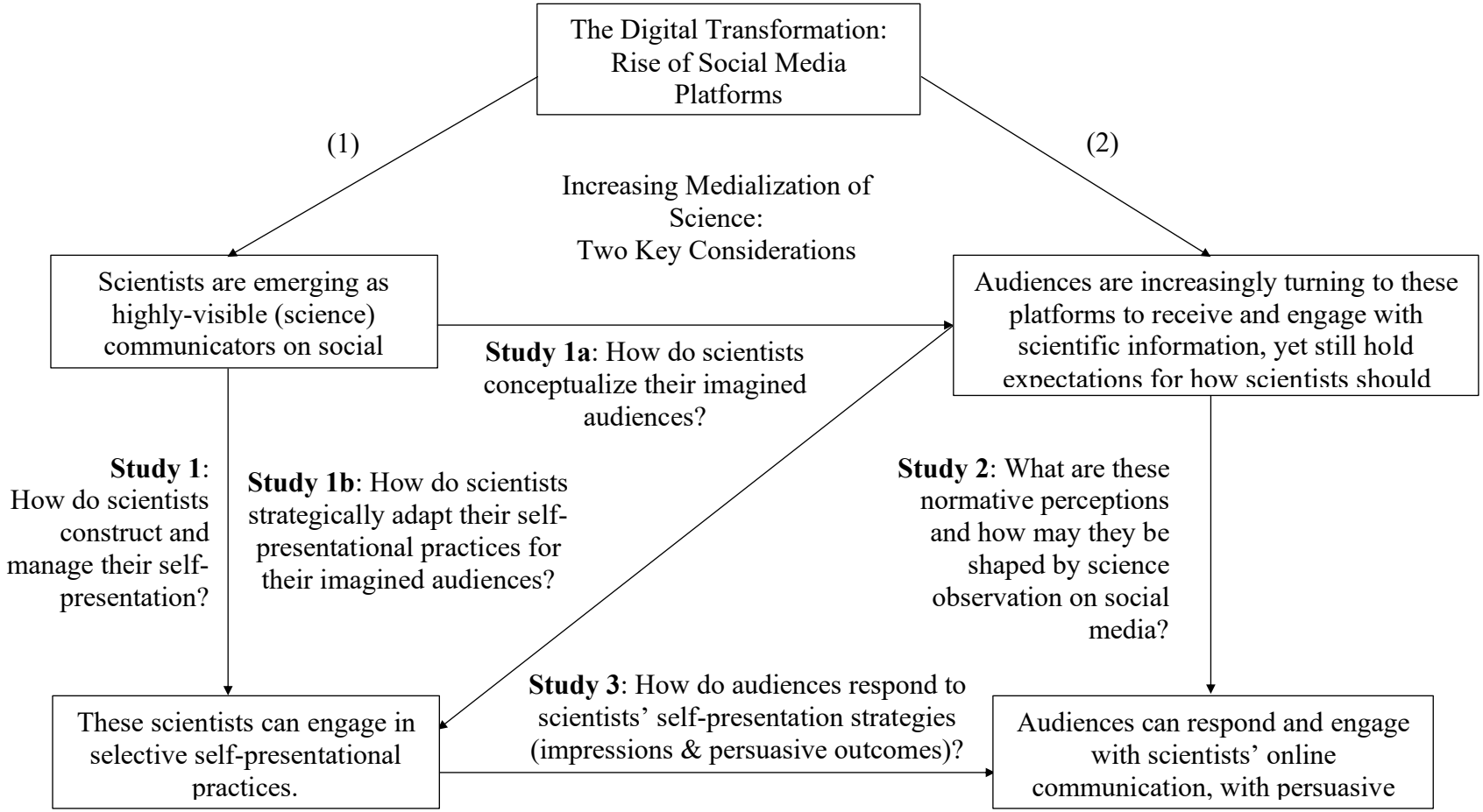

Figure 1.1 Roadmap of the three studies and key research questions guiding this dissertation.

Chapter 2:

Performing "the Scientist," Credibly and Authentically: Understanding How Scientists Manage their Self-Presentation on Social Media

Introduction

In the last few decades, social media platforms have quickly emerged as important sites on which people receive and engage with information about science, environmental, and health-related risk issues (Brossard, 2013; Rainie et al., 2015). These shifts beyond traditional media (e.g., newspapers, academic journals, and television) towards more interactive channels such as social media reflect a broader transformation of the current media landscape (Liang et al., 2014). This reality became especially apparent during the peak of the coronavirus (Covid-19) pandemic: nearly 50% of American adults reported getting "some or a lot" of Covid-19 news and information through social media (Mitchell & Liedke, 2021).

This understanding has prompted various stakeholders to turn towards social media as they seek to communicate with public audiences on science, health and environmental issues (Yeo, 2015). One group that has emerged as particularly compelling sources on these platforms are scientists themselves (Peters, 2014). Take, for instance, the widespread social media presence of epidemiologists, infectious disease specialists, and medical experts during the pandemic: these scientists utilized Facebook, X (formerly Twitter), TikTok, and more to share science in real-time with public audiences, and to advocate for Covid mitigation behaviors and policies (Fahy &

Lewenstein, 2021). As they came to the forefront of public discourse, they sought to position themselves as key science communicators with expertise and authority in these online information environments (Huber et al., 2019).

Scientists have thus established a prevailing presence on these platforms, with many amassing large public followings far beyond their personal networks. For example, X hosted nearly 300,000 scientists at the height of its popularity (Costas et al., 2020). Many other scientists flocked to popular platforms like Instagram or TikTok and were subsequently propelled into the public spotlight as they actively shared Covid-19 research and information with their followers. But as Chapter 1 explored, the sociopolitical and digital landscape have changed considerably in the last two years, marked by growing anti-science sentiment and platform instability. These dynamics, of course, complicate our prior understanding of science communication on social media; yet they also put into stark relief the tensions and stakes that scientists must navigate in their self-presentation practices.

While extensive literature has examined online self-presentation across different populations, including traditional professions like journalists (Carpenter et al., 2017), scientists represent a distinct case. Their credibility and expertise are often institutionally conferred and shaped by longstanding professional expectations of objectivity, and neutrality rooted in the scientific method itself (although this idea has become increasingly contested; see Büntgen, 2024; van Eck et al., 2024). At the same time, they contend with persistent stereotypes of what a scientist should look like or behave (Chambers, 1983; Fiske & Dupree, 2014). And now, they are navigating social media environments that reward popularity and virality and prioritize connection and relatability, entertainment, and personal storytelling (van Dijck & Poell, 2013). These dynamics take on added urgency amid volatile shifts in both the political climate and the media landscape,

where growing anti-science sentiment and platform instability complicate efforts to build trust, maintain credibility, and foster meaningful public engagement with science (Tollefson et al., 2025).

As such, this study seeks to address this gap by analyzing data collected via semi-structured interviews ($N = 24$) conducted with highly-visible U.S., Canadian, and European scientists across various social media platforms. In this chapter, highly-visible scientists are conceptualized as scientists with public profiles (that is, able to be viewed by any other user on that platform) and who have over 10,000 followers on one or more social media platform. These interviews explored scientists' self-presentation goals, strategies, and posting behaviors; perceptions of their audience; opportunities and challenges associated with their social media presence; and reflections on social media's role in science and science communication. The findings here reveal how scientists' self-presentation can become a dynamic medium through which scientific credibility, trust, and authenticity are performed and negotiated in public. These performances are shaped by their own impression management goals, audience management strategies, as well as broader institutional, sociocultural, and platform norms and expectations.

Scientists' Self-Presentation and the (Imagined) Audience

On social media, just like in arguably any other environment, people care about how others perceive them. Individuals are motivated to manage their public efforts and to present an appropriate and positive image (Goffman, 1959); impression management is critical for not only shaping and preserving our sense of identity but also regulating potential social outcomes and consequences (Leary & Kowalski, 1990). Erving Goffman's (1959) dramaturgical approach to self-presentation, first articulated in the context of face-to-face settings, provides a useful framework towards understanding how people may present themselves on social media. Goffman

describes every social interaction as a performance, whereby people can "perform" their public identity to an audience based on their assessment of the environment, their motivations and goals, and the impression they want to convey (Goffman, 1959). In this perspective, social media operates as a sort of "front stage," where users can perform "performances" that are both increasingly visible and persistent, to increasingly broader audiences[3,4].

Scientists, then, are no exception to such impression management: as they navigate social media, they too manage their identities and strategically present themselves, whether to establish themselves as credible and trustworthy communicators, as friendly and down-to-earth scientists, or approachable educators. Put simply, scientists' self-presentation in this context refers to the strategic and intentional ways in which they seek to shape how others perceive them; they may do so through decisions about what to share, how to frame their expertise, and which aspects of their identity to foreground. Ostensibly, then, such opportunities on social media are endless: anyone can post anything they want on their own profile pages. Indeed, social media has offered these scientists increased access to an expanded and more diverse audience, allowing them to bypass traditional ways of reaching such a lay audience (e.g., through legacy media or institutional ties). These platforms can provide a space for scientists to present themselves and communicate with

[3] Chapter 1 provides a more thorough discussion on the specific features of social media that intersect with our understanding and the dynamics of science communication.

[4]While this literature review takes a higher-level framing of self-presentation as a strategic identity performance, it is important to acknowledge that self-presentation on social media is also shaped by a range of other factors, including platform affordances (e.g., editability, visibility, persistence) and user practices (e.g., distinctions between Finsta / Rinsta (Tao & Ellison, 2023), which can introduce additional nuance to how identities are presented and managed online. While these dynamics are beyond the immediate scope of this study, they underscore the multifaceted nature of self-presentation and audiences on social media and offer important directions for future research.

their audiences in ways that suffice their own motivations and goals, and in ways that are rooted in and contextualized by their lived experiences (Zhang & Lu, 2024).

But social media, and the digital landscape more broadly, have also introduced additional nuances and challenges to our understanding of impression management on these sites. A central concern is the very nature of that audience: who are they?

After all, self-presentation practices and strategies are deeply intertwined with an individual's audience and objectives. As Hollenbaugh (2021) points out, "without an audience, there is no self-presentation" (p. 84). Already, a few studies have sought to explicate scientists' understanding of their audiences on different social media platforms and to quantify their audiences. In a survey of 587 scientists (nearly all of whom had less than 1,000 followers), Collins et al. (2016) found that scientists saw their Facebook audiences as predominately friends, family members, and members of the public who are already interested in science. These scientists also indicated that their intended audiences on Twitter were mostly their fellow scientists, followed by the public, other organizations and institutions, and finally the media (Collins et al., 2016). A more recent study found that when scientists engaged in science communication on social media, they considered their audiences to consist of both members of the lay public as well as of the academic community itself (Nerghes et al., 2022). In terms of scientist's actual audiences, a 2018 study found that scientists with over 1000 Twitter followers often possessed a varied audience that included educational organizations, members of the media, people with otherwise no scientific expertise or education, and even policymakers (Côté & Darling, 2018).

These studies highlight two important points: first, the findings from Collins et al. (2016) suggest that platform differences can and do influence how scientists conceptualize their audiences. For example, most people use Facebook to connect with people they already personally know or

have a shared identity with (Ellison et al., 2007), while Twitter fosters more asymmetrical connections, since users do not need mutual approval to follow other users. Second, these studies taken together underscore the difficulty of ascertaining one's *actual* audience (that is, those who actually view or engage with one's content), which may differ significantly from *intended* audiences.

This second consideration points to one of the key challenges of self-presentation on social media: that audiences are often unknown or difficult to determine (Litt, 2012), although of course, users can still manage the actual audience through strategies like privacy settings (Krämer & Haferkamp, 2011). In response, users must rely on cues from the online environment to instead *imagine* their audiences and create a "mental conceptualization of the people with whom they are communicating (Litt, 2012, p. 331).

In a study of Twitter users, Marwick and boyd (2011) found that the imagined audience can range from specific populations, such as friends, family, and co-workers, to more abstract audiences, such as a community with similar or disparate interests, "a fanbase," or even "the public." Furthermore, Twitter users with large audiences (over 100,000) indicated imagining this audience as a "fan base" or a "community with whom they could connect and [strategically] manage" (p. 120). Neither is this "imagined audience" a stable construct; rather, the imagined audience can fluctuate, shifting from post to post for the same individual (Litt & Hargittai, 2016a).

Understanding this imagined audience matters, because it actively shapes how users construct and manage their self-presentation, from what and how they post to which aspects of their identities they choose to highlight (or conceal) (Litt & Hargittai, 2016a). As scientists navigate a complex landscape where their posts can potentially reach a wide spectrum of audiences, their imagined audience can therefore shape not only the tone and style of their communication

but also the content they choose to share (Gil-Lopez et al., 2018). For instance, when scientists envision fellow academics as their primary audience, they may lean into technical explanations and professional updates. Conversely, imagining a general public audience might encourage efforts to simplify language, emphasize accessibility, or share personal anecdotes to build connection.

The imagined audience is thus a pivotal factor that guides scientists in not only tailoring both their science communication efforts and general social media use to effectively engage with audiences, but also anticipating expectations and making sense of their public-facing identities. In this way, the imagined audience can not only serve as a cognitive guide for who scientists are communicating with, but structure the very ways in which scientific identity is presented and embodied on social media. This chapter therefore explores how visible scientists on social media conceptualize their imagined audiences and how these mental models might influence the ways in which they construct and manage their self-presentation on social media.

Blurred Boundaries and Collapsed Contexts

While users may seek to tailor their content with a particular "imagined audience' in mind, posts and messages on social media can nonetheless leave a user's original network as others interact with and share the content to their own networks, sometimes reaching audiences users cannot anticipate or control (Choi & Bazarova, 2015). Of course, users can again employ various privacy settings or private or separate accounts to restrict audiences from viewing certain information (Litt & Hargittai, 2016b; Krämer & Haferkamp, 2011). But for highly-visible scientists, even posts that were intentionally made public and strategically crafted with a specific audience in mind may still be viewed and interpreted by many others, anticipated (colleagues, students, institutional stakeholders) or not (hostile commenters and trolls). Scientists thus face new

challenges as they seek to strategically manage these boundaries and to present a single, cohesive, and appropriate identity across these various settings and audiences (boyd & Heer, 2006).

These dynamics reflect "how people, information, and norms from one context seep into the bounds of another" (Davis & Jurgenson, 2014, p. 477), a phenomenon known as "context collapse" (boyd, 2002; Marwick & boyd, 2011a). This is further complicated by the often persistent nature of user content. As Hogan (2010) introduces in his exhibition approach towards understanding self-presentation, social media can be considered an "exhibition site … where people submit reproducible artifacts" (p. 381). Hogan argues that social media isn't necessarily bounded by space and time, meaning that even after a performance has taken place for a specific audience, it can still be accessed by other audiences, depending on a third-party curator (e.g., the TikTok or Facebook algorithm). Thus, audiences—real and imagined, intended and unintended—often have access to the same set of self-presentation strategies and practices.

We see some indication of this context collapse already occurring for many scientists on social media. For one, opportunities for context collapse almost inevitably occur as one's network size increases (e.g., Gil-Lopez et al., 2018); as discussed earlier, when scientists' follower count increase, so too does the heterogeneity of that network (Côté & Darling, 2018). In another study, nearly half of the 600 surveyed scholars reported using the same Twitter account for tweeting both professional and personal information. In this case, context collapse is an expression of those flattened boundaries between professional and personal communities: scholars' friends and family may be exposed to their self-presentation strategies intended for the public or professional colleagues (e.g., sharing research updates), while their colleagues and institutional ties may also view self-presentation strategies intended for the public or friends and family (e.g., sharing personal updates) (Bowman, 2015). And as these traditional group-based boundaries begin to blur,

people, expectations, norms, and information from different environments and settings "collapse" into one (boyd, 2007).

Furthermore, context collapse can complicate online authenticity, a concept that is on one hand an idealized goal of truthful self-expression and on the other, a socially constructed and context-dependent performance often determined by the audience (Marwick & boyd, 2011; Marwick, 2013). As Haimson et al. (2021) note, the "online authenticity paradox" occurs when users feel compelled to be transparent to appear genuine but simultaneously constrained by imagined surveillance and audience expectations. For public-facing scientists who perform a range of roles from educator, researcher, mentor, to even simply an approachable or trust guide on social media, these issues can therefore be amplified when different contexts come together in potentially incongruent ways, creating tensions and amplifying self-presentation concerns (Marwick & boyd, 2011).

Existing research has identified several strategies that scientists might employ to navigate this collapsed context. For one, they might adopt a "lowest common denominator" approach, where users identify the most socially distant individuals to guide their content-sharing practices (Hogan, 2010). Put simply, when people cannot predict who will view their posts, they manage the potential risks by avoiding content that may be seen as controversial or inappropriate by specific, salient individuals for whom they are seeking to "present an idealized front" (p. 383).

For example, if public-facing scientists with large networks recognize and want their content to reach individuals averse to scientists or not interested in scientific issues, they might be particularly aware of the impressions their posts could generate for these audiences. As such, they may choose to avoid sharing especially controversial opinions or overly technical content, instead focusing on what may be perceived as most appropriate for those audiences.

Alternatively, Marder et al. (2016) suggest that individuals might cater towards the audiences that they perceive as the most valuable, and the standards of that audience (the "strongest audience effect," as opposed to simply the "strictest" audience). While this perspective has yet to be systematically tested outside of a college student context, it could also be that scientists see their fellow scholars or the general public as the strongest audience and continue to engage in self-presentation practices accordingly; this may entail prioritizing how content will be received by academic peers, tenure committees, or institutional leadership.

Each of these strategies demand constant calibration, self-monitoring, and an acute awareness of how their self-presentation might be interpreted across different audiences. For scientists whose reputations and careers are shaped by how they are perceived both within and outside of academia, managing their self-presentation on social media thus becomes deeply tied to their professional credibility and public legitimacy. And while research has examined how professionals navigate context collapse in the workplace (e.g. Vitak et al., 2012), less is known about how scientists experience and manage these pressures within highly-visible public accounts. Understanding how they perceive and navigate this context collapse is thus important because it reveals the deeper cultural and institutional logics shaping contemporary science communication. After all, in today's media landscape and (political) climate, scientists are no longer evaluated exclusively by their expertise or research credibility (Besley et al., 2021; Davies et al., 2019), but also by how they present themselves as public figures across different platforms, across different audiences, and amid different norms and expectations.

Navigating (Professional) Norms and (Public) Expectations

While the challenges of managing imagined audiences and context collapse complicate self-presentation for all users, the tensions inherent in online self-presentation are amplified for

those whose professional identities carry specific cultural and social expectations, such as scientists. Scientists occupy multi-faceted roles and identities: they are not just social media users, content creators, or communicators, but they are also representatives of science, educators, private individuals, and more. Yet each role is governed by distinct, and at times conflicting, norms and assumptions about what constitutes appropriate, credible, and effective communication. Which identity becomes most salient at a particular moment may shift depending on the context, but the boundaries between them are rarely straightforward; thus, scientists must navigate often-competing norms and expectations within the scientific community, the broader (social media) public, and more.

Unlike influencers, everyday users, or even users from other traditional professions (e.g., journalists; Carpenter et al., 2016), scientists enter social media spaces already embedded within an institutional system that confers expertise, credibility, and authority. Their expertise is rooted not only in individual knowledge but also in affiliations with academic institutions, research organizations, and scientific methods built on ideals of objectivity, neutrality, and evidence-based reasoning (McKaughan & Elliott, 2018). At the same time, they often contend with stereotypes of what scientists should look like or behave. Historically, scientists have been viewed as competent but cold; that is, respected for their expertise, but perceived as socially distant or emotionally detached (Fiske & Dupree, 2014; Chambers, 1983). These stereotypes, which persist even today (e.g., Chinn et al., 2024), may also shape how scientists anticipate audience reactions to their self-presentation.

This creates a double bind: on one hand, scientists may feel compelled to present themselves as a "traditional scientist" (e.g., one who appears objective, apolitical, and emotionally detached) due to the aforementioned stereotypes or institutional norms that have positioned such

traits as markers of scientific credibility. As a result, they might choose to avoid disclosing too much personal information and engaging in public debates on contentious topics to maintain this objectivity and professionalism. On the other hand, some might recognize the need to actively counter these cultural stereotypes and strategically embrace social media's affective and relational norms to appear more relatable, and to effectively reach their (imagined) audiences.

Moreover, social media platforms introduce a distinct set of logics that complicate these choices. After all, "the characteristics and culture of social media platforms facilitates [users] to be candid about their thoughts and share them in public" (Hermida, 2012, p. 321), as users express themselves to maintain relationships, to receive social support and capital, and to entertain (Shabahang et al., 2024). The more personal nature of social media may mean that users expect other users (including scientists) to share more intimate information and to present themselves as individuals with personal beliefs, convictions, and emotions. Scientists must therefore also reckon with social media logic designed to reward popularity and virality (van Dijck and Poell, 2013) and prioritize connection, relatability, entertainment, and personal storytelling.

This pressure intersects with the growing "celebrification" of science (Fahy & Lewenstein, 2021), where scientists increasingly engage in forms of personal branding often associated with influencers or micro-celebrities as they build large followings, gain media attention, and become known as "celebrity scientists" (see Chapter 5 for a more detailed description of this framework, derived by synthesizing and comparing features of celebrity generally with that of several post-World War II scientists who became prominent in popular culture). The infrastructure and culture of social media further encourages micro-celebrity practices (Marwick & boyd, 2011b); for scientists, this can entail interacting with their followers, sharing behind-the-scenes updates of

their research and personal lives, and cultivating an individual "brand" to appear approachable to diverse social media audiences.

Yet importantly, these practices also carry risks: while visibility and self-promotion may build public trust or engagement, they can simultaneously alienate peers or undermine professional credibility (Weingart & Guenther, 2016). So too, excessive self-promotion or overt emotional appeals may be perceived as inauthentic, self-serving, or at odds with scientific norms that privilege modesty and dispassionate reasoning (Marwick & boyd, 2011a; Väliverronen, 2021). In other words, the same strategies that incentivize scientific engagement with one group of audiences may simultaneously jeopardize scientific credibility with another.

Summary and Research Questions

Taken together, these dynamics emphasize how being a "scientist on social media" is much more than simply communicating science for public audiences; rather, it is an ongoing construction of a public self that can negotiate the oft-conflicting demands of multiple imagined and collapsed audiences, norms, and expectations. Scientists might grapple with the challenges of presenting themselves authentically while adhering to traditional norms of objectivity and impartiality; of conveying scientific information credibly while maintaining accessibility; of being professional yet personable. At the same time, they may seek to tailor their content across plural imagined audiences that range from peers and colleagues to lay publics to even hostile observers. Each introduces distinct tensions and opportunities that influence the strategies scientists adopt to manage their self-presentation and how they conceptualize their role in an evolving science communication landscape.

Yet, few studies have sought to examine how scientists themselves make sense of these tensions, particularly as they intersect with professional identities and shifting audience

expectations in both the science communication and social media landscape. This study thus addresses that gap by exploring how scientists understand and negotiate these dynamics through their self-presentation on social media. Altogether, the research questions are as follows:

RQ1: How do scientists construct and manage their self-presentation on social media as they navigate the norms and expectations of their imagined audiences?

RQ1a: How do scientists conceptualize their imagined audience?

RQ2: How do scientists make sense of their self-presentation on social media in the broader context of the changing science and science communication landscape?

Methods

Participants and Recruitment

Semi-structured interviews with 24 scientists on social media were conducted between January and March 2025. For the purposes of this study, I define scientists as individuals who have obtained, or are working towards, a terminal degree in a STEM [5] (Science, Technology, Engineering, and Mathematics) field regardless of their current affiliation; that is, they may work at a university, government research institute, industry, non-profit, or otherwise. Such a definition reflects the diversity of scientists on social media and seeks to capture the breadth of voices, and their respective experiences, contributing to how science is communicated and discussed in these spaces.

Additionally, I limited the sample to scientists with over ten thousand followers who were not full-time, professional science communicators. I selected a threshold of 10,000 followers for

[5]This study adopts the National Science Foundation's definition of STEM, which encompasses the areas of chemistry, computer and information technology science, engineering, geoscience, life sciences, mathematical sciences, physics and astronomy, social sciences (anthropology, economics, psychology, and sociology), and STEM education and learning research (Gonzalez & Kuenzi, 2012).

two reasons. First, follower count is a common proxy for visibility and audience reach on social media platforms; scientists with more than 10,000 followers often transition from smaller, personal, and primarily academic circles to a more public-facing presence, where posts are more likely to reach diverse, unknown, or unintended audiences ranging from organizations, journalists, policy makers, and the general public. Second, many platforms also use this threshold to unlock new platform features (e.g., TikTok allows users who have hit this benchmark to have access to monetization, creation of video series, use of live studio, and more) (Whateley, 2024). Thus, these scientists' self-presentation may have unique implications for public understanding of science and scientists, as I explore in Chapter 4. Finally, the focus of this dissertation is not on professional science communicators, who while may also have large followings, may have different self-presentational goals, motivations, and tensions in their social media use.

Once the study was deemed exempt from oversight by the university's Institutional Review Boards, I employed a purposive sampling frame to find scientists who met the inclusion criteria across a range of characteristics, including race, gender, social media platform, and field of expertise. This approach allowed me to capture a diverse set of perspectives in order to examine scientists' experiences across multiple platforms, as well as how different tensions and goals may arise for scientists across different backgrounds.

To identify potential participants, I conducted an initial search on multiple social media platforms to compile a list of 50 scientists who met the inclusion criteria. I then expanded this list by examining their follower networks and identifying additional scientists who met these criteria, and repeating the process iteratively. Scientists were contacted through different methods, including private messaging on social media, and emails or contact forms available on their

personal or professional websites. In these initial emails, I provided details about the study, emphasizing its focus on how scientists with substantial followings use social media.

In total, I contacted 74 scientists across multiple rounds of recruitment. Of these, 28 initially agreed to participate, and 24 ultimately completed interviews. At this point, I determined that data saturation had been reached, as additional interviews were unlikely to provide novel insights (Saunders et al., 2017). The final sample consisted of 24 scientists, including 15 women and 9 men across different racial backgrounds and nationalities, career stage, and field of expertise (see **Table A.1** for additional participant demographics). According to a survey conducted by the Pew Research Center (2015), a slightly higher proportion of women scientists (44%) than men scientists (39%) reported regularly engaging on social media to share their research. The same survey found that younger scientists were more likely than older scientists to view social media as an important tool (Raine et al., 2015). Given these trends, it is perhaps unsurprising that the sample skewed towards younger and women scientists. For social media platforms, 15 participants had over 10,000 followers on TikTok; 10 on Instagram; and 13 on X (formerly Twitter). To protect participant privacy, pseudonyms chosen by participants themselves are used when referring to individual interviewees.

Interviews

Once participants responded and indicated an interest in participating in the study, they completed an informed consent form, as well as a brief form with questions about their demographic details, current occupation, and the platforms on which they primarily posted. Interviews were conducted via Zoom, lasting approximately one hour on average and ranging from 40 minutes to 90 minutes. Prior to participating, interviewees provided consent for the interview to be audio recorded.

The semi-structured interview protocol covered a range of topics related to scientists' experiences and self-presentation on social media, including their motivations for using social media and how their online presence may have evolved as they gained larger audiences; how they hope to be perceived on the platforms; the types of content and strategies they use to communicate with their audiences; the tensions and challenges they encounter as scientists in these spaces; and their reflections on the state (and role) of social media for scientists. Interviews were recorded and transcribed using Zoom's audio transcription service. After the interview, participants were sent a $50 Amazon gift card (one declined payment). The full interview protocol is provided in **Appendix A.**

Data Analysis

I conducted a reflexive thematic analysis (RTA), wherein the process of coding and theme development is structured yet flexible (Braun & Clarke, 2006). That is, themes were not predefined but rather generated by organizing codes around a "central organizing concept that the researcher interprets from the data" (Byrne, 2022, p. 1393). Given the nature of this research, a key guiding principle was to approach data collection and analysis in a way that accurately represented scientists' own perspectives, experiences, and motivations for engaging with social media, while also acknowledging the reflexive role of my interpretations as the researcher; therefore, RTA was selected as the method of analysis. Data analysis thus followed the six phases of reflexive thematic analysis. In the data familiarization stage, I read each transcript for accuracy to immerse myself in the data. At the same time, I took notes on the initial analytic observations both within each transcript and in relation to the entire dataset.

Next, I imported the transcripts into Atlas.ti, a qualitative data analysis software, and began line-by-line coding of the transcripts to generate succinct, descriptive codes (i.e., labeling and

organizing data items into meaningful groups). This phase occurred iteratively, such that each transcript was coded twice; any codes that were added later in the process could then be included in the second cycle of analysis. Afterwards, I visually mapped related codes to identify initial themes. Themes that overlapped were collapsed and refined, and reviewed and synthesized again to generate a single set of proposed themes. The entire dataset was read for a final time to ensure thoroughness and accuracy. The final quotes here are presented verbatim as much as possible, with slight editing for readability (e.g., removing fillers, hesitation markers, or words that are redundant) (Lareau, 2021).

Results

This study explored how visible scientists construct and manage their self-presentation on social media, particularly in response to their perceptions of their audiences as well as shifting norms and expectations. While many did not begin with the intention to perform public-facing science communication, increased (and often unexpected) visibility prompted a heightened awareness of their audiences and the performative dimensions of being "a scientist" online. Scientists' imagined audiences varied, but consistently influenced how they communicated, what content they shared, and which aspects of themselves they highlighted. These self-presentation practices were broadly informed by three key, often overlapping, goals: to (a) humanize and challenge stereotypes of scientists, (b) build trust and credibility through authenticity, and (c) push back against exclusionary narratives within STEM. Each of these goals required negotiating with platform expectations, professional norms, and audience pressures.

The Imagined Audience

For the most part, scientists did not begin on social media with the intention to strategically engage with and present themselves to the public. Rather, several described creating personal

accounts for friends and colleagues or turning to platforms like TikTok and X during the COVID-19 pandemic as creative outlets or ways to stay connected with friends and colleagues. Eight others saw their following grow unexpectedly after "accidental virality struck" (Aaron), drawing larger and more diverse audiences than they initially anticipated.

As their followers expanded, however, many became increasingly aware of the changing nature of their audience, and the potential of that visibility. When posting, scientists often had in mind a "target imagined audience" (Litt, 2012, p. 331). Broadly, these imagined audiences were aligned with Litt and Hargittai's (2016a) categories of personal (e.g., friends and family), professional (e.g., colleagues and employers), communal (e.g., people from a community with shared interests, values, or experiences), and phantasmal (e.g., illusionary relationships) ties.

For example, Astrid viewed her imagined audience as her parents, using them as "*a barometer for what people know and don't know*." Imagining her audience as personal ties, then, encouraged a level of empathy that *"I wouldn't have done if I wasn't thinking about people I'm close with." So I try to take on a tone that's not 'Haha, you're dumb for believing this,' but 'Here's why I knew this was fake. Here are the red flags so you can spot them next time.'"* Others imagined their audience through communal ties; these imagined audiences then shaped the ways in which they communicated about scientific information (e.g., more entertaining, or less use of jargon). James shared that he aimed for an intimate and educational tone, viewing his TikTok followers as "*students in my big classroom.*" So too, *Kennedy*, *Kateryna*, *Luke*, *Rose*, and *Heather* each described imagining a broad public audience, with a specific focus on "*people who are interested in science*" (Kennedy) or "*haven't been exposed to careers in science*" (Kateryna).

On the other hand, some scientists like Michelle, Mike, and Amarachi described their imagined audiences as still primarily composed of other scientists (professional ties). Their posts

thus consisted of self-promotion of their research (Michelle) or facilitation of research discussions (Amarachi). At the same time, Mike reflected on how that imagined scientific audience might unintentionally exclude others: "*I'm a little more careful with how I phrase things [with a larger audience]. I try to avoid technical terms or reflect on how something might be read by non-academics.*" He added: "*But honestly, if I put a preprint online and my mom were on Twitter, I don't think she'd even know what a preprint is. Or she might not feel like she's allowed to engage in a conversation like that… I think you have to have a certain kind of confidence or white male syndrome to feel entitled to insert yourself into scientific conversations if you're not a scientist, even if you are welcome to.*"

For others, like Timothy and Zoey, the imagined audience fluctuated between the two categories, an acknowledgment of the multiplicity and overlap of their audience. "*There's an interesting mix of people who follow me: scientists who study birds and birders who are more casually into it,"* Timothy said. *"I like that I straddle both realms and feature both sides of my personality. I want to engage people who aren't super scientifically inclined but are adjacent to that realm."*

A few scientists, however, imagined and strategically courted audiences that were skeptical, or even downright hostile, to science. To an extent, this reflects what Litt and Hargittai (2016a) termed "phantasmal ties;" that is, people they had an illusionary relationship with. Rather than imagining only like-minded audiences, Roxy described "*purposefully instigating things just a little bit*" to avoid "*creating an echo chamber.*" She shared, "*I want people with an opposite or different worldview to see my content and become part of a conversation.*" Kristen imagined her audience as "*people science has left behind*" and deliberately avoided discussing politics ("e*ven though I*

have very strong political beliefs"). She noted, "*I think I can actually reach more people by avoiding that kind of content. I prefer to stay a bit of a blank slate that people can project onto.*"

Similarly, Aaron often intentionally presented himself *"like I may have voted for Donald Trump. I'm not afraid of appealing to the anti-science far right because that's who needs to hear from science the most.*" To do so, he too engaged in self-censorship ("*I conceal a lot of my genuine opinions to not push away the audience I really want to reach*") or carefully curating content to resonate with these (skeptical) imagined audiences ("*I wanted them to see a scientist saying that Biden did look cognitively bad [during the 2024 presidential debates], follow me, and over time, I subliminally convince them that science is really interesting*").

The imagined audience, then, influenced how scientists constructed and managed their self-presentation as publicly-visible scientists. Overall, they described navigating social media with three interwoven self-presentational goals, which I describe in more detail below, as well as the competing tensions and expectations influencing each goal.

Breaking out of the Ivory Tower, But Carefully

Humanizing Science

Almost every single scientist shared that they viewed their social media account as an opportunity to humanize scientists and to fight against enduring stereotypes of scientists as competent but cold (Fiske & Dupree, 2014). As Kateryna described, "*The easiest way to sum up my account is my life as a scientist. There's this stigma about scientists, that they're closed off, nobody knows what they're doing, they don't interact with the public, and they're serious. I'm trying to show that no, we're people. We're just like other individuals; we all have personalities."*

This work of humanizing scientists often involved not just sharing their research, but also content showcasing personality, and sharing humor, hobbies, and mundane moments; that is,

content that otherwise diverges from traditional images of scientists (Mead & Métraux, 1957; Wyer et al., 2010). Megan described posting "*funny, silly videos*;" Juno frequently posted about "*my pet or something cute I bought*." Most scientists also openly expressed their political opinions: as Roxy reflected, "*I want people to understand I'm a human, and I care about and talk about things, even if it's political. I'm just keeping it real.*"

This approach was often explicitly strategic, part of a broader effort to shape public perceptions of science and scientists. Kennedy, for example, described her TikTok account as a bridge to the public: "*The fundamental issue in science is that we focus on the science, but forget about the human doing the science. When people forget that, something is lost."* For her, humor, storytelling, and personal moments were tools to "*bridge that gap…I want to talk about science, I want to be funny, and I also want to humanize it and the scientists doing the work."* Zoey similarly framed her choices as a response to politicized perceptions of scientists: "*Society holds a very narrow image of what a scientist is. Especially now, as a lot of grants and federally funded research come under fire by the government, people start to see professors and scientists as 'the enemy'...this idea of the ivory tower. I'm actively trying to fight that because I'm just a person, and so are my colleagues, my mentors, and the big names in the field."*

Others like Timothy and Harold, however, described the personal nature of their content as less intentional. As Timothy put it, *"It's just a transparent reflection of who I am. I am a scientist, but I'm also someone who loves the outdoors, birds, and nature. So I put all of that out there."* Still, he acknowledged that these moments could contribute to collapsing the perceived distance between scientists and the public: "*You get a glimpse behind the curtain on social media. You see what someone does professionally, but also a little bit of who they are as a real, normal person.*

And I do want people to see that this is a normal person, not a stodgy academic they have to be scared to approach. I like that aspect of trying to be genuine and approachable."

Negotiating Audience Expectations of Objectivity and Neutrality

However, scientists noted that these self-presentational efforts to humanize themselves often collided with the very stereotypes they worked to push against. For example, both Aaron and Ashley stopped sharing personal information after noticing that their audiences unfollowed or disengaged. "*I came to the conclusion that these people don't care about me; they see me as a vessel for delivering information,*" Aaron observed. "*Anytime I stray from that, I run the risk of jeopardizing my perceived position as a scientist*."

This tension intensified around political content: scientists described a persistent expectation that they should remain apolitical, with audience comments like "*Stick to [biology], bro*" (Andrew) or "*You're a scientist, stop talking about politics*" (Kateryna). As Astrid further elaborated, "*As soon as you share anything political, people say, 'Stop making science political. Stay in your box. I followed you for the science, not politics.'*"

For many, navigating these tensions became an ongoing negotiation over what to share, when, and how to balance humanizing science, credibility, and personal values in light of potential risks to credibility, safety, audience engagement, or professional reputation. Some became "*less forthcoming*" (Harold) or "*toned down the political stuff*" (Timothy) in response to the increasing political hostility toward scientists under the Trump administration. Others opted against sharing political content altogether: "*My online persona is always happy, laughing about things, never mad, whereas my in-person persona gets furious about things. Both personas have a lot of opinions, but I only share a narrow range of topics online*," Kristen said. "*I want to give people a certain view of science and scientists as fun, so I don't want to talk about the shitty stuff, because there*

are already people who show science as condescending or gate-keeping." Finally, some like Kennedy wrestled with where to draw the line between professional constraint and moral responsibility: "*That's an important internal boundary we all have to face: where do we draw the line? And honestly, I'll cross that professional boundary if it means doing the right thing*."

Where the Ivory Tower Meets Social Media: Academic Norms and Social Media Logics

Simultaneously, many scientists expressed navigating a parallel tension: this time, a persistent skepticism from *within* the scientific community towards social media. As Timothy put it: "*The intersection of the old-school ivory tower meeting the new social media academia world can be awkward.*" Caroline, too, contended with how her self-presentation on social media could influence her colleague's perceptions of her scientific credibility: "*Sometimes I felt like they didn't view me as a legit researcher because they thought I was just goofing around on TikTok all the time.*" David further articulated:

> "*I never expected to be a scientist on TikTok. It's still viewed oddly in the research community. To be seen as a successful scientist, having a public profile or notoriety from your contributions or visibility is valuable. It's made me one of the most visible people in my field, without matched scientific stature, which I'm self-conscious about… My colleagues often joke that my key contribution is providing another viral video or good social media communications, which is frustrating because I'm also a scientist leading projects, getting some of the hardest samples in the world. They trivialize it because the platform feels youthful, and older scientists refuse to understand it."*

His account reflects a broader contradiction within contemporary science communication: on one hand, visibility is increasingly necessary for scientists to gain public trust and recognition; on the other hand, it simultaneously can undermine a scientist's credibility within academic

institutions that continue to privilege traditional outputs (e.g., peer-reviewed publications). Take, for example, the establishment of the "Kardashian Index" (K-Index; Hall, 2014), a satirical but rather revealing proposal to quantify the gap between a scientist's social media following and their academic citation record. While the K-Index has been critiqued for reinforcing the idea that visibility is inversely correlated with scholarly value, its existence points to a very real sentiment within academia at large: that scientists who communicate science on social media are somehow seen by some as less rigorous or professional. And as David's comments illustrates, these attitudes are not only real but also *consequential*; they can shape how these scientists are perceived by colleagues, potential hiring committees, and professional peers.

A key source of this tension was the context collapse (Marwick & boyd, 2011) of multiple audiences (e.g., professional peers, future employers, personal connections, and diverse public audiences) into the same digital space. This collapsed context required scientists to carefully manage their self-presentation to maintain scientific legitimacy, all while engaging a broader audience. Zoey described this balancing act: "*I want to be funny and relatable, but I also try to maintain a level of professionalism. It sucks because I'm constantly wrestling with the urge to say something more polarizing or reflective of opinions I feel need to be shared. But I can't always do that with the audience I have.*"

Roxy chose to instead push back against this tension. "*People don't see a value in humanizing themselves in the context of their research. People don't understand, what does someone liking deep sea fishing have to do with pipetting stuff in a lab?*" she said, "*It may have nothing to do with your research, but it has everything to do with establishing trust and humanizing you as a person—the person doing the science. People are able to paint a bigger picture of what you're offering when you speak.*"

Others, however, opted for implementing careful boundary-setting or self-censorship. Charlie, who was on the job market, said she "*needed people to know I could do science too; I'm still a hardcore scientist. I had to figure out how and where to separate Dr. Charlie from Charlie.*" Megan, too, described how her self-presentation evolved as her career advanced: "*I used to post a lot more angrily, like calling out misinformation, cussing in my videos to seem relatable. I've toned that back. I've cleaned it up, but that's cost me engagement and interest.*" Ultimately, as Amarachi said, "*It's not really the currency we're supposed to be collecting as academics. We don't have a role model or script for an academic as a social media influencer.*"

Authenticity as a Double-Edged Sword

Performing Authenticity: Cultivating Trust, Credibility, and Relationships

In addition to challenging stereotypes and humanizing scientists, many participants also reported that they strategically built trust and credibility with their audiences through authenticity—a candid performance of the hidden inner self (Marwick & boyd, 2011). Authenticity was often performed through leaning into platform norms that prioritize low-production, casual, and conversational content. "*There's a different level of trust when you can see someone answering questions, showing you around the lab, or explaining how a vaccine is made,*" Caroline explained. Her comment reveals how social media affordances and features (like interactivity or the ability to respond directly to followers' questions) can allow for these types of authentic, behind-the-scenes glimpses into scientists' lives. Similarly, Aaron deliberately rejected traditional, institutional heuristic cues to credibility in lieu of building relational credibility: "*Instead of me being like, 'Hey everyone! You can trust me. I have a PhD and work at [a highly-ranked university],' it was the opposite. I'm just in a T-shirt, not in a lab coat.*" By opting for a less formal appearance and adopting these casual aesthetics, Aaron sought to decrease the symbolic distance

between the scientist and the audience. Quite literally, then, he took off his lab coat to reveal "the hidden inner self" (Marwick & boyd, 2011), a performance of authenticity that reveals the person behind the science, one who is approachable, relatable, and can be trusted.

Authenticity also meant embracing transparency about their knowledge boundaries and fallibility in science. These tactics included publicly correcting their mistakes by "*not deleting videos when I've gotten something wrong but link to them and talk about what I got wrong and why*" (Astrid) or being "*honest about failures because it makes people feel seen…they might be going through their own failure, and they appreciate the honesty*" (Juno). Others reflected on their efforts to show that "*science is incremental*" (Rose) and sought to "*model good scientific behavior*" (Kristen) and "*intellectual humility*" (Amarachi). Broadly, scientists described seeking to cultivate what Astrid termed "*a form of expertise that's fallible, willing to admit mistakes, and self-effacing*."

Some scientists sought to cultivate authenticity by openly sharing personal identities to disrupt dominant narratives that often reinforce perceptions of scientists as social threats (Chinn et al., 2014). *"I want people to see a piece of themselves in me and see that science is for everyone,"* Megan said. In sharing her first-gen, LGBTQ+, rural, and low-income background, Megan aimed to disrupt dominant narratives that often reinforce perceptions of scientists as social threats (Chinn et al., 2014). "*I want people to share my videos with anti-vax or anti-science relatives and see that I'm just a random person, not funded by Big Pharma, not trying to convince you of anything.*" Similarly, Arby noted that being authentic appealed to skeptical audiences, especially those who shared their identities, reflecting a strategic awareness of broader cultural dynamics: "*I tried to show more sides of me so they understand that I have a similar background. I grew up in a redneck area. I still came to the same conclusions. Sharing a bit about your personal life, just me going out and doing something, is important to build that layer of trust.*"

Overall, authenticity was viewed as critical for fostering the very conditions for effectively sharing science on social media and to avoid "*coming across as having an agenda.*" Roxy explained, "*If I'm just this regular woman next door who loves the Buffalo Bills and eating chicken, it's not as weird when I tell you about what's going on in science. But if you don't know who I am and what I stand for, and I get on social media to tell you to get vaccinated, people would be like, 'who are you telling me to inject something into my body?'*" This recognition that building trust wasn't just about delivering accurate information, but about *who* was delivering it and how authentically they came across, surfaced repeatedly. Arby further reflected, "*That's why I don't think the cure to misinformation is one Bill Nye. It's a lot of scientists with 10,000 followers, because people trust different people. There's a relationship that scientists need to build with their audience, and that's going to look different for every scientist and every audience*."

Too Real, Too Visible: Managing Authenticity, Boundaries, and the Parasocial

Arby's quote reflects an understanding that authenticity itself was not universally defined, or universally received. Timothy reflected that even earnest efforts to "*be yourself*" required careful calibration: "*It's the kind of small-medium nature of a person's account, combined with the fact that they're being themselves, that people find attractive, and can influence people's opinions and behaviors. If someone becomes aware of that and becomes more polished and artificial, they could lose that, right*?"

Several scientists also noted that as their visibility grew, efforts to perform authenticity became increasingly fraught with new challenges: they observed that audiences began to develop parasocial relationships (Horton & Wohl, 1956), characterized as "enduring, long-term, and usually positive, one-sided intimacy at a distance that users develop toward media performers, based on repeated encounters" (Dibble et al., 2016, p. 24).

Megan, Kateryna, Amarachi, and Zoey each described the "weirdness" of realizing how their audiences "know a lot about me, but I know nothing about them" (Kateryna). For some, the loss of control over how and when they were perceived became unsettling. Kennedy shared, "*I get stopped by undergrads on campus sometimes, like, 'Hey, are you that TikToker?' Honestly, sometimes I say no because I just want to be left alone. I don't want people knowing where I live. I don't want everyone in my personal life. There's a luxury in deciding what to share. And the bigger this gets, the less I'll have that luxury.*"

The emotional weight of these parasocial dynamics also prompted a need to (re)negotiate the private and the public. Charlie and Andrew both shared that over time, the cumulative effect of being authentic yet visible became unsustainable and forced them to "set really strong boundaries" (Andrew). For Charlie, it also meant taking a break. "*People would come up to me knowing so much about my life, and I had no idea who they were. I didn't know how to do this, how to show up in these spaces.*" Her reflection revealed a more subtle tension, a feeling of guilt in withdrawing from the audience and (scientific) trust she had worked to build. "*It was scary at first because it felt like, Am I letting people down? But I always went back to, well, no…there's still Charlie behind my science. It's a person, not a robot. And I don't owe people every single thought I have.*" Finally, Andrew (the scientist with the largest social media following in this study) added, "*I've realized that people no longer see me as a person. People see me as a celebrity or a brand. And I'm like, it's literally just me, trying to use this platform to effect positive change in the world and support science and scientists*."

Complexities of (STEM) Representation on Social Media

Representation as Responsibility: "The First, but Not the Last"

For several participants, their self-presentation on social media was shaped by an acute awareness of what their visibility and identities entailed in a field that has historically—and often still—excludes them (Women and Minorities in the S&E Workforce, 2018). Scientists described intentionally making their marginalized identities visible in ways that challenged assumptions about who can "do" science. "*The first Black scientist I ever knew was myself,*" Kennedy said. "*If you're looking for a Black woman in STEM, a first-gen, grad student trying to do things that usually don't happen for someone in my position…I want people to grow up seeing people like me in roles like this.*"

Yet they emphasized that that visibility alone was not enough, and described intentionally presenting themselves as mentors and role models who sought to uplift and create pathways for those after them. Charlie reflected, "*The scientific enterprise doesn't have a lot of people that look like me. I'm one of the few people others look to as someone who's 'made' it.*" She described her self-presentation as intentionally shaped by a "*lift as you climb*" mindset; that is, sharing knowledge, advice, and candid reflections on her journey through science to demystify the process for others. "*If there's a piece of information I got by happenstance as I've been matriculating through the scientific enterprise, I'll post, 'Hey, here's something I didn't know, so I'm going to tell you now', to the person behind me.*"

Others similarly framed their presence online as a deliberate act of mentorship. "*I didn't have role models like me growing up. Now, I hope to be that for younger girls, especially younger brown girls,*" Juno said. "*That's why I'm honest about my journey in STEM and my failures. People deserve to see how it really is.*" For Juno, modeling success meant offering not just an image of success but a transparent account of the obstacles she faced, including both her initial rejection,

and later acceptance, into graduate school. "*As a woman of color in STEM, it may seem like the odds are against us. I want to show them you can do it despite the obstacles.*"

Representation as Risk: When Identity Shapes What Visibility Exposes

At the same time, scientists were also deeply aware of how "*the same dynamics that play out in social media are also playing out in real life, both in terms of privilege and access*" (Harold). Some described the emotional toll of simply existing as marginalized scientists in these digital spaces. "*A lot of Black scientists and scientists from marginalized backgrounds are facing emotional exhaustion. We go on social media and see something every single day that is not for us, that is actively against us,*" Charlie said. "*That is hard to deal with on top of having large platforms and still wanting to do the work. It's extremely hard and requires a lot of boundaries.*" Similarly, as Rose wryly noted, "*You know how it is. Being a woman on social media.*"

For women scientists, those boundaries were often tested by the constant threat of gendered harassment, threats, and sexualization, realities that complicated their efforts to present themselves as visible, positive representations of who belongs in STEM. For example, Astrid said, "*Literally today, I opened my notifications and saw, 'You look like you'd be nice to hug.' It's creepy and unnecessary… I'm trying to protect my mental health more now, which sometimes means not engaging.*" Others like Heather shared strategies such as blocking users, disengaging from hostile comments, or withdrawing from platforms altogether—particularly from X, a shift many noted became increasingly common among marginalized scientists as the platform grew more hostile following Elon Musk's acquisition.

Still, others fought to keep control of what and how they presented themselves, especially when that harassment directly undermined their credibility or shifted focus away from their science. For Astrid, pushing back became another form of boundary-setting and a way to reclaim control:

"*Sometimes that means publicly shaming people. 'I was talking about a black hole study, and you're talking about my cleavage. Don't do that.' I call it out and block them. That helps me feel more in control, especially when so much is out of your control online.*"

Part of that feeling of loss of control stemmed from how algorithms often pushed posts beyond scientists' imagined audiences into viral visibility. Yet at the same time, some scientists revealed an important nuance in how they conceptualized audience boundaries. When posts left their imagined audience and into an actual audience that included hostile viewers, some scientists viewed those audiences as beyond the reach of productive science communication altogether. In doing so, these scientists reveal a pragmatic understanding of the limits of their engagement, and a refusal to center and accommodate audiences who actively undermined their message or identity. For example, Kateryna noted:

> "*With my most recent viral video, the most hateful comments were from men. Comments about my face, body, glasses [that were] completely unrelated to the video. It's disappointing, but they're not my audience. I'm not going to convince them to care about science or make a difference in this world.*"

For male scientists, many explicitly acknowledged how their own identities and privileges shaped their self-presentation, and how safely they could navigate these online spaces. "*I feel obligated to be here because, as a white, straight, cis man, I get less harassment,*" David reflected. "*Women immediately get questioned just because of toxic behavior online. I get annoying climate denialist responses, but it's never personal.*" Luke shared how identity influenced not only audience reactions but also professional perceptions: "*I do wonder how much of it is because I'm a man, a cis man in science; how much I reap the benefits versus my female colleagues… A good friend of mine has been told by senior [colleagues that] she should post less, be less antagonistic.*

She's not antagonistic; she's just outspoken and respectable." Harold put it even more bluntly: "*The privilege of being a loud, confident white man in this field gives me leverage and a long leash to act like a fool and not have it hurt me. That's not a common experience… I get both: freedom to speak and freedom to change my mind. That grace isn't given to others.*"

Scientists in the Court of Public Opinion: Navigating a Changing Science Communication Landscape

"A Moral Obligation"

Many scientists conceptualized their self-presentation on social media as part of a broader, necessary performance of scientific visibility in a changing information landscape. "*Public opinion is so important and often driven by social media. In the court of public opinion, if you're not in the court, how are you going to influence the opinion?*" Roxy said. "*People are going to have the conversation with or without you.*"

Scientists repeatedly framed their presence on social media as "*simply a reality of life now*" (Zoey), "*mandatory*" (Kennedy), and a "*responsibility*" (Astrid). This sense of obligation only became amplified in a political climate marked by rising anti-science sentiment, growing hostility toward experts, and direct attacks on scientific institutions (Nowogrodzki et al., 2025). "W*e haven't done a good enough job justifying the value of our publicly-funded institutions. You want to reach people, you want eyeballs on your work. And the eyeballs are on TikTok*," David said. "*That's where you need to be, especially when times get tough. It's part of our obligation as scientists*." Similarly, Aaron observed that while science itself often remains inaccessible, social media offers a unique entry point to the public: "*What is accessible is whatever's going on on social media; and most of the time, when there's a post about science or medicine, it's coming from*

someone who's not a scientist or doctor. So there's this 'like it or not' situation going on, and I believe we need to do something about it."

Altogether, scientists described how visibility on social media is increasingly seen as part of a scientist's moral and civic duty to safeguard public trust in science via accessible, direct communication with audiences. Aaron's quote, in particular, reflects a more responsive and engaged approach towards science communication (Davies & Horst, 2016); we see how scientists are, in real time, embodying these shifts as they adapt their strategies to changing communication platforms and publics, and reconstruct their role(s) to include fighting misinformation and meeting audiences where they are (literally, for both the science and the platform).

For some, fulfilling that obligation also meant (re)conceptualizing what it was to be a scientist on social media. Some saw their role as "*voices of accurate information among all the other voices*" (Asher), or as "*editors responding to what others say about science*" (James). Megan offered a framing rooted in authenticity: "*I want scientists to be out there. I want to tell [other scientists], download an app, shitpost, be a person*" (Megan).

Yet for some scientists, this sense of moral obligation came with its own toll: the expectation to *always* be present "*felt unattainable and stressful*." As Rose described,

> *"Eventually, it felt unattainable and stressful to do well, especially with the scientific accuracy I wanted. It took up so much time, and a lot of that was spent feeling guilty. Like, why am I reading a book instead of making videos? Am I really doing a good job supporting science, and looking at the state of science, we need science now more than ever. It became a guilt spiral. I decided to stop completely. If the expectation is that I'm not making videos, then I won't feel guilty. But if the assumption is that I'll make videos when inspired, it's hard because you keep wondering why you're not inspired."*

This alternative perspective reveals two additional tensions: first, Rose's reflection points to the emotional labor of sustaining scientific visibility online, a labor that often goes unacknowledged within institutional structures and amplified by social media logics. Second, this sense of responsibility and accountability towards her audiences, towards her own internalized expectations, and towards science itself echoes what Duffy and Chan (2018) term "imagined surveillance" (p. 121). That is, social media users imagine that they are constantly under scrutiny; therefore, they change their online behaviors due to perceiving potentially negative consequences (in Rose's case, for not posting frequently). Rose's eventual decision to take a hiatus, which she described not as avoidance but rather a reframing of expectations, further supports the need for more flexible models of science engagement and communication that recognize these personal costs of visibility and responsibility.

Others similarly reflected on how social media's role and their own relationship to it shifted across broader social, political, and cultural contexts. For both Mike and Charlie, what felt like a crucial site for connection and dialogue, especially during the early Covid-19 pandemic lockdown, was now giving way towards a renewed emphasis on offline engagement as the world slowly reopened. "*I think social media is still really powerful*," Charlie said. "*But the time we spent on social media in 2020 looks really different now. Now, social media is a supplement to the work we have to do in person because of where our communities are spending their time*."

Finally, scientists themselves were acutely cognizant of the changing social media landscape, sharing their concerns of the looming threat of a TikTok ban, the fallout from X's acquisition, and what Harold described as the "Balkanization" of online communities, as audiences scattered across fragmented platforms. Amid these shifting ecologies, Rose offered a reflection that captured both the uncertainty and possibility ahead:

"*There are spaces, and people always find spaces. And the reason that social media is as popular as it is is because people want to find connections. It started with forums, then Reddit, Myspace, and now videos and pictures, something closer to home. X died, so people moved to Threads, which felt similar. Now it's BlueSky. Evolution isn't just biological; it's sociological. We'll keep finding things. The real question is: what conversations and relationships do you want to have, with who, and how?*"

Looking Forward: Supporting Scientists on Social Media

As scientists reflected on their experiences, many pointed to a pressing need for stronger structures to support scientists in these spaces, especially within academic institutions. "*Social media and TikTok specifically is a big time commitment, actually*," Caroline explained. "*[My institution] was supportive... but I wasn't released from any of my service duties. That tells you it's not really valued in the same way for the time commitment that it is.*"

Several scientists advocated for other forms of institutional support, such as hiring dedicated personnel or integrating public engagement into formal merit structures. As Asher said, "*Unfortunately, in academia, it's not part of your tenure package, so you don't get credit for it. It becomes service work you're doing on your own time, at the expense of your research, teaching, or other duties.*" Others, like Heather, suggested guidance and formal training, such as "*talks about academics using social media and boundaries*" and other self-presentational challenges that come with increased visibility and context collapse.

Lastly, many scientists called for "*broader acceptance and open-mindedness*" (Luke), hinting at a cultural shift within the scientific community that values and normalizes scientists on social media. "*I want to combine these things…this work that I do online can be useful, and not*

something I have to hide in my professional career," Kateryna said. "*I can make this a part of who I am as a scientist and not try to put them in separate boxes.*"

Discussion

This study explores how highly visible scientists on social media construct and manage their self-presentation on social media amid diverse and at times competing audience expectations and normative pressures by drawing on semi-structured interviews with 24 scientists across TikTok, Instagram, and X. Next, I summarize the main findings and consider their implications for understanding the dynamics of scientists' self-presentation and how these decisions might shape public engagement with science.

First, this study sought to explicate the nuances of who scientists have in mind for their self-presentational goals on social media. The imagined audiences varied among different scientists, but broadly aligned with Litt and Hargittai's (2016a) categories of personal (friends and family), professional (colleagues, peers, or supervisors), communal (people interested in science) and phantasmal (science skeptics) ties. By relying on targeted imagined audiences, scientists strategically calibrated the extent to which they utilized scientific language and jargon, adjusted their tone and emotions, or shared personal information to resonate (or in some case, not alienate) their imagined audiences. These findings therefore contribute a more nuanced understanding of how visible scientists on social media conceptualize and engage a range of imagined audiences in practice. In doing so, this chapter responds to calls to better characterize plural audiences within science communication (Schäfer & Metag, 2021) by offering a perspective grounded in scientists' own reflections.

Second, scientists' self-presentation on social media reflects and reveals both a range of strategic, normative, and identity-driven goals as well as competing expectations, tensions, and

constraints as they construct and manage their public-facing identities. Three key themes emerged: first, many scientists described their self-presentation on social media as a way to humanize themselves, and to challenge cultural stereotypes of science as cold, inaccessible, and isolated within the "ivory tower" (Fiske & Dupree, 2014; Mead & Métraux, 1957). Their experiences revealed that they are simultaneously working to dismantle public stereotypes about science and scientists while managing a persistent stigma towards social media within the academy. These dual tensions, in part a result of the context collapse of multiple audiences (Marwick and boyd, 2011), shaped how participants managed their self-presentation as they constantly negotiated what it meant to be both a credible scientist and human in a space that collapsed professional, personal, and public expectations.

In response to these tensions, some scientists adopted a "lowest common denominator" approach (Hogan, 2010) by tailoring their self-presentation to what they perceived to be least controversial or most acceptable to their audiences. Others described a "strongest audience effect" (Marder et al., 2016), whereby their self-presentation was primarily oriented towards their most consequential audiences (e.g., future hiring committees, department chairs, or institutional leaders), even if that meant sacrificing relatability with broader publics.

Authenticity emerged as another central theme across interviews, and particularly, building trust and credibility through authenticity. For some, authenticity meant transparency in the scientific process through sharing failures and mistakes. Others employed strategies such as using personal storytelling and humor, disclosing personal identities, or even rejecting traditional credibility heuristics, aligning with experimental research that has suggested some of these strategies can indeed enhance public engagement with science (Zhang & Lu, 2022; Zhang & Lu, 2025). In one sense, these strategies suggest that for many scientists, authenticity was as much

about being true to themselves ("*it's about what doing this in a way that feels authentic to you*," Kristen said) as it was a deliberate means of reconsidering how (scientific) trust, credibility, and relationships with public audiences are built.

But in another sense, these strategies also increasingly mirrored the dynamics of micro-celebrity. As Marwick and boyd (2011) describe, micro-celebrity can be understood as "a mindset and set of practices in which audience is viewed as a fan base; popularity is maintained through ongoing fan management; and self-presentation is carefully constructed to be consumed by others" (p. 140). Similarly, the lens of micro-celebrity may help explain why for some scientists, efforts for authenticity could paradoxically feel performative; that is, it required a heightened awareness of audience expectations, platform cultures and features, and personal-professional boundaries. These reflections point to two intertwined tensions that complicate scientists' performance of authenticity on social media, mirroring dynamics of musician-fan relationships (Baym, 2018); first, a constant negotiation between being "authentic" and avoiding the appearance of being overly curated or inauthentic; and second, the challenge of sustaining authenticity with the expectations of audiences in relationships that, by design, cannot be fully mutual or reciprocal ("*You can't connect deeply with 7,000 people*," like Charlie said).

Many scientists also acknowledged the unequal risks that the visibility of their self-presentation carried, and particularly so for women, people of color, and other scientists from marginalized backgrounds, for whom identity and representation often became inseparable from how they navigated and performed their presence online. Their experiences underscore how some scientists' self-presentation became a means to push back against exclusionary narratives in STEM but heightened their exposure to harassment and threats from hostile audiences, who reacted against the very identities and narratives their self-presentation made visible. As a result, their

efforts to mentor, model success, and expand representation in STEM were frequently challenged by the realities of existing as women, people of color, first-generation scientists and more in spaces that both amplified their voices and the risks they faced. In response, scientists employed a range of boundary-setting and audience management strategies: some chose to disengage from hostile platforms or limit certain types of personal disclosure, while others sought to reclaim control by publicly calling out harassment, blocking users, or explicitly (re)asserting their self-presentational goals.

Finally, scientists' reflections revealed how their self-presentation on social media was deeply intertwined with broader shifts in both the science communication and political landscape (as described in Chapter 1). Across interviews, participants emphasized a growing sense of moral obligation to be publicly visible as scientists, and particularly so in the face of heightened politicization, anti-science sentiment, and an increasingly fragmented media environment. Many scientists saw themselves as filling a vacuum in a digital information ecosystem that often lacked credible yet authentic experts. Thus, they took on a range of roles—educator, fact-checker, advocate, and even "shitposter," as Megan put it—to meet this perceived duty, similar to how journalists also perform a multitude of emerging and traditional roles on social media (Mellado, 2022).

Over time, though, some scientists described cycles of guilt and burnout, while others like Charlie and Mike reflected on the shifting relevance of social media as both public and personal contexts evolved. These findings suggest that scientists' self-presentation should be understood not only as a response to audience expectations or professional norms, but also as a reflection of their understanding of the changing media landscape and thus their conception of what it means to "do science" in public.

Altogether, this study contributes to the current literature in four key ways. First, this study foregrounds individual scientists as key actors in the science communication ecosystem; throughout the interviews, participants acknowledged their self-presentation as a means to shape how science and scientists are perceived by different audiences. In other words, scientists view their self-presentation as both a performance of their personal brand and professional visibility (e.g., their own self) and a performance of science itself as credible, trustworthy, and accessible (e.g., as public representatives of science). These findings align with scholarship that has advocated for positioning scientists as "symbolic focal points for the public sense-making of science" (Davies & Horst, 2016; Koivumäki et al., 2020, p. 434). But at the same time, it raises a deeper contradiction about what constitutes "appropriate" visibility: after all, how can we expect to advocate for this positioning of scientists as visible, symbolic focal points when at the same time, the findings here reveal a persistent stigma towards scientists on social media (arguably one of the most relevant platforms to do so)? If such social media visibility is deemed inappropriate or not legitimate, then what *does* acceptable visibility look like, and who gets to define it? Such dynamics make scientists a particularly compelling group to examine, and reveal how self-presentation becomes a site where individual identity and the public perceptions of science and scientists can be co-constructed in real time.

Second, this work extends prior scholarship on imagined audiences and context collapse by contributing to a more granular understanding of how self-presentation practices are shaped by scientists' evolving conceptions of "the audience," in line with the growing body of scholarship that has called for more explicit engagement with audience conceptualization in science communication (McCarthy & Grant, 2024). These imagined audiences, whether scientific peers, lay audiences, or hostile observers, also hold epistemic and political implications; that is, the very

act of imagining certain publics can serve to include or exclude them from science communication writ large. These dynamics are further complicated by the context collapse and exhibitionary nature of social media (Hogan, 2010), where content is persistent, searchable, and often recirculated beyond its originally intended audience, and particularly so for visible scientists, whose posts may acquire broader public significance. Put simply, imagined audiences can therefore reflect how visible scientists conceptualize the boundaries of science communication itself, thus shaping what kinds of scientific personas are rendered visible (through scientists' self-presentation) and which publics are invited into that scientific discourse.

Third, the findings here provide an important foundation for future quantitative research. For example, this chapter identified a number of common strategies that scientists used to manage their self-presentation (e.g., self-disclosure of personal identities, use of casual aesthetics, etc.); these strategies could be experimentally manipulated and empirically examined to assess their influences on perceived authenticity, credibility, or trust. Similarly, additional surveys could further examine how scientists' imagined audiences vary under different contexts (such as their career stage or platforms), and how those perceptions relate to different content choices or boundary management practices. Such quantitative work could both validate and scale up insights from this chapter, as well as help to identify the downstream outcomes of these decisions and the mechanisms by which they might operate.

Finally, this work seeks to advance a perspective of science communication (on social media and beyond) that is both relational and situational. By relational, I argue that scientists' self-presentations are fundamentally shaped by their relationships with real and imagined audiences. In other words, how a scientist is perceived is not merely a function of their self-presentation but also of how audiences receive, respond to, and (re)shape those performances over time. By

situational, I argue that scientists' self-presentation does not occur in a vacuum but instead is deeply embedded within and constrained by institutional norms, sociopolitical climates, and platform logics.

In doing so, this work contributes to the growing body of literature that has moved beyond the information-deficit model of science communication and instead centers the lived experiences of scientists themselves (Irwin & Horst, 2016; Koivumäki et al., 2020). And as contemporary science communication ecologies become increasingly participatory and networked (Peters et al., 2014), this research highlights how scientific trust and credibility are not simply conveyed by way of institutional ethos or scientists' social media presence alone ("*I want people to listen because they're interested, because they think it's fun, not because I've listed all my credentials and that's why they should believe me,*" Kristen) nor rooted in hierarchical authority ("*...and the beauty of social media is it flattens these hierarchies,*" Amarachi*)*, but rather performed and earned through authenticity, accessibility, and sustained visibility over time.

Limitations & Future Directions

As with any study, there are a number of limitations that should be acknowledged in this method and sample. Although this study employed a purposive sampling strategy to recruit scientists across a range of disciplines, regions, and career stages, there were recruitment challenges in soliciting interviews from more senior scientists. Subsequently, the final sample was skewed toward early- and mid-career scientists; thus, the findings may not fully capture the self-presentational concerns or strategies of more senior researchers, who may face different institutional pressures or reputational stakes. Second, the sample was limited to English-speaking scientists based in Western, Educated, Industrialized, Rich, and Democratic (WEIRD) countries. Future research should examine how cultural differences, political systems, and societal attitudes

toward science may differently shape how scientists engage in self-presentation online. Such comparative studies would be particularly valuable in unpacking how norms, expectations, and tensions may vary across geographic and cultural contexts.

Finally, these interviews were conducted during a particularly volatile political climate in the U.S: since January 2025, thousands of federal research grants have been delayed and cancelled, important scientific databases and papers have been erased or censored, and thousands of employees have been terminated at U.S. science agencies (Tollefson et al., 2025). This broader climate of institutional instability and anti-science sentiment may have amplified the stakes of online visibility for many participants, shaping how they approached their self-presentation and the perceived risks and responsibilities of speaking publicly as scientists. Thus, while the timing of these interviews offers important insight into how scientists navigate self-presentation amid heightened political pressure, it may also reflect dynamics that are uniquely intensified in this particular moment. Furthermore, while this study focused on three major platforms for science communication, it does not fully explore platform-specific dynamics in depth nor account for newer or emerging platforms where different performances of scientific identity might take shape. Together, these point to the need for continued, cross-cultural, and longitudinal research to better understand the complex and evolving relationship between scientists' self-presentation and the broader ecosystems in which they communicate.

Chapter 3:

How Science Observation on Social Media Shapes Normative Perceptions of Science Communication and Trust in Scientists

Introduction

While Chapter 2 centers the motivations and experiences of visible scientists on social media, it leaves open still the question of how scientists' self-presentation, as it manifests within their communication on social media, is actually received by lay audiences. This chapter therefore shifts attention from scientists to the audiences they seek to reach by asking, *what are audiences' normative expectations for how scientists should communicate on social media*? After all, these platforms operate as dynamic spaces where audiences engage with scientific information, negotiate its meaning within broader cultural contexts, and build and shape their relationships with science and scientists (e.g., Yeo, 2015).

A significant body of research has already focused on how scientists can strategically leverage social media for science communication and to promote trust in science (Hwong et al., 2017). Less work, however, has examined the reciprocal side of that engagement; that is, how might these same platforms shape *audience's* expectations and normative perceptions of scientists' communication, roles, and behaviors in these spaces? After all, social media can offer audiences unprecedented access to the informal, behind-the-scenes, and affective dimensions of science, making visible behaviors and knowledge that may have otherwise remained behind lab doors or hidden within the "ivory tower" (Zhang and Lu, 2022).

Through social media affordances such as visibility, platforms can render scientists' communication styles, disclosures, and interactions publicly (or sometimes even highly) visible and enduring (Treem et al., 2020). Over time, these repeated exposures can inform what audiences come to see as normative, appropriate, or expected behaviors for scientists in public life. In this way, social media can contribute to "the set of expectations, schemas, and scripts that [audiences] draw on" when evaluating scientific content and engaging with scientists (Bayer et al., 2020, p. 475). Therefore, the present study adopts a social media affordances approach to investigate the potential for social media to (re)shape these normative perceptions. Influencing these perceptions, in turn, can guide attitudes and behaviors, serving as a mechanism for social change (Tankard & Paluck, 2016). Such an approach is particularly relevant in today's information landscape, where audiences on platforms like TikTok, Instagram and X are increasingly exposed to different, often informal, models of science communication (e.g., Zeng et al., 2020).

By utilizing data from a two-wave U.S. national panel survey conducted in February and March 2025, this exploratory study seeks to examine a theoretical model in which science observation on social media may be associated with normative perceptions across four dimensions: political expression, warmth-oriented strategies, competence-oriented strategies, and public engagement. Subsequently, these normative perceptions may play a critical role in shaping broader attitudes toward science, particularly so as attitudes towards science become more politically polarized (Gauchat, 2012). Thus, I also examine whether these norms are associated with trust in scientists and willingness to be vulnerable to scientists, and whether the aforementioned relationships might be moderated by political ideology.

Science Observation on Social Media: An Affordances Approach

The concept of affordances was first coined by Gibson (1977) to refer to the potential perceived actions that an environment offers individuals. Later, the concept was applied to communication technology to describe the "relational structure between an object/technology and the user that enables or constrains potential behavioral outcomes in a particular context" (Evans et al., 2017, p. 36). The affordances approach provides a holistic and nuanced perspective towards examining technology and user behavior that transcends specific platforms or features (Evans et al., 2017; Treem & Leonardi, 2013). Rather than assume platform structures exert uniform or predetermined outcomes, such an approach instead highlights the mutuality between a user's subjective interpretations and intentions and a platform's features and technological capabilities to consider the "possibilities for action" (Evans et al., 2017, p. 36; Majchrzak et al., 2013; Treem & Leonardi, 2013).

Already, a breadth of literature has explored how social media affordances can facilitate interaction and promote participation, engagement, and learning in the realm of political and organizational communication (Kim & Ellison, 2022; Treem & Leonardi, 2013). For example, Kim and Ellison (2022) found that affordances like visibility, persistence, association, and editability can allow people to learn about political engagement by observing others' behaviors on social media. Drawing on Bandura's (1977) social learning theory, the authors argue that social media users can acquire these new norms and behaviors through attention, retention, and reproduction of observed (political) actions of their networks (Bandura, 1977; Kim & Ellison, 2022).

In the context of the present study, then, affordances can perhaps provide a useful lens to examine how social media can similarly structure the possibilities for how audiences observe

science, and how that observation can shape normative perceptions about science communication. While some emerging research has applied the affordances lens to understand how scientists engage with the public on social media (for example, during the Covid-19 pandemic; Hara & Chae, 2025), this work seeks to extend this perspective to examine how affordances may also shape how *audiences* come to observe, interpret, and form expectations based on that engagement. After all, just as observing other users' political behaviors can influence what users internalize as acceptable or expected political participation norms (Kim & Ellison, 2022), observation of science content on social media may also shape beliefs and expectations about what constitutes appropriate or normative science communication.

Here, science content is defined broadly to reflect the diversity of science information and discourse that can be observed on social media, ranging from reports of scientific findings, to personal commentary on or political expression towards science-related topics, to even science misinformation. Such content may originate from a wide range of sources[6], including scientists, institutions, influencers, or bad-faith actors, and may vary in tone, accuracy, intent, and framing. The present study therefore conceptualizes science observation as a function of exposure to this broad landscape of science content on social media, the nature of which may be shaped by social media affordances.

[6]Science observation was intentionally defined broadly here to reflect how social media users actually experience science online. That is, most users do not distinguish posts *from* scientists and posts *about* science, since an important feature of social media is that content can circulate without clear indicators of the source or their expertise. For example, a user might view a scientist's TikTok stitched with a viral reaction video, or read political commentary about science without recognizing that it originated from a scientific source. Thus, this measure was designed to reflect what users see, rather than what they know (or remember) about who posted it. While future studies can further differentiate between specific sources, this study is interested in what becomes perceived as normative, which may not necessarily be based upon verified expertise or authorship, but rather the visible repetition of certain behaviors and discourse.

An exhaustive list of social media affordances here would be, as Theochraris et al. (2022) argue, "long, subject to some debate, and vulnerable to growing outdated rapidly" (p. 793). Instead, this study identifies four key, top-level affordances shared by many popular social media platforms—visibility, social presence, association, and personalization—that are relevant to science communication and theorize how they may impact how social media might shape science observation, and why that matters for shaping normative perceptions.

On social media, users can be afforded the ability to make publicly visible their behaviors, knowledge, preferences and network connections that otherwise would remain inaccessible or invisible (Treem & Leonardi, 2013; Treem et al., 2020; Ellison & Vitak, 2015). For example, people can now observe or easily locate information about other users' attitudes towards science or online science engagement, which can be made visible through their profiles, status updates, and photos (e.g., Halpern et al., 2017). In this way, the affordance of *visibility* can shape what kinds of science content are made visible on social media, that is, not only formal scientific press releases or findings, but also personal commentary on scientific issues, science-related political expression, or more from users' own social media networks.

At the same time, as Chapter 2 demonstrated, many scientists use social media to present themselves, discuss their research, engage with other users, and respond to current events (Jarreau et al., 2019; Zhang & Lu, 2025). Prior to social media, lay audiences were not privy to such observations, which were often filtered through traditional media or institutional channels (Fahy & Nisbet, 2011). Visibility, then, can quite literally render visible dimensions of scientific work and identity that traditionally remained "in the ivory tower," thereby providing users with the opportunity to observe and learn how scientists engage and behave on social media.

Furthermore, this visibility is likely amplified by the scale and nature of scientists' engagement: hundreds of thousands of scientists actively maintain social media presences, often with large and heterogeneous audiences (Costas et al., 2020). Many of these scientists also use a single account for both professional and personal expression, collapsing the boundaries between the persona of the scientist and the social media user (Bowman, 2015). Subsequently, audiences may encounter and observe the affective, informal, and interpersonal dimensions of science communication on social media (Zhang & Lu, 2024). In doing so, visibility not only influences public exposure to science and scientists, but also structures what kinds of recurring science content and communicative behaviors are observed and potentially internalized as normative.

Relatedly, social media can also promote *social presence*, which refers to users' subjective feelings of an "awareness of the other person's presence in online environments" (Short et al., 1976, p. 65; Fox & McEwan, 2017). As science content—and the behaviors and knowledge of the people behind it—become increasingly visible on social media, audiences can observe various self-disclosures, storytelling, or interpersonal messaging in science content. Observation of such content, as well as the use of interactive platform features (e.g., tagging, commenting, direct messaging with scientists), can contribute to a heightened sense of social presence (Zhang & Lu, 2024). That is, audiences are afforded an opportunity to feel such mediated closeness to science communicators (e.g., scientists) and perceive them as more "real" and less "removed" from the everyday experiences of non-scientists.

As an affordance, social presence is particularly significant given the persistent gap between lay audiences and the scientific community: a 2021 national poll found that 72% of Americans could not name a single living scientist, a figure that, while still high, represents a nearly 10% decrease from the same survey conducted in 2017 (Research!America, 2017; 2021).

While social media has, of course, existed well before both polls, the Covid-19 pandemic appears to have marked a turning point: scientists, science influencers and communicators, and science content became more prominent in public discourse (Fahy & Lewenstein, 2022; Saks & Tyson, 2022). Amid these shifts, social media can contribute to this psychological phenomenon in which users can feel as if they are with other salient social actors (in this case, the scientists) within this technologically-mediated environment (Weidlich & Bastiaens, 2019).

Next, the affordance of *association* allows for the capacity to create and navigate connections between users, content, and networks (Treem & Leonardi, 2013; Fox & McEwan, 2017). Platforms like X, Instagram, and TikTok allow users to connect with other users regardless of whether that other user follows them back; in doing so, users can observe (science) content directly or encounter such posts through mutual "friends" and networks (boyd & Ellison, 2007; Fox & Moreland, 2015). Furthermore, as Ellison et al. (2015) articulate in the context of knowledge-sharing practices within organizations, the association affordance enables users to more easily identify or contact other users with certain expertise (Ellison et al., 2015). These linkages therefore can allow users to situate science content and scientists within broader social and informational networks, help them identify (scientific) expertise, or even shape how audiences interpret scientists' credibility and relevance. At the same time, users' own networks can shape the type of content, as well as communicative behaviors, they are most likely to observe (Ellison & Vitak, 2015), thus influencing how users might learn and form expectations about science communication.

Lastly, *personalization* can be conceptualized as both receiver-oriented (that is, users customize what they see based on who they interact with) and sender-oriented (how communicators craft content directed towards particular audiences) (Fox & McEwan, 2017;

Malhotra, 2024). Social media platforms can afford both: science communicators can personalize their communication style, tone, or content to align with the perceived preferences or expectations of a given audience segment (Luzón, 2013). Users who perceive that content as directed towards "people like them" may be more inclined to interact with such tailoring (Lou et al., 2021). In turn, this type of content may be more likely to appear in their feed and reinforce its perceived typicality. Such reciprocal forms of personalization therefore influence the kinds of science content that are most observable (and memorable) to audiences. Put simply, content that aligns with user preferences may be more likely to be observed and interpreted as what science communication *should* look like on social media.

Altogether, such an approach can help explain why and how social media may uniquely structure science observation, and offer an exploratory framework towards how normative perceptions of scientists' communication on these platforms can be (re)formed, which I discuss in more detail in the next section. Broadly, I predict that science observation on social media can be associated to the very normative perceptions surrounding science communication due to the affordances of social media.

Normative Perceptions of Scientists' Communication

Normative perceptions refer to individuals' subjective perceptions of norms, which are the behaviors and attitudes that are considered acceptable, appropriate, or expected within a given context (Ajzen, 1991). These expectations relate to the standards or assumptions individuals hold regarding how others should behave (Burgoon, 2015). Importantly, though, these normative perceptions may not be necessarily grounded in reality; rather, they can be shaped by users' "unique and local experiences" (Tankard & Paluck, 2016, p. 182), such as their social media

networks or what is made visible (and thus observable) to them through public behaviors and signals (Ross et al., 1977; Fiske & Taylor, 1984).

In the previous section, I explored how the affordances lens can help explicate the sociotechnical aspects of the broader communication environment under which these normative perceptions can be shaped. As audiences observe science content and recurring patterns of behaviors or communicative styles, these practices may become perceived as normative and therefore a reality, signaling the "normative" or "expected" way for scientists to behave on these platforms (Bayer et al., 2020; Zillich & Wunderlich, 2024).

Here, I focus specifically on normative perceptions of scientists' communication for two reasons. First, although not all science content on social media originates from scientists, patterns observed across the broader information landscape may still inform or contribute to what audiences come to expect of scientists' roles and behaviors in public discourse (e.g., Pierce (2009) describes a spillover effect in the form of inadvertent emergence of new (shadow) norms in the context of privacy). Second, perceived violations of communication norms may undermine trust or amplify skepticism (Bormann et al., 2022; and as Chapter 4 will go on to show). As scientists seek to position themselves as prominent science communicators with expertise and authority in these online information environments (Huber et al., 2019), specifying these norms and how they might emerge is thus essential, particularly so in a political climate that has become increasingly hostile towards scientists (Tollefson et al., 2025).

While these perceptions can run the gamut from different communication styles and behaviors to various public-facing roles, this study focuses on four types that reflect salient aspects of contemporary science communication: scientists' political expression, warmth-oriented strategies, competence-oriented strategies, and public engagement behaviors. First, I selected

political expression to capture growing tensions and evolving norms about scientists' political expression on social media, especially in the face of increasing politicization and polarization of scientific issues (Gauchat, 2012). The next two perceptions draw from the Stereotype Content Model (SCM), which posits warmth (e.g., friendliness, relatability) and competence (e.g., intelligence, capability) as the two dimensions that guide social perception (that is, how people evaluate others; Fiske et al., 2002). Finally, I included *public engagement* to reflect broader expectations for engagement and interaction, particularly as models of science communication move beyond one-directional, "deficit model" approaches (Sturgis & Allum, 2004).

Political Expression

Political expression can broadly be understood as "practice of posting about political processes or public affairs on social media sites, to which a set of users are given access" (Kim et al., 2021, p. 1124). In the political communication arena, political expression on social media holds significant implications for a well-informed, democratic public, as it can facilitate offline political participation (Kwak et al., 2018). While political expression on social media is not a new phenomenon, its role in science communication has been subject to ongoing professional debates (see Büntgen, 2024; van Eck et al., 2024). Longstanding norms of scientific objectivity and neutrality have traditionally discouraged political expression among scientists, with some scholars cautioning that political expression could undermine public perceptions of trust and credibility (Büntgen, 2024). However, other scholars (including many interviewed in Chapter 2) have pointed to the growing politicization and polarization of science in the U.S., arguing that political expression is a moral imperative and necessary to justify scientific research (and funding) to public audiences (van Eck et al., 2024).

Despite these debates, existing research suggests that scientists are increasingly engaging in political expression on social media. For example, Alabrese et al. (2024) analyzed posts from a sample of 97,737 U.S. academics on X and found that approximately 40% expressed at least one political opinion on topics ranging from climate action to immigration to racism (although it is also important to note that they did find significant ideological polarization for these topics among academics). Similarly, Basch et al. (2021) also identified nearly 60% of the climate-related TikTok videos examined in their study included political expression and critiques, or policy commentary. Such trends suggest how the affordance of visibility can render scientists' political expression observable to other users through status posts. And as these expressions become visible, audiences may come to view political expression as a normative component of scientific communication on social media. Therefore, I hypothesize:

H1a. Science observation on social media (Wave 1) will be positively associated with normative perceptions of scientists' political expression on social media (Wave 2).

Warmth and Competence Oriented Strategies

Warmth-oriented strategies include a range of verbal, visual, and aural cues that convey friendliness, relatability, and authenticity; competence-oriented strategies can utilize similar cues to express expertise and intelligence (Bunquin & Zhang, 2025; Cuddy et al., 2008). As mentioned earlier, these strategies map onto the two dimensions of the SCM, which structure how individuals make judgements towards social groups, including scientists (Fiske et al., 2002). While scientists have been generally perceived as high in competence and low in warmth (Fiske & Dupree, 2014), social media has provided new opportunities for scientists to strategically employ both warmth-oriented and competence-oriented strategies to shape how scientists are perceived and what types of strategies audiences observe and come to expect (Bunquin & Zhang, 2025).

Already, research suggests that scientists frequently employ both types of strategies on social media. In a multi-modal content analysis of popular scientists' videos on TikTok, Bunquin and Zhang (2025) found that scientists blend various warmth and competence-oriented strategies to humanize themselves while also establishing their credibility. Specifically, these scientists utilized social media scripts, personal self-disclosures, affective and casual language and imagery to signal warmth, and used jargon, professional self-disclosures, formal and explanatory language or (visual) demonstrations to signal competence (Bunquin & Zhang, 2025). Steinke et al. (2024) identified similar dual strategies through a reflexive thematic analysis of 30 women in STEM influencers on Instagram; the authors found that they cued warmth by being approachable and exhibiting interpersonal attraction and displayed competence by referencing their scientific roles, research, and expertise (Steinke et al., 2024).

Observations of these strategies, and subsequently expectations of their use, are often amplified by the aforementioned social media affordances. For example, research has shown how warmth-oriented strategies like personal self-disclosures can increase perceived social presence, which in turn increases perceptions of scientists' warmth (Zhang & Lu, 2024). This creates a reinforcing cycle of sorts: as scientists increasingly use strategies that increase social presence, so too audiences experience their interactions with scientists as more real and meaningful (e.g., Kim & Song (2016) in the context of celebrities). And the stronger these feelings of "being with a scientist," the more likely these strategies may be interpreted as normative. Similarly, when scientists personalize their strategies for specific audiences, and users selectively engage with content that aligns with their interests, the perceived typicality of those strategies may increase (Fox & McEwan, 2017; Lou et al., 2021). That is, warmth or competence strategies that feel "real,"

personally relevant, tailored, and that are frequently observed are therefore more likely to be perceived as expected components of science communication. As such, I propose:

H1b. Science observation on social media (Wave 1) will be positively associated with normative perceptions of scientists' use of warmth-oriented strategies on social media (Wave 2).

H1c. Science observation on social media (Wave 1) will be positively associated with normative perceptions of scientists' use of competence-oriented strategies on social media (Wave 2).

Public Engagement Behaviors

Finally, public engagement behaviors refer to those that encourage engagement and interactions, such as replying to comments, answering questions from lay audiences, promoting audience participation, or responding to feedback. Such behaviors reflect an acknowledgement of growing normative expectations for scientists to move beyond a one-directional, deficit model of communication and towards more engagement or participatory approaches (Sturgis & Allum, 2004). These expectations are even more salient in an increasingly digital science communication landscape: as lay audiences turn towards social media to obtain science information, scientists have been called upon and encouraged to be accessible and engaged on these platforms (e.g., Mojarad, 2017).

Indeed, scientists do actively engage in these behaviors on social media, which have become more visible and publicly observable. A Pew Research Center report found that nearly half of the scientists associated with the American Association for the Advancement of Science engaged with online publics through social media (Raine et al., 2015). More recently, we saw the widespread social media presence and engagement of epidemiologists, infectious disease

specialists, and medical experts during the Covid-19 pandemic: these scientists utilized Facebook, X, TikTok, and more to share real-time scientific updates with public audiences, answer their followers' questions about different scientific developments, and address mRNA vaccine misinformation circulating among these platforms (Fahy & Lewenstein, 2021). Furthermore, the affordance of association enables users to situate and locate those with relevant expertise (in this context, scientists) within broader social and informational networks (Ellison et al., 2015). For example, when a climate scientist is followed by and regularly engages with journalists, advocacy groups, other users, and organizations, these visible associations may signal a more "public-facing" role, reinforcing normative perceptions around public engagement. Thus, I hypothesize:

> **H1d**. Science observation on social media (Wave 1) will be positively associated with normative perceptions of scientists' public engagement on social media (Wave 2).

Why Norms Matter: Trust and Willingness to be Vulnerable to Scientists

Normative perceptions have long been shown to be powerful "vehicles for social change" that can shape attitudes and behaviors, across fields from social psychology to communication to public policy (Tankard & Paluck, 2016, p. 102). After all, people are motivated to understand the norms of the communities they engage with or belong to, so as to feel a sense of belonging, avoid social rejection, and to maintain accuracy about (social) facts (Cialdini & Goldstein, 2004). People's normative perceptions, even if objectively inaccurate, can thus become a reality that shapes and guides their own behaviors as well as expectations for others' behaviors (Ross et al., 1977). Subsequently, many strategic communication campaigns have sought to influence normative perceptions instead of attitudes themselves, since these perceptions may be more malleable than well-formed attitudes tied to personal ideologies or values (Tankard & Paluck, 2016).

Given the influence that normative perceptions can have on how individuals interpret behaviors and evaluate others, I argue here that normative perceptions of scientists' communication on social media can similarly influence important downstream outcomes: specifically, trust in scientists and willingness to be vulnerable to scientists. Trust in scientists, often conceptualized as an integrative perception of competence, integrity, benevolence, and openness, has important implications for a healthy and informed society (Besley et al., 2020; Cologna et al., 2025). Higher trust provides a foundation for effective and efficient evidence-based decision-making (Algan et al., 2021) and can encourage individual and collective action on pressing scientific challenges like climate change (Cologna & Siegrist, 2020). Yet, trust in scientists (that is, perceptions of trustworthiness) alone may not be sufficient, particularly in politicized or polarized scientific contexts where individuals must not only see scientists as trustworthy, but also be willing to cede authority or accept potential risks based on scientific recommendations (Brossard & Nisbet, 2007; Cologna et al., 2025). The second outcome then focuses on this more behavioral form of trust; that is, the willingness to make oneself vulnerable to scientists, where vulnerability might be understood as "a willingness to take personal advice from scientists or want government to take advice from scientists" (Besley et al., 2020, p. 710).

Although few studies have directly examined how normative perceptions influence these outcomes, there is growing evidence that the underlying behaviors themselves—political expression, warmth, competence, and public engagement—can shape trust in and willingness to be vulnerable to scientists. For example, a majority of German and U.S. citizens support and expect scientists' political advocacy on climate change (Cologna et al., 2021); this advocacy is associated with increased public trust, especially for liberal individuals (Cologna et al., 2024). Similarly, when scientists engage in strategies that influence the extent to which they are perceived as

competent and warm, people may be more likely to support science policies (Zhang & Lu, 2025). Lastly, public engagement has long been explored as a means for restoring trust in science (Wynn, 2006).

Still, equally important is whether audiences perceive those behaviors as normative, because these normative perceptions can operate as heuristics of sorts for interpreting behaviors, particularly so in contexts where individuals lack motivation and ability or are faced with a novel or unfamiliar situation (Fiske & Taylor, 1984; Petty et al., 2002). Scientists on social media (still a relative novelty in and of itself), then, is one such context: when forming judgements related to trust and vulnerability in watching a science TikTok video, for example, audiences may choose to evaluate whether that scientist's communication styles or behaviors align with their own normative perceptions instead of assessing them based on their message or expertise alone (Cialdini & Trost, 1998). In other words, these normative perceptions become cues for assessing scientists' typicality, and by extension, their trustworthiness.

Furthermore, expectancy violation theory suggests that we expect individuals to behave and communicate in certain ways due to social norms and other factors (Burgoon, 1993; Burgoon & Hale, 1988). For example, scientists who violate traditional communication expectations (e.g., appearing too casual or political; Büntgen, 2024) may provoke negative evaluations. However, if audiences hold normative perceptions that such behaviors are appropriate or expected, these same behaviors may instead be evaluated more positively. In a way, these shifting normative perceptions may also buffer against negative reactions to behaviors that once might have been seen as inappropriate: audiences may increasingly interpret public engagement, warmth- and competence-oriented messaging, or political expression not as deviations, but as legitimate and even expected dimensions of scientific trustworthiness. I therefore pose the following research question:

RQ1: How might normative perceptions of scientists' communication on social media be associated with (a) trust in scientists and (b) willingness to be vulnerable to scientists?

Additionally, I predict that normative perceptions may serve as important mediators between science observation and the two downstream outcomes. When users consistently observe scientists' behaviors on social media, they may extrapolate and generalize those perceptions to scientists more broadly (as "cognitive misers," Fiske & Taylor, 1984). That is, audiences who frequently observe science on social media may begin to develop normative perceptions about the types of behaviors that are typical or appropriate for scientists. These emerging normative perceptions, in turn, may influence those audiences' broader attitudes towards scientists. Thus, I ask as a second research question:

RQ2: Will normative perceptions of scientists' communication on social media mediate the relationship between science observation on social media and (a) trust in scientists and (b) willingness to be vulnerable to scientists?

The Role of Political Ideology as a Moderator

In recent decades, ideologically-driven differences in trust in scientists and other attitudes towards science have widened in the U.S., with conservatives expressing lower trust in scientists and increased skepticism towards scientists and scientific institutions than liberals (Gauchat, 2012; Kennedy & Tyson, 2023). These divisions, then, may extend to how people respond to scientists' behaviors and communicative strategies on social media.

Indeed, people are more likely to attend to and believe information that aligns with their prior beliefs, while discounting or resisting incongruent information (Taber & Lodge, 2006). For conservatives, behaviors like political expression or informal, personalized messaging may be viewed as dissonant messages, and thus could be less likely to shift their normative perceptions

and instead reinforce negative attitudes (Nisbet et al., 2015). On the other hand, liberals, who tend to hold more positive attitudes toward scientists and may be more supportive of scientists' public engagement and advocacy roles, might be more receptive to these same behaviors and perceive them as normative (Funk et al., 2019).

Furthermore, selective exposure and political homogeneity on social media may mean that conservatives and liberals differ in the extent to which they encounter science content on social media (e.g., Garrett, 2009). However, these patterns may be complicated by algorithmic curation (that is, algorithms might promote the spread of content outside of one's ideological preferences; Thorson & Wells, 2016) or by the socialization of social media information (e.g., via social endorsements), which can promote exposure to information from politically-heterogenous sources (Messing & Westwood, 2014). Thus, even when individuals do observe the same set of interactions or content (i.e., observing scientists reply to comments or advocate for policy), the extent to which their observations might influence their normative perceptions may be moderated by their political ideology.

However, a number of studies have suggested that political ideology may not actually moderate these relationships, or perhaps to a lesser extent: a 2024 study examining the associations between social media use and perceptions of social norms related to the Covid-19 vaccine found no significant interaction with political affiliation (Chinn & Hasell, 2024). Others, too, have found a lack of moderation effects even in politically-polarizing contexts such as climate change (e.g., Hart et al., 2023).

Still, investigating political ideology as a moderator allows us to examine whether normative perceptions about scientists' communication behaviors are malleable even for partisan audiences, who might hold otherwise stable and affect-laden attitudes toward science and scientists

(Gauchat, 2012). As described earlier, social media allows for new opportunities for intentional and incidental science observation; if such observations can indeed shift these normative perceptions, even among partisans, these findings can further clarify how everyday, online encounters with science might influence ideological gaps in trust in science or encourage (or discourage) broader receptivity towards scientific recommendations. Given these conflicting findings, I ask as my last research question:

RQ3: Does political ideology moderate the association between science observation on social media and normative perceptions of scientists' communication on social media?

In addition to the above-stated hypotheses and research questions, this study also explores whether the direct or total effects of science observation on social media may be moderated by political ideology.

Summary of Theoretical Expectations

Altogether, this study explores a theoretical model in which science observation on social media may influence normative perceptions related to scientists' political expression, warmth-oriented strategies, competence-oriented strategies, and public engagement, which may be associated with broader attitudes toward science. Additionally, I examine whether these relationships might be moderated by political ideology.

To summarize, the proposed directions of causality are based upon expectations rooted in several complementary strands of theory. First, Bandura's social learning theory (Bandura, 1977) suggests that individuals can acquire beliefs and expectations through observation of others. In the context of this study, audiences' repeated exposure to others' science communication behaviors online (whether through scientists directly or through the broader discourse on science) can serve as a form of vicarious learning. When such behaviors are made visible and recurrent, or receive

social endorsement (e.g., likes, shares, reposts, etc.), they may serve as cues towards what is acceptable or normative. Over time, these observations can contribute to the internalization of normative perceptions about how scientists should communicate on social media.

Furthermore, the affordances perspective may explain *how* users come to observe these behaviors. Specifically, affordances like visibility, social presence, association, and personalization can structure what types of science content users may be likely to encounter, and often incidentally so. These affordances can amplify particular types of communication behaviors, make visible interpersonal ties, and filter what users observe based on platform dynamics and social networks. In this way, audiences' normative perceptions about how scientists *should* communicate may be in part shaped by social media affordances, which can afford opportunities for both active and passive observation of scientists' communication on these platforms.

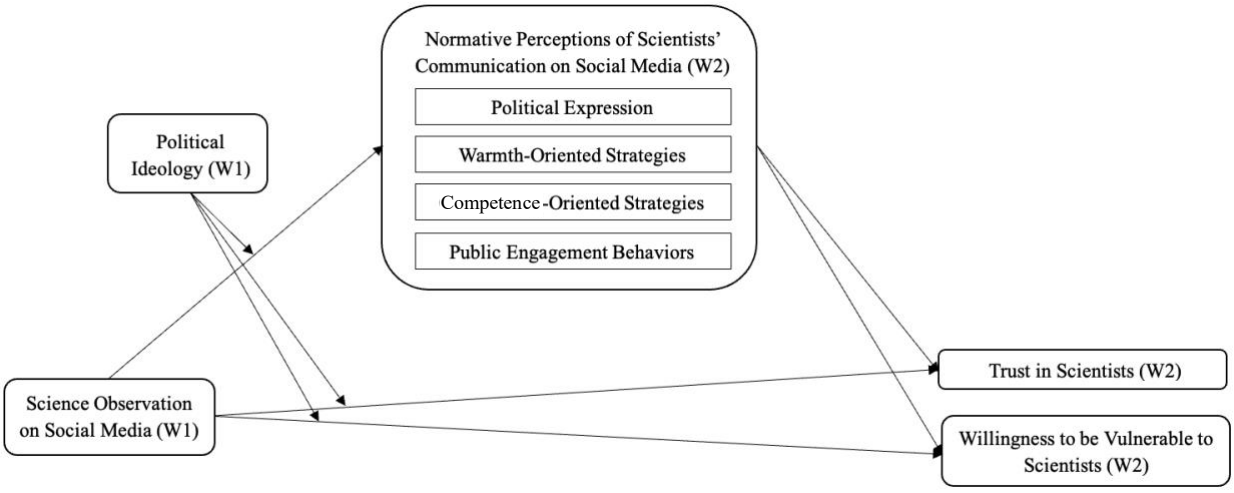

Figure 3.1 Full Conceptual Model.

Lastly, once these normative perceptions become internalized, they may serve as cognitive heuristics that inform users' broader attitudes towards scientists (e.g., Petty & Cacioppo, 1986).

That is, if audiences observe scientists who communicate in ways that align with their normative perceptions, they may be more likely to trust or be vulnerable to scientists (in line with what Burgoon's (1993) expectation violation theory would also suggest). The conceptual framework is shown above in **Figure 3.1**.

Method

Data

The present study analyzes original data from a two-wave panel survey of U.S. participants collected in February and March of 2025. Participants were recruited through Forthright, an online sampling platform, using quota sampling to closely reflect U.S. census characteristics. Only participants who reported using social media and currently possessed an active account were eligible to participate, since the independent variable required participants to use social media.

Wave 1 data were collected between February 19 and February 27, 2025, yielding 1,268 valid responses after excluding participants who failed either of two attention check questions embedded within the survey flow. Of those initial respondents, 878 completed the second wave of the survey (conducted between March 17–21, 2025), resulting in a retention rate of 69.2%.

The average age of participants was 47.6 years (SD = 16.6). Approximately half (49.0%) identified as female, 47.4% as male, and 3.6% as nonbinary or chose not to disclose their gender. The majority of participants were White (67.4%), followed by African American (12.1%), Hispanic or Latine (11.5%), Asian (4.2%), and 5.0% identified as "other." For education, 10.5% of participants held an advanced degree, 27.1% held a Bachelor's degree, 40.1% had completed some college or held an associate degree, 20.3% were high school graduates, and 2.0% had not completed high school. The median self-reported family income was $50,000 - $74,999.

Measures

After consenting to the survey, participants first were presented with a definition for "science" and "scientists." Since individuals may hold different interpretations of these terms, this definition was included (in both waves) to promote conceptual clarity and ensure consistent interpretation across all participants. The definition was adapted from Mede et al. (2025) and read as follows:

> *When we say "science," we mean the understanding we have about the world from observation and testing, across not only traditional scientific fields like physics, biology, and medicine but also applied and everyday sciences such as sustainability, food science, and technological innovation.*
>
> *When we say "scientists," we mean researchers, medical professionals, engineers, environmental scientists, and experts in fields such as physics, biology, social sciences, and technology.*

Science Observation on Social Media.

In the first wave of the survey, participants were asked, "Generally, how often have you come across the following types of information about science on social media?" The 8 types of science content included items such as "reports on new discoveries, research findings, or expert analyses," and "posts encouraging political action on science-related issues." ($M = 2.59$, $SD = 0.81$, $\alpha = 0.88$).

As noted earlier, a composite index of science observation was employed to reflect the range of science content on social media. However, additional analyses were conducted, where science observation was further categorized into three sub-types (informational, advocacy, and provocative science content). The full results of those analyses are presented in **Appendix B**.

Normative Perceptions of Scientists' Communication on Social Media

In the second wave, participants were asked to indicate their agreement (1 = *strongly disagree*, 5 = *strongly agree*) with several statements related to their expectations for scientists' communication on social media across four types of perceptions. These statements are drawn from existing research, such as Bunquin & Zhang (2025), that have identified common strategies utilized by scientists on social media (e.g., through content analysis). Given the lack of established constructs and scales related to these perceptions, an exploratory factor analysis (EFA) was employed to explore the extent to which items in each type of perceptions did indeed load onto a single, distinct factor (e.g., discriminant validity). **Appendix B** provides the results of the EFA.

(1) Public engagement was captured by asking participants to indicate their agreement with four statements, such as "replying to comments and questions from the public about science" and "responding to feedback and encouraging audience participation" ($M = 3.97$, $SD = 0.94$, $\alpha = 0.83$).

(2) Competence-Oriented Strategies were measured with six items, such as "using precise, technical language" and "prioritizing accuracy and evidence-based communication" ($M = 4.02$, $SD = 0.47$, $\alpha = 0.69$).

(3) Warmth-Oriented Strategies were similarly measured with five items, including "incorporating humor, memes, or pop culture references" and "using a conversational, friendly tone" ($M = 3.67$, $SD = 0.61$, $\alpha = 0.63$).

(4) Political expression was captured by asking participants to indicate their agreement with two statements, "express their opinions on political and societal issues unrelated to science" and "express their opinions on political and societal issues related to science" ($M = 3.02$, $SD = 1.01$, $r_{SB} = 0.62$).

Trust in Scientists

In the second wave of the survey, twelve items were averaged to create an index, adapted from Cologna et al., 2025. Examples of these items include, "When I think about scientists, most are…competent / qualified when it comes to conducting high-quality research / honest." Participants responded on a 5-point scale of 1 = *strongly disagree* to 7 = *strongly agree*. (M = 3.81, SD = 0.72, α = .94).

Willingness to be Vulnerable to Scientists

In the second wave of the survey, three items were averaged to create an index, adapted from Mede et al., 2025. These were, "How much or little should people rely on scientists' guidance when making lifestyle choices related to science?," "How much or little should governments rely on scientists' guidance when making decisions related to science?," and "How much or little control do you want scientists to have on government decisions related to science?" Participants responded on a 5-point scale of 1 = *Very little* to 7 = *Very much*. (M = 3.70, SD = 0.94, α = .84).

Political Ideology

In the first wave of the survey, political ideology was measured by asking participants "When it comes to politics, do you generally consider yourself to be…" on a scale that ranged from (1) Very liberal to (7) Very conservative (M = 3.69, SD = 1.80).

All items for each scale employed in the study are included in **Table 3.1**, and inter-item correlations for all variables in the model are reported in **Table 3.2**.

Table 3.1 Items for each scale.

Scale Name	Items	Cronbach's *α*	*M (SD)*
Science Observation on Social Media	Over the last 12 months, how often have you come across the following types of information about science on social media? • Reports on new discoveries, research findings, or expert analyses • Science explained in simple, engaging ways (e.g., infographics, science reels) • Personal opinions or commentary on science topics • Science-related activism content • Posts encouraging political action on science-related issues • Controversial or politicized science issues that generate public debate • Misinformation about science that spread false, exaggerated, or misleading information related to scientific topics. • Emotionally-charged science content that frame these issues in ways meant to provoke outrage, fear, excitement, or moral concern	$\alpha = .88$	2.59 *(0.81)*
Public Engagement Behaviors	• Scientists on social media should reply to comments and questions from the public about science. • Scientists on social media should engage in discussions about science topics with public audiences rather than just posting information. • Scientists on social media should encourage audience participation by asking questions, responding to feedback or inviting discussion. • Scientists on social media should interact with the public rather than primarily communicating with other scientists.	$\alpha = .94$	3.97 *(0.94)*

Competence-Oriented Strategies	• Scientists on social media should prioritize accuracy and evidence-based communication over engagement tactics. • Scientists on social media should present themselves as authoritative, knowledgeable experts in their field. • Scientists on social media should use precise, technical language when necessary to convey scientific accuracy. • Scientists on social media should correct misinformation about science even when it may cause public conflict. • Scientists on social media should share personal experiences or updates to their science or research. • Scientists on social media should maintain professional neutrality and objectivity when discussing scientific topics.	$\alpha = .69$	4.02 *(0.47)*
Warmth-Oriented Strategies	• Scientists on social media should use a conversational, friendly tone rather than a formal or academic one. • Scientists on social media should incorporate humor, memes, or pop culture references. • Scientists on social media should share aspects of their personal lives unrelated to science (e.g., hobbies, daily life). • Scientists on social media should make science feel approachable and relatable to non-experts. • Scientists on social media engage people who reject or misrepresent science, rather than ignoring them.	$\alpha = .63$	3.67 *(0.61)*

Political Expression	• Scientists on social media should express their opinions on political and societal issues related to science. • Scientists on social media should express their opinions on political and societal issues unrelated to science.	r_{SB} = .62	3.02 *(1.01)*
Trust in Scientists	When I think about scientists, most are • Experts • Intelligent • Qualified when it comes to conducting high-quality research • Honest • Ethical • Sincere • Concerned about people's well-being • Eager to improve others' • Considerate of others' interests • Open to feedback • Willing to be transparent • Pay attention to others' views.	α = .94	3.81 *(0.72)*
Willingness to be Vulnerable to Scientists	• How much or little should people rely on scientists' guidance when making lifestyle choices related to science? • How much or little should governments rely on scientists' guidance when making decisions related to science? • How much or little control do you want scientists to have on government decisions related to science?	α = .84	3.70 *(0.94)*
Political Ideology	• When it comes to politics, do you generally consider yourself to be… [1] = *Very liberal* to [7] = *Very conservative*]	N/A	3.69 *(1.80)*

Table 3.2 Inter-item correlations between variables in the model ($N = 878$).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Science Observation on Social Media	—						
(2) Public Engagement Behaviors	.207**	—					
(3) Competence-Oriented Strategies	.179**	.548**	—				
(4) Warmth-Oriented Strategies	.236**	.519**	.475**	—			
(5) Political Expression	.250**	.246**	.217**	.397**	—		
(6) Trust in Scientists	.144**	.226**	.356**	.247**	.389**	—	
(7) Willingness to be Vulnerable to Scientists	.211**	.240**	.357**	.249**	.388**	.608**	—

Note. ** Correlation is significant at the 0.01 level (2-tailed).

Results

First, ordinary least squares (OLS) regressions were used to examine how science observation on social media was associated with the four dimensions of normative perceptions of scientists' communication on social media (H1a-d), controlling for the following demographic variables: age, gender, race, education, and political ideology in Wave 1 (**Table 3.3**). Science interest in Wave 1 was also used as a control variable ($M = 3.41$, $SD = 1.01$), as it may relate to the variables of interest in the current study. Results showed a positive and significant main effect of science observation on social media on normative perceptions of scientists' political expression

(B = 0.15 (0.04), $p < 0.001$), use of warmth-oriented strategies (B = 0.15 (0.03), $p < 0.001$) and competence-oriented strategies (B = 0.06 (0.03), $p = 0.012$), as well as public engagement behaviors (B = 0.13 (0.04), $p < 0.001$). Thus, H1a-d were supported. The full results showing the associations between all predictors and the two dependent variables are shown in **Tables B.6** and **B.7** in **Appendix B**.

Table 3.3 Science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2).

	Normative Perceptions of Scientists' Communication on Social Media							
	Political Expression		**Warmth Strategies**		**Competence Strategies**		**Public Engagement**	
	B	**(SE)**	**B**	**(SE)**	**B**	**(SE)**	**B**	**(SE)**
Age (W^1)	-0.01	0.00**	0.00	.00	0.00	0.00$^{\#}$	0.00	0.00
Gender (Women) (W^1)	-0.07	0.06	0.07	0.04$^{\#}$	-0.04	0.04	0.06	0.05
Race (White) (W^1)	-0.13	0.07$^{\#}$	-0.00	0.05	-0.01	0.04	-0.07	0.06
Education (W^1)	-0.02	0.02	0.01	0.01	0.02	0.01	-0.02	0.02
Political Ideology (W^1)	-0.16	0.02***	-0.04	0.01**	-0.04	0.01***	-0.04	0.02**
Science Interest (W^1)	0.15	0.04***	0.05	0.02*	0.10	0.02***	0.11	0.03***
Science Observation (W^1)	0.15	0.04***	0.15	0.03***	0.06	0.03*	0.13	0.04***
Constant	3.20	0.19***	3.04	0.13***	3.49	0.13***	3.40	0.17***

Note. Unstandardized coefficients reported. $^{\#}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Next, OLS regressions were run to include the interactions of political ideology and science observation on social media to examine how associations with science observation may be moderated by political ideology (RQ3, **Table 3.4**). Political ideology had a significant interaction with science observation on social media for normative perceptions of scientists' use of warmth-

oriented strategies (B = 0.03 (0.01), $p = 0.016$). Johnson-Neyman analyses revealed that as science observation on social media increased, so did participants' expectations of scientists' use of warmth strategies; however, these differences were only significant as political ideology increased (>1.80). Put in other words, conservatives who indicated higher science observation had significantly higher expectations for using warmth-oriented strategies than did conservatives who indicated lower science observation. **Figure 3.2** provides a visualization depicting the conditional effect of political ideology. No other interactions were significant.

Table 3.4 Interaction of political ideology and science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2).

	Normative Perceptions of Scientists' Communication on Social Media							
	Political Expression		**Warmth Strategies**		**Competence Strategies**		**Public Engagement**	
	B	**(SE)**	**B**	**(SE)**	**B**	**(SE)**	**B**	**(SE)**
Age (W^1)	-0.01	0.00**	0.00	.00	0.00	0.00$^{\#}$	0.00	0.00
Gender (Women) (W^1)	-0.07	0.06	0.07	0.04$^{\#}$	-0.04	0.04	0.06	0.05
Race (White) (W^1)	-0.13	0.07$^{\#}$	0.00	0.05	-0.01	0.04	-0.07	0.06
Education (W^1)	-0.12	0.02	0.01	0.01	0.02	0.01	-0.02	0.02
Political Ideology (W^1)	-0.17	0.06**	-0.13	0.04**	-0.08	0.04*	-0.12	0.05*
Science Interest (W^1)	0.15	0.04***	0.05	0.02*	0.10	0.02***	0.11	0.03***
Science Observation (W^1)	0.14	0.10	0.02	0.06	0.00	0.06	0.01	0.08
Ideology x Science Observation	0.00	0.02	0.03	0.01*	0.02	0.01	0.03	0.02$^{\#}$
Constant	3.24	0.32***	3.41	0.21***	3.66	0.19***	3.74	0.26***

Note. Unstandardized coefficients reported. $^{\#}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

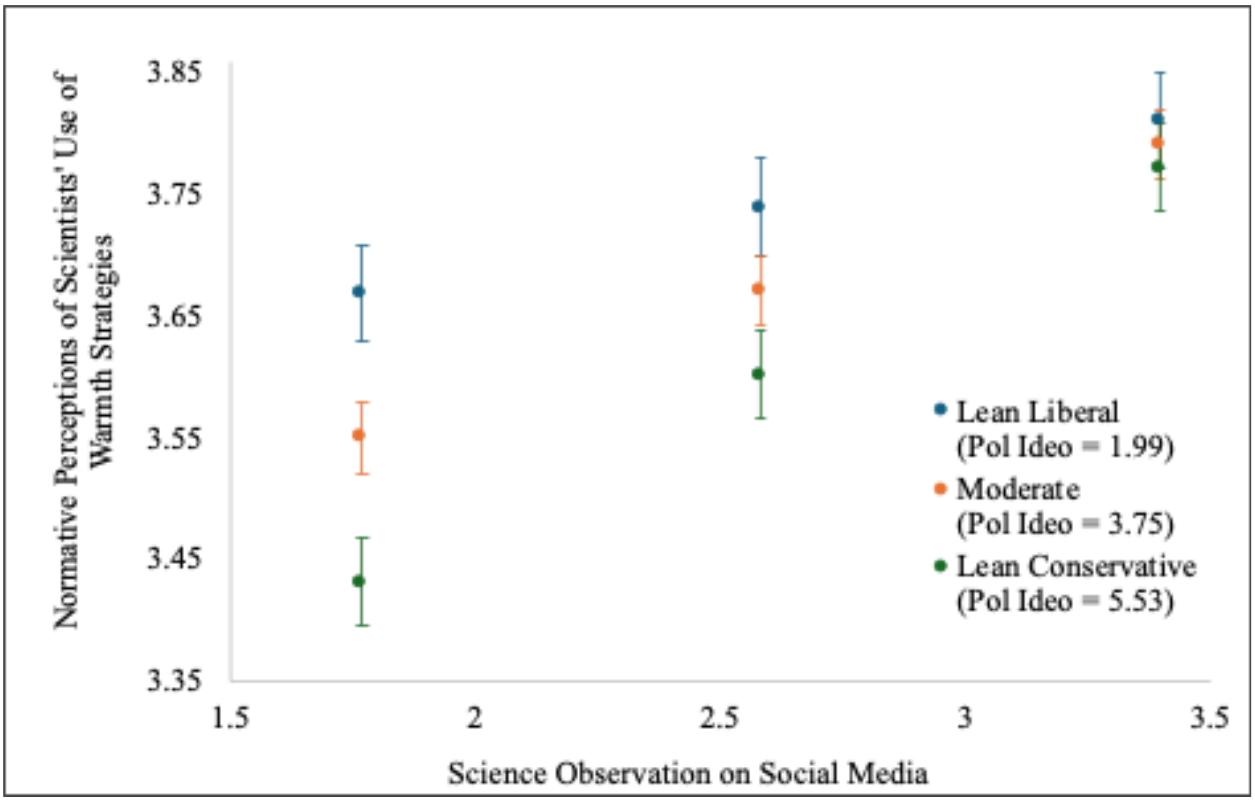

Figure 3.2 Effect of science observation media on normative perceptions towards scientists' use of warmth-oriented strategies. Conditional effects of political ideology are shown at one standard deviation above (lean liberal) and below (lean conservative) the mean (moderate).

A final set of OLS regressions were used to test how normative perceptions of scientists' communication on social media were associated with trust in scientists (RQ1a) and willingness to be vulnerable to scientists (RQ1b) in the second wave, again controlling for age, gender, race, education, political ideology, and science interest (**Table 3.5**). Results showed a positive and significant main effect of both normative perceptions of scientists' political expression (B = 0.17 (0.02), $p < 0.001$) and use of competence-oriented strategies (B = 0.32 (0.05), $p < 0.001$) on trust in scientists. For willingness to be vulnerable to scientists, there was a positive and significant main effect of both normative perceptions of scientists' political expression (B = 0.15 (0.03), $p < 0.001$) and use of competence-oriented strategies (B = 0.40 (0.06), $p < 0.001$).

Table 3.5 Normative perceptions of scientists' communication on social media predicting trust in scientists and willingness to be vulnerable to scientists (wave 2).

	Trust in Scientists (W^2)		Willingness to be Vulnerable to Scientists (W^2)	
	B	**(SE)**	**B**	**(SE)**
Age (W^1)	0.00	0.00*	-0.00	0.00$^{\#}$
Gender (Women) (W^1)	0.04	0.04	-0.03	0.05
Race (White) (W^1)	0.12	0.05**	0.21	0.06***
Edu (W^1)	-0.00	0.02	0.02	0.02
Political Ideology (W^1)	-0.13	0.01***	-0.21	0.02***
Science Interest	0.06	0.02**	0.06	0.03*
Normative Perceptions of Scientists' Communication on Social Media				
Political Expression (W^2)	0.17	0.02***	0.15	0.03***
Warmth Strategies (W^2)	-0.02	0.04	0.00	0.05
Competence Strategies (W^2)	0.32	0.05***	0.40	0.06***
Public Engagement (W^2)	-0.02	0.04	-0.01	0.04
Constant	2.19	0.19***	2.19	0.24***

Note. Unstandardized coefficients reported. $^{\#}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

To test the mediation models (RQ2), the SPSS macro PROCESS (Hayes, 2018) model 4, which utilizes OLS regressions, was employed as follows: science observation on social media as a continuous independent variable, the four dimensions of normative perceptions as parallel mediators, and either trust in scientists or willingness to be vulnerable to scientists as the dependent variable, and a 95% confidence interval (CI) based on 5,000 bootstrapped samples. Age, gender, race, education, political ideology, and science interest were included as covariates. Our results showed that only normative perceptions of scientists' political expression ($b_{indirect}$ = 0.03, $SE_{indirect}$ = 0.01, 95% CI = [0.01, 0.04]) and use of competence-oriented strategies ($b_{indirect}$ = 0.02, $SE_{indirect}$ = 0.01, 95% CI = [0.00, 0.04]) were significant mediators between science observation and trust in scientists. Similarly, only normative perceptions of scientists' political expression ($b_{indirect}$ = 0.02,

$SE_{indirect}$ = 0.01, 95% CI = [0.01, 0.04]) and use of competence-oriented strategies ($b_{indirect}$ = 0.03, $SE_{indirect}$ = 0.01, 95% CI = [0.01, 0.05]) were significant mediators between science observation and willingness to be vulnerable to scientists. **Figure 3.3** presents the unstandardized coefficients for the mediation results[7].

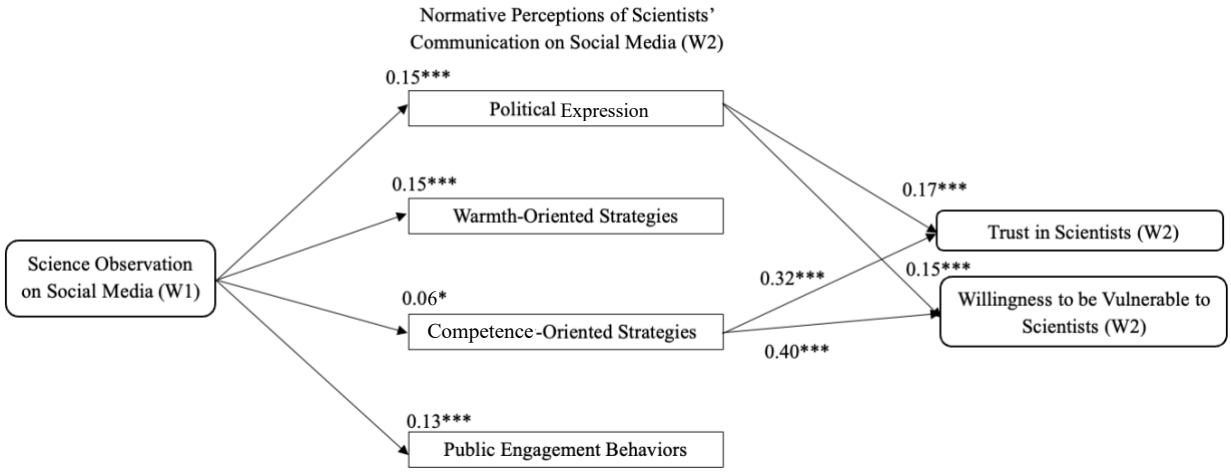

Figure 3.3. Full constructed model with unstandardized coefficients. All non-significant paths are not shown. *p < .05, **p < .01, ***p < .001.

[7]Steiger's Z-tests were conducted to compare the strength of correlations between the two outcome variables and each of the four normative perception variables. Results show that trust is more strongly associated with expectations for scientists' use of competence-oriented strategies than warmth-oriented strategies (Z = 2.32, p = .02). Additionally, trust is more strongly associated with political expression than either warmth (Z = 3.02, p < 0.01) or public engagement (Z = 3.35, p < .01). Similarly, competence-oriented strategies were more strongly associated with willingness to be vulnerable than either warmth strategies (Z = 2.68, p < .01) or public engagement (Z = 2.86, p < 0.01). Additionally, political expression was more strongly correlated to vulnerability than warmth (Z = -3.22, p < .01) or public engagement (Z = 2.86, p < .01). Broadly, these results are in line with the findings from the full constructed model (**Figure 3.3**).

Finally, to test the two moderated mediation models (see **Figure 3.1**), the SPSS macro PROCESS model 8 was employed as follows: science observation on social media as a continuous independent variable, the four types of normative perceptions as parallel mediators, political ideology as the moderator, either trust in scientists or willingness to be vulnerable to scientists as the dependent variable, and a 95% CI based on 5,000 bootstrapped samples. The analyses also control for Wave 1 age, gender, race, education, and science interest. The indexes of moderated mediation were not significant (95% CI included zero) across the indirect effects for either dependent variable.

Discussion

In the wake of the COVID-19 pandemic, and amid growing political polarization and hostility towards scientists and scientific institutions in the U.S., scientific content and information has taken on heightened visibility and urgency in public discourse (Saks & Tyson, 2022; Tollefson et al., 2025). In particular, social media platforms have emerged as critical sites for both scientists and lay audiences: a recent study from the Pew Research Center (2022) showed that nearly half (48%) of U.S. adult social media users reported seeing science content on these platforms in the past few weeks. More so, one in three users now say they follow accounts focused on science content (a 7% increase from 2017). So, too, have scientists become increasingly present and visible in these spaces, as they share their research, challenge misinformation, advocate for public policies, and more (Costas et al., 2020; Zhang & Lu, 2025). As social media platforms continue to shape where science is communicated and how it is consumed, this study seeks to offer an initial examination of how audiences observe and make sense of scientific content in these spaces, and evaluate science and scientists more broadly, by analyzing data from a two-wave U.S. national panel survey conducted in early 2025.

First, I applied a social media affordances approach to investigate how these platforms might contribute to the formation of the very norms that people perceive about how scientists should communicate and interact with the public. Through affordances such as visibility and association, social media can make visible previously-hidden or private information (e.g., scientists engaging in political expression, responding to questions from their networks, or disclosing personal experiences) (Treem & Leonardi, 2012; Kim & Ellison, 2021). Over time, observation of such information and behaviors can lead audiences to perceive them as normative, appropriate, or even expected ways for scientists to communicate (Bayer et al., 2020). Our results offer support for this relationship between science observation on social media and audiences' normative perceptions of scientists' communication behaviors. Specifically, the more frequently audiences observe science content on social media, the more likely they are to perceive scientists' political expression, warmth- and competence-oriented strategies, and public engagement behaviors as typical or normative.

Next, we found that political ideology interacted with science observation on social media, but was only significant for normative perceptions of warmth-oriented strategies. In particular, among social media users with low science observation, those who were conservatives and those who were liberal differed significantly in how much they expected scientists to use warmth-oriented strategies (liberals indicated higher perceptions than conservatives). But among those with high science observation, those partisan differences disappeared (controlling for science interest). Put differently, increased science observation among conservatives was associated with a significant increase in normative perceptions of warmth-oriented behaviors.

The fact that this pattern only occurred for warmth-oriented strategies holds two interesting implications: first, it suggests a unique opportunity for scientists to connect with more skeptical

audiences on social media. That is, warmth cues such as humor, personal self-disclosure, or using casual and relatable language may serve as potential inroads for shifting what conservatives expect of, and how they perceive, scientists, in line with growing experimental research (e.g., McKasy et al., 2023). And particularly given that much of science content on social media is encountered incidentally rather than intentionally (Funk et al., 2017), even casual or unintentional observation of warmth-oriented strategies that evoke humanizing portrayals of scientists may help reduce perceptions of scientists as distant elites or threats (Chinn et al., 2024). Second, the findings also point to a lower threshold for shifting normative perceptions that are interpersonal in nature, as opposed to those related to scientists' political, civic, or expert roles. Still, the broader implication is encouraging: even amid rising anti-intellectualism and polarization of science, normative perceptions around scientists' warmth may be amenable to change through repeated, visible exposure, and could possibly serve as a mechanism for bridging ideological divides.

Finally, the mediation analyses found that these normative perceptions can potentially serve as routes from which science observation on social media can influence both trust in scientists and willingness to be vulnerable to them. However, only normative perceptions of competence-oriented strategies and political expression behaviors influenced these downstream outcomes. In other words, while observing science content on social media was associated with higher normative perceptions across a range of behaviors—including warmth-oriented and public engagement strategies as well—only some of these normative perceptions resulted in increased trust and vulnerability towards scientists.

These findings raise a number of considerations and questions. First, why might only two of the normative perceptions influence trust and vulnerability? Perhaps such a pattern highlights the distinction between an *expectation* of a behavior as typical or even appropriate and

interpretation of that behavior as trustworthy. For example, returning to Burgoon's (2015) expectancy violation theory, positive violations of expectations can lead to positive outcomes, despite not being in line with the initial expectation; the expectations themselves, then, may operate similarly (Burgoon, 2015). After all, the participatory nature and user-generated content on social media means that users are often exposed to science content that can be both credible *or* non-credible (e.g., performative engagement, misinformation, inflammatory and fear-based appeals, and more) (Chinn et al., 2023). As a result, audiences may view some behaviors as normative but not necessarily rely on them exclusively for trust-related judgements; another possibility is that these behaviors may not have been consistently performed or observed in ways that do signal broader trust in scientists. At the least, this suggests additional work is necessary to further clarify what types of warmth or engagement behaviors do meaningfully influence trust, and whether these effects might differ depending on context, platform, or audience predispositions.

Second, that both competence and political expression norms led to increased trust and vulnerability towards scientists reflect at once both persistent and emerging normative perceptions. On one hand, longstanding stereotypes and expectations of scientists as authoritative experts who emphasize their expertise, use jargon and technical language, and talk primarily about their research may align with normative perceptions of competence-oriented strategies (Fiske & Dupree, 2014; Chambers, 1983). On the other hand, political expression represents an evolving yet contested dimension of scientific identity: debates about whether the role of scientists as political advocates undermine credibility and trust continue to this day within the scientific community (Büntgen, 2024; van Eck et al., 2024). Our findings suggest that, at least for social media users who frequently observe science content, political expression is viewed as both appropriate and

potentially as a cue for trust itself. This aligns with recent work showing that a majority of both scientists and citizens across the U.S. and Germany support greater political expression and engagement by scientists, especially on urgent issues like climate change (Cologna et al., 2025).

Taken together, this research examined science communication on social media from a social media affordances approach, thereby shifting attention towards and offering novel insights into how everyday, online observations of science-related content may influence normative perceptions about science communication. In bridging theoretical insights from computer-mediated communication, science communication, media psychology, and political communication, the findings here highlight how science observation—intentional or otherwise—on social media can be associated with perceptions of what audiences come to see as normative from scientists across a wide range of communicative strategies and behaviors, beyond simply a reflection of personal preference. These shifting perceptions can potentially serve as mechanisms that influence trust in and vulnerability towards scientists.

Furthermore, the social media affordances lens is particularly critical and durable amidst a rapidly-changing (social) media and political landscape: while platforms and practices rise and fall, such an approach allows us to examine how affordances hold broader theoretical and practical significance for understanding how communicative norms emerge and come to be seen as standard or even legitimate markers of trust or credibility. That such shifts can and do occur highlight how visibility, social presence, association, and personalization can (re)shape public expectations and normative perceptions of scientists' communication on social media in ways that may be more participatory, but also more fragmented. Finally, this study seeks to center the roles of the audience and social media affordances in shaping the relationships between science and (social media) publics in increasingly visible and interactive online environments: that is, shifting audience norms

may not only reflect the changing media landscape, but shape the very meaning of being a trustworthy scientist online and beyond.

Limitations & Future Directions

Of course, this study is not without limitations. First, all measures relied on self-reported survey data, which are susceptible to overstatements of media exposure due to demands on participants' memory (Prior, 2009). Participants' reports of their social media exposure may therefore not accurately reflect the frequency, content, or source of the science-related information they actually encountered. While this does limit claims about how direct exposure to scientists specifically may shape perceptions, it also highlights a potential spillover effect: even incidental or general science observation on social media (i.e., from other users) may contribute to emerging norms about how scientists should communicate. Similarly, future research could explore how additional dispositional factors (e.g., people's stereotypes towards scientists) may also play a role in these relationships.

Similarly, while the measure of science observation employed in this study was intentionally broad to reflect the diverse landscape of science content on social media, future research would benefit from pairing self-reported data with behavioral data or experimental approaches to more precisely capture how observation of different communicative strategies can shape normative perceptions. So too, additional research would benefit from an explicit comparison of science observation on social media with that on other information sources, such as traditional news media, which would help differentiate the unique impacts of social media on normative perceptions. Next, while our measures of normative perceptions were grounded in existing literature, they do not represent the full range of behaviors that might be seen as "normative." That is, warmth- or competence-oriented strategies can manifest through different

strategies and behaviors, depending on the platform, context, or communicator themselves. Future research could therefore consider a more diverse set of behavioral and communicative examples.

Finally, while the hypotheses are theoretically derived, this study cannot definitively establish causal direction: the mediators and outcome variables were only collected at Wave 2. This decision was made in light of financial constraints and to reduce participant burden; however, this limited the ability to test lagged or reciprocal effects and to isolate the influence of science observation on normative perceptions at Wave 2, controlling for those perceptions at Wave 1. As such, the possibility of reverse causality may exist: for example, individuals with stronger pre-existing normative perceptions towards scientists' communication on social media may be more likely to seek out science content in general, thus reinforcing both their algorithmic preferences as well as their expectations towards scientists (e.g., similar to how users may select media outlets aligned with their political predispositions, thus leading to increased political polarization; Stroud, 2010). Similarly, individuals may recall or interpret observed content in ways that align with pre-existing levels of trust in science, therefore biasing their self-reported frequency of science observation on social media and normative perceptions (i.e., motivated reasoning; Kunda, 1990). Thus, future longitudinal work would benefit from measuring both the independent variables and mediators at multiple time points, with longer gaps between waves, to further clarify the nature of the relationships and causal directions between science observation on social media and normative perceptions, and trust in scientists. Such work could be further triangulated with experimental approaches or those that leverage large-scale social media data, such as those that examine how users actually engage and interact with posts featuring these behaviors and strategies.

Chapter 4:

How Scientists' Self-Presentation on Social Media Influences Public Perceptions, Support for Science, and Information Seeking Intentions[8]

Introduction

In March 2024, a viral trend took the academic world on X by storm: thousands of scientists posted their "Academic Rejection Transparency" thread, consisting of all their PhD rejections, acceptances, and then their current position (Washington, 2024). These posts were, in part, inspired by a larger movement to show that failures and struggles are normal in the scientific and academic processes; that is, sharing such failures can "show your followers you are a real person . . . that scientists are just people too" (Cheplygina et al., 2020, p. 7).

The plethora of such interactions on social media highlights a growing focus within the scientific community: to foster more positive perceptions toward scientists and attitudes toward science at large (Rainie et al., 2015), a key self-presentational goal echoed by the scientists interviewed in Chapter 2. After all, effective science communication hinges in large part on public trust in scientists, grounded in perceptions of their competence, benevolence, integrity, and openness (Besley et al., 2021). Yet scientists often still contend with enduring negative stereotypes and perceptions: they are seen as "competent but cold" (Fiske & Dupree, 2014), elites in ivory towers, "removed" from lay people, or even as social threats for certain segments of the U.S.

[8]A version of this paper is published in *Science Communication:* https://journals.sagepub.com/doi/epub/10.1177/10755470251322902

population (Chinn et al., 2023). These negative perceptions can hinder efforts to build meaningful connections with the public and to promote broader support for science (Zhang & Lu, 2024).

The rise of social media, however, has provided scientists with strategic opportunities to shape how they are perceived, and greater agency to do so, thus presenting both possibilities and challenges for cultivating such positive perceptions. On one hand, these platforms can allow scientists to break down traditional barriers between themselves and public audiences by sharing personal experiences, research insights, and behind-the-scenes glimpses of their work (Zhang & Lu, 2024). Posts like the aforementioned "Academic Rejection Transparency" threads reflect deliberate tactics to humanize scientists, counteract stereotypes, and foster a sense of connection and relatability. These strategies thus serve as a powerful tool for scientists to demonstrate qualities like openness and benevolence, which are central to building public trust (Besley et al., 2021).

Yet, this same environment demands careful self-presentation: as Chapter 2 revealed, scientists must navigate a careful balance between the personal and the professional, the likable and the credible. Different self-disclosure strategies, such as sharing professional achievements, political opinions, or personal experiences, can yield varied benefits and effects on how audiences perceive scientists (Kim et al., 2024; Zhang & Lu, 2024). Despite the increasing prevalence of such tactics on social media, the mechanisms by which scientists' self-presentation might map onto specific dimensions of trustworthiness and the broader implications for public attitudes toward science remain underexplored.

This study aims to address this gap by focusing on scientists' self-presentation strategies as practical communication tactics for fostering positive perceptions toward scientists. In this way, this work builds on the findings from both Chapters 2 and 3: while Chapter 2 explores how scientists construct their self-presentation and Chapter 3 examines audiences' normative

expectations for how scientists should communicate (as informed by their self-presentational goals), this chapter seeks to bring these elements together to ask: *what happens when audiences actually encounter scientists' self-presentation on social media*?

This study therefore tests a sequential mediation model where two dimensions of scientists' self-presentation influence the parallel mediators of identification and expectancy violation, which are then predicted to positively impact the serial mediators related to perceptions of the scientist (i.e., competence, benevolence, openness, and integrity). Ultimately, these perceptions are expected to positively influence science information-seeking intentions and support for science. **Figure 4.1** presents an overview of the full conceptual model, which will be explained in detail as follows.

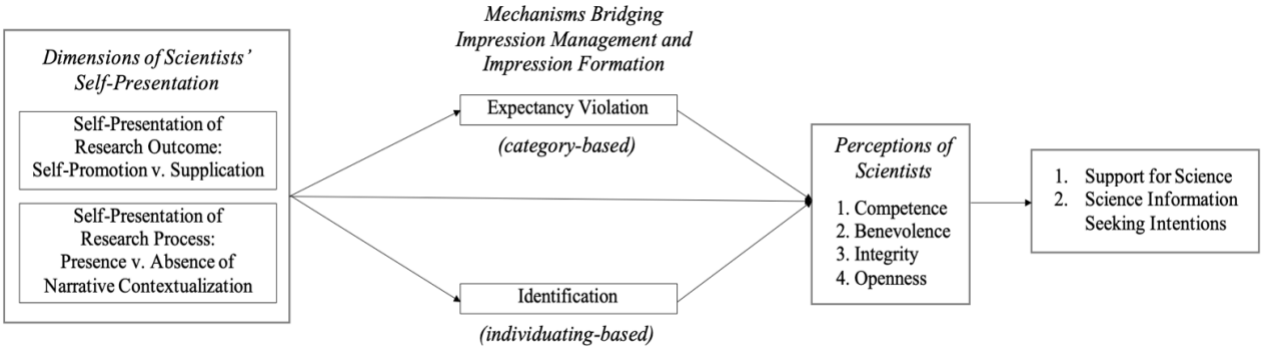

Figure 4.1 Full Conceptual Model

I begin with a discussion of scientists' self-presentation, focusing specifically on two strategies that were mentioned by the scientists in Chapter 2, and that are already commonly present on social media. Then, I discuss how certain self-presentation strategies might influence the four aforementioned trustworthiness dimensions, examining as well potential interpersonal and psychological mechanisms that may bridge scientists' self-presentation and audience's actual perceptions of them. Finally, I discuss how these impressions can affect audiences' support for

science and information-seeking intentions. Altogether, this interdisciplinary study integrates theoretical insights from research on self-presentation, social media, and science and computer-mediated communication to understand how scientists' self-presentation strategies on social media can shape science communication outcomes and promote sustained public trust in both scientists and the scientific enterprise.

Scientists' Self-Presentation on Social Media

Self-presentation can be broadly understood as people's efforts to manage their public images (Goffman, 1959). As conceptualized in Goffman's (1959) dramaturgical approach of self-presentation, social media operates as a sort of "front stage," whereby a performer can perform in the presence of others. Users therefore engage in public, social interactions, as well as present themselves using strategic self-presentation techniques to adhere to personal, social, and cultural expectations, norms, and values (Zhao et al., 2013).

That scientists on social media are also engaging in self-presentation is no new phenomenon: as general users of the platform, they are also operating within the norms and expectations of a networked platform (Bukvova, 2011). It is worth noting as well that historically, scientists who could effectively present themselves and their research, whether in professional settings, through media appearances, or in public lectures, enjoyed greater visibility and success, and often as a consequence, greater public perceptions of scientific credibility (Fahy & Lewenstein, 2021). These scientists, like Albert Einstein, Margaret Mead, and later Carl Sagan, and Richard Dawkins, rose to public prominence because they possessed what Goodell (1977) termed "media-oriented" characteristics. They were "articulate, controversial, had a credible reputation, a colorful image and worked on hot topics;" that is, ideals of competence and authority perpetuated by traditional media and stereotypical norms (Goodell, 1977, p. 18; Fahy & Lewenstein, 2021).

Social media has offered an opportunity to influence these dynamics, or at least, a chance for a wider and more diverse array of scientists—from different backgrounds, and at different career stages—to present themselves and their work on their own terms, reaching potentially global audiences (Zhang & Lu, 2024). So too, the self-presentation strategies that these scientists on social media can engage in do not necessarily reflect, nor are constrained by, the same traditional media framing and message strategies surrounding science and risk communication (Balog-Way et al., 2020) (although as Chapter 2 showed, can still be constrained by other tensions and expectations). This new environment, as well as shifting norms within the scientific community itself (McNutt, 2016), has encouraged scientists to employ diverse self-presentation strategies to connect with their audiences.

Two common self-presentation strategies that we see scientists on social media already engage in (and that were mentioned by several scientists in Chapter 2) are related to sharing their research outcomes. For example, in a 2020 article titled "Ten simple rules for getting started on Twitter as a scientist," the authors suggest that scientists can share "whenever you have some scientific accomplishment" to gain attention and foster connections (Cheplygina et al., 2020, p. 6). At the same time, the authors also recommend "opening up a little bit to show your followers you are a real person . . . One way to do this is through sharing failures, [such as] a rejected paper or job application . . ." (p. 7). Such advice reflects two different classes of self-presentation strategies: self-promotion and supplication (Jones & Pittman, 1982). Self-promotion occurs when people highlight their accomplishments so that others will see them as competent, while supplication occurs when people present certain weaknesses or deficiencies to elicit compassion or understanding (Jones & Pittman, 1982). These suggestions are further exemplified in a 2019 study that analyzed the public engagement of a group of scientists on Twitter: the authors found that

almost a third of messages were related to the presentation of research outcomes, like recent publications and successful projects (Jünger & Fähnrich, 2020).

These two strategies for sharing research outcomes also bear significance in the context of how science information may be shared and received on social media. Consider, for example, a climate change scientist on social media who had a recent paper published or a grant awarded. They may turn to social media to promote this accomplishment in hopes of being viewed as a proficient and competent scientist while also sharing information about the paper itself (e.g., a tweet that reads, "I just had a paper published! We examined the increased risk of heat waves in the American South using novel computational models . . ."). As they do so, they are both engaging in self-promotion to showcase their scientific accomplishments *and* communicating information on issues that public audiences may be exposed to (Wolf, 2017). On the flip side, a scientist whose project did not succeed may also share their frustrations in hopes of garnering support from their community, weaving the presentation of their "failures" with science information.

Often complementing scientists' self-presentation of research outcomes is their self-presentation of research *processes*: scientists on social media often share stories about their experiences navigating the scientific endeavor (Jarreau, 2020). Such narratives provide unique context for readers and often focus on the various challenges and struggles that inevitably occur throughout the research process. This approach, which we refer to as narrative contextualization, involves embedding personal stories of obstacles, setbacks, or turning points within their broader discussions of science or research processes. These narratives offer audiences an intimate view into the complexities of scientific research, grounded in the scientist's direct, lived experiences (Jarreau et al., 2019; Zhang & Lu, 2024). Thus, scientists can choose whether to employ these narratives to contextualize their research process as another self-presentation strategy. Take again,

then, our earlier scientist who posts their new paper publication on social media. After they celebrate the accomplishment, they may follow up with some context: "This project was no easy feat . . . It was a real struggle to push through to the end!" In this way, the presence of (or lack thereof) narrative contextualization also becomes intrinsically tied to how the rest of the science information is presented.

Such narratives play a strategic role in the self-presentation of scientists' research processes. While narrative elements have long been present in news coverage of science issues (Nisbet et al., 2003), traditional media narratives of science issues often lack exactly such personal presentations of struggles throughout the research endeavor. Instead, scientific discoveries are portrayed as an "honorable quest . . . in which the hero scientist has produced reliable and consequential knowledge through a journey yielding knowledge, often cast as discovery" (Ophir & Jamieson, 2021, p. 1009). These stories often depict the scientific process as linear and rarely discuss the inevitable dead ends and false starts that do happen, which can have detrimental effects for how audiences perceive these issues. By contextualizing their research outcomes with narratives that do aim to portray "the realities of scientific discovery" (Jamieson, 2018, p. 2626), like struggles they faced during their research process, scientists can share a counterbalance to this conventional portrayal and present themselves as active agents confronting these challenges.

Effects of Scientists' Self-Presentation Strategies on Public Perceptions

There is reason to expect that these self-presentation strategies, in conveying different types of information about the scientist and their research, could influence public perceptions about the scientist. Here, we incorporate the two aforementioned dimensions of scientists' self-presentation related to their research (a) *outcomes* and (b) *processes* to examine whether these strategies can influence four distinct dimensions of trustworthiness: perceptions of competence, benevolence,

integrity, and openness. These perceptions are drawn from Besley et al.'s (2021) suggestion to orient variables used to assess public perceptions of scientists along the four-factor approach: competence (i.e., ability), benevolence (i.e., caring/warmth), integrity (i.e., honesty), and openness (i.e., willingness to tell the whole story/accept feedback). This four-factor approach thus extends beyond the traditional warmth/competence dimensions (Fiske et al., 2007) to capture a more nuanced view of audience perceptions and to allow us to understand how specific self-presentation strategies may influence each of these different dimensions (Besley et al., 2021).

As defined above, self-promotion of research outcomes involves sharing scientific achievements and accomplishments, often with the explicit goal of being perceived as competent, while supplication involves presenting weaknesses (in this case, scientific failures) to elicit compassion (Jones & Pittman, 1982). Accordingly, then, these strategies could evoke those specific audience responses. That is, self-promotion may elicit more perceptions of competence compared to supplication, while supplication might elicit more perceptions of benevolence compared to self-promotion.

However, the effects of these strategies might also extend beyond their primary goals; that is, they may also impact perceptions that may not always be intentional or goal-directed, yet may still explain subsequent relationships. For example, the use of supplication inevitably "acknowledges personal faults, mistakes, and limits" (D'Errico, 2020); this acknowledgment and candidness may increase perceptions of integrity and openness. On the other hand, more overt promotion may actually backfire in this regard, as highlighting one's strengths may also be seen as self-aggrandizing.

In a similar way, narrative contextualization can make scientists appear more approachable and relatable (Lin-Siegler et al., 2016). The sharing of these narratives, particularly those that

highlight struggles faced, can also be construed as a form of self-disclosure, which has been previously linked with benevolence (Cuddy et al., 2013) and humility (Coulehan, 2011). Moreover, the willingness to share these narratives can be interpreted as a form of openness, indicating an honest engagement with the research process whether positive or negative (Abitbol et al., 2022). But again, sharing these struggles may also inadvertently underscore challenges and difficulties and thus diminish perceptions of competence.

All told, these expectations would broadly be in line with recent research suggesting that scientists who disclose professional achievements indeed are seen as more competent and as possessing more expertise, while those who share personal information are seen as more likable but less competent (Zhang & Lu, 2023, 2024). Formally stated, we predict:

> ***H1***: Scientists who engage in supplication (vs. self-promotion) of their research outcomes will be seen as (a) less competent but more (b) benevolent and (c) open, and as having more (d) integrity.
>
> ***H2***: Scientists who share narrative contextualization of their research processes (vs. those who do not) will be seen as (a) less competent but more (b) benevolent and (c) open, and as having more (d) integrity.

Finally, we anticipate potential interaction effects between the self-presentation of research outcomes and of research processes in shaping source impressions. For example, the combination of self-promotion of research outcomes with narrative contextualization might mitigate potential self-promotion backlash. That is, these two strategies together may portray a more nuanced impression of the scientist as someone who is honest about the difficulties they faced yet still successful, leading to perceptions of competence *and* openness. Conversely, supplication and narrative contextualization may interact in different ways, such as leading to more negative

impressions across the board. We are unaware, however, of previous research that has examined how different combinations of these self-presentation strategies might influence perceptions of scientists. Thus, we ask as a research question:

> ***RQ1***: How will the self-presentation of research outcomes interact with the self-presentation of research processes to influence perceptions of scientists?

Testing Mechanisms: Expectancy Violation and Identification as Mediators

Beyond examining the direct effects of self-presentation strategies on audience perceptions, we aim to also investigate underlying processes that may provide a lens to understanding the dynamics of audience perceptions. Existing literature suggests people form impressions of others on a continuum, from category-based (evaluations based on stereotypes and prejudices about various social groups) to individuating processes (evaluations based on individual attributes beyond category membership) (Fiske & Neuberg, 1990). Thus, we propose two potential mechanisms to capture this range of processes that may bridge impression management and impression formation relevant to the context of this study: (a) expectancy violation, akin to a category-based process, may explain how individuals evaluate others and their behaviors through deviations from norms and expectations, and (b) identification may reflect a more individuating process, rooted in how people might evaluate others as they take on the unique perspectives, or relate to the experiences, of that other individual.

Expectancy violation

Expectancies are defined as "patterns of anticipated behaviors"; in other words, we expect individuals to behave and communicate in certain ways due to social norms and other factors (e.g., attributes of the communicator, context of the communication) (Burgoon, 1993, p. 31). Expectancy violations therefore occur when an individual does not behave according to these expectations.

Unlike other perspectives, expectancy violation theory does not suggest that all violations lead to negative outcomes (Burgoon, 2015). Rather, positive violations, or those that are evaluated as better than expected, can lead to more positive communication outcomes than positive confirmations; negative violations, or those that are worse than what we expect, lead to more negative outcomes than negative confirmations (Afifi & Metts, 1998; Burgoon, 1993).

Expectancy violation is an important interpersonal mediator to consider in the context of how scientists' self-presentation strategies on social media influence audience impressions. As Chapter 3 has demonstrated, individuals hold certain normative expectations for how scientists, as a social group, should communicate and present their research, even in online contexts (Zhang & Lu, 2024). Therefore, deviations from audience's expectations (in other words, these expectancy violations) have the potential to shape how audiences respond to scientists' self-presentation on social media.

For instance, when scientists engage in supplication and openly acknowledge their scientific failures, audiences might experience an expectancy violation because they expect experts to project competence (Huber et al., 2019). The deviation from self-promotion, which is more commonly seen on scientists' social media (Jünger & Fähnrich, 2020), could be perceived as an expectancy violation. Similarly, the presence of narrative contextualization within scientists' self-presentation might also trigger expectancy violation. Traditional media narratives of science issues often present polished narratives of success rather than openly sharing the challenges faced by scientists through the research process (Ophir & Jamieson, 2021). When scientists defy this category-based expectation and share their struggles transparently, audiences could experience a positive violation, potentially enhancing impressions of the scientist (Burgoon, 2015). But, this narrative contextualization may also lead to negative violations if they are perceived by audiences

as undermining the scientist's competence. Given these potentially conflicting dynamics, we ask as a research question:

> ***RQ2***: How will expectancy violation mediate the relationships between the self-presentation of (a) research outcomes and (b) of research processes, and perceptions of scientists?

Identification

As conceptualized by Cohen (2001), identification refers to "an imaginative process through which an audience member assumes the identity, goals, and perspective of a character" (p. 261). Identification can begin as a result of a particular production or content feature that allows an audience member to adopt a character's perspective, or from the perception of similarity between the character and the audience member (Maccoby & Wilson, 1957). Subsequently, this can lead to a psychological merging, wherein that audience member internalizes the character's goals and identity. Outcomes of identification can include both positive (e.g., liking) and negative feelings (e.g., fear) (Cohen, 2001). Cohen (2001) further distinguishes identification from audience perceptions by noting that perceptions describe "attitudes or judgments that people make about characters based on their perceptions of the characters…To compare or judge a character, one is required to activate his or her own psychological schemas and, hence, to be self-aware, whereas identification uses one's own psyche to imagine being someone else" (p. 254).

This psychological phenomenon holds important implications within the context of scientists' self-presentation on social media: when scientists employ self-presentation in their social media messages, they essentially establish themselves as a unique individual, with whom audiences can identify with through such self-presentations. In line with Cohen's (2001) conceptualization, we treat identification as a process initiated by specific content features (in this

case, the self-presentation strategies) that invite audiences to adopt the scientist's perspective. During this process, audience members imagine themselves within the scientist's goals and identities (psychological merging), thus suspending and "lacking an awareness of the self" (Cohen, 2001, p. 253). Once the identification process concludes (i.e., after message exposure ends), audiences may form a judgement of character (which, as Cohen notes, requires "treating a character as external to the self" (p. 254)). In this way, identification functions as a mechanism that mediates the relationship between message features to audience impressions.

A number of studies have attempted to examine various strategies and mechanisms that may increase identification. For example, some studies have found that narratives from the perspective of a character can promote identification (de Graaf et al., 2012), while others have found that sharing stories about a character's struggles or setbacks can lead to increased identification with that character (Paharia et al., 2011). So, we may expect that narrative contextualization and the use of supplication to present research outcomes would lead to increased identification with the scientist: sharing these struggles and failures may be more likely to resonate with audiences through shared experiences (Lin-Siegler et al., 2016). This increased identification can "make the source of a message . . . attractive" (Cohen, 2001, p. 259); in other words, audiences who see themselves in the scientist may be more likely to form more positive impressions of that scientist. On the other hand, self-promotion may reinforce existing perceptions of scientists as elites in ivory towers and "removed" from lay people (Chinn et al., 2023), thus decreasing identification with the scientist. This decreased identification, then, could lead to less favorable impressions of the scientist, with prior research showing that people who strongly identify with others tend to make more positive attributions toward those individuals (Roussin & Webber, 2012). Altogether, we propose:

H3a: Identification will mediate the relationship between the self-presentation of research outcomes and perceptions of scientists. Specifically, supplication (vs. self-promotion) will lead to increased identification, which will be associated with more positive perceptions of scientists.

H3b: Identification will mediate the relationship between the self-presentation of research processes and perceptions of scientists. Specifically, the presence (vs. absence) of narrative contextualization will lead to increased identification, which will be associated with more positive perceptions of scientists.

Why Perceptions Matter: From Perceptions to Persuasion

In this study, we are interested in two persuasive outcomes as indicators of the messages' efficacy: support for science and information-seeking intentions. Our first outcome seeks to examine whether these different self-presentation strategies can impact support for science, defined here as support for scientists' role in public and science policy and for scientific funding. Our second outcome focuses on information-seeking intentions, or the extent to which an individual is likely to seek out more information about the scientific topics in the messages. Research on the persuasive effects of source impressions have largely fallen under the dual process models of persuasion (e.g., Elaboration Likelihood Model, Petty et al., 2002). Such work has argued that attributes of a source, such as their credibility and expertise, can serve as heuristics (or "mental shortcuts" that can be used to evaluate a persuasive message) (Petty et al., 2002). Broadly, the literature suggests that messages from sources that are evaluated less positively are also less likely to be persuasive, while those who are seen as more likable or attractive (i.e., more favorably) can increase their persuasiveness (Pornpitakpan, 2004). But while the research landscape has extensively explored the impacts of a number of common source attributes, our four perceptions

(competence, benevolence, integrity, and openness) reflect a range of perceptions that may provide more nuanced insights for shaping persuasion dynamics.

Altogether, we expect that more positive perceptions will lead to increased support for science and science information-seeking intentions. We recognize, of course, that depending on how messages are framed, scientists who share their research may not explicitly call for support for science or encourage science information seeking. However, positive impressions of the scientist as possessing competence, benevolence, openness, or integrity can still shape how audiences interpret the overall relevance of and their assessment of the scientific issue. That is, positive perceptions may still enhance the perception of the issues' significance and motivate individuals to engage with it on a deeper level (Petty & Wegener, 1999), leading to a greater willingness to consider the broader implications of the research. As such, we hypothesize:

H4*:* Positive perceptions will be positively associated with stronger (a) support for science and (b) science information-seeking intentions.

Methods

Participants

The present study employed a 2 (self-presentation of research outcomes: self-promotion or supplication) × 2 (self-presentation of research processes: presence or absence of narrative contextualization) × 2 (scientific context: astronomy or geosciences) between-subjects factorial design. Using quota sampling to obtain a nationally representative (on age, gender, region, and race) sample, we recruited 2,323 U.S. adults in March 2024 through Forthright, an online participant recruitment platform. We retained 1,843 participants after excluding those who failed to answer the two attention check questions correctly, those who failed to provide a response for

all key measures, and those who completed the survey in less than a third of the median time (Greszki et al., 2015).

The average age of the participants was 45.7 (*SD* = 17.0) years. Almost half of the sample (49.3%) were female, 48.9% were male, and 1.8% were nonbinary or did not indicate their gender. The majority of the participants were White (65%), followed by African American (15%), Asian (5%), Hispanic or Latine (10%) and 5% of participants who identified as "other." A third of the participants had received either a bachelor's degree (25%) or a master's degree (9%). Almost a quarter (24%) reported that they follow at least one scientist on social media.

Experimental Design

An X (formerly Twitter) profile, consisting of a scientist's profile picture, biography, and username, and a recent thread (series of messages) they posted, were employed as the stimuli for the study. The name, username, and photo of the scientist were held constant across all conditions, while the biography was changed to fit the particular scientific context.

For the first manipulation, the X thread described either a successful or an unsuccessful research experience for the self-promotion and the supplication conditions, respectively. In the "present" condition of the second manipulation, the thread contained a struggle narrative as operationalized by Hong & Lin-Siegler (2012): a story containing relevant information about the difficulties or resistance faced by the scientist throughout their research process. In this study, we take a broad definition of stories (or narratives) as "a representation of connected events and characters that has an identifiable structure, is bounded in space and time, and contains implicit or explicit messages about the topic being addressed" (Kreuter et al., 2007, p. 222). As such, the narrative contextualization in the X thread described setbacks such as funding challenges faced by the scientist throughout the research process, leading up to the respective research outcome. The

absent condition did not contain any narrative contextualization and, to avoid introducing additional confounding information, contained one less message compared to the present condition. Before the main experiment, the messages were pre-tested (N = 301) to ensure their successful manipulations of each condition.

The scientific issue manipulation was the final manipulation. Since political ideology[9] can impact public perceptions of scientists and attitudes towards science, particularly for highly polarizing issues like climate change or vaccines (Nisbet et al., 2015), we opted for ideologically-neutral scientific topics. We chose geosciences and astronomy as the two contexts based on prior research showing less ideological divide in beliefs about these fields (Nisbet et al., 2015). Selecting less polarizing contexts thus allows us to isolate the effects of the two self-presentation types on perceptions of the scientist and attitudes towards the topic outside the influence of political ideology. (See **Appendix C** for an overview of experimental conditions, the full stimuli used across all conditions, as well as induction checks for both the pre-test and main experiments).

After exposure, participants answered questions assessing their responses towards the stimuli and the scientist. All measures employed in the study are included in **Table 4.1**.

---

[9]Although Chapter 3 examined political ideology as a moderator, the results found that political ideology only played a limited role in moderating normative expectations towards scientists on social media. Nonetheless, to remain consistent across the studies, we also examined whether political ideology moderated the effects of the experimental conditions in this chapter. The findings revealed no significant moderation effects by political ideology. These results are in line with previous research suggesting that political ideology may be more likely to moderate responses when the science topic itself is ideologically-polarized (e.g., climate change, vaccines) (Nisbet et al., 2015). Because we intentionally selected ideologically-neutral scientific topics, we did not find significant ideological divergence as anticipated. However, we acknowledge that future work could examine how different self-presentational strategies might interact with participants' political ideology in more polarized contexts.

Table 4.1 Measures employed in the study. All items were measured on a five-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). Items with an asterisk (*) are reverse-coded.

	All Item(s)	Cronbach's α	*M (SD)*
Identification *(Cohen, 2001)*	"I can identify with/ I can relate to/ I have difficult identifying with/ I can understand what …was going through/I think I have a good understanding of… this scientist." (five items).	.88	3.44 *(0.90)*
Expectancy Violation *(Afifi & Metts, 1998)*	I completely expected the scientist to post what they did*. (one item)	—	2.72 *(1.06)*
Perceived Competence *(Besley et al., 2020)*	The scientist in these tweets is: "intelligent/unskilled*/qualified/knowledgeable." (four items)	.86	4.13 *(0.73)*
Perceived Benevolence *(Besley et al., 2020)*	The scientist in these tweets: "tries to improve one's lives/has good character/is considerate/does not treat others with dignity." (four items)	.80	3.75 *(0.69)*
Perceived Integrity *(Besley et al., 2020)*	The scientist in these tweets is: "honest/ethical/sincere." (three items)	.85	3.96 *(0.77)*
Perceived Openness *(Besley et al., 2020)*	The scientist in these tweets: "is unlikely to withhold information/does not try to tell the whole story/welcomes feedback/does not listen well*/sees everyone's views as legitimate." (five items)	.75	3.66 *(0.68)*
Support for Science *(adapted from Besley et al., 2020 and Zhang & Lu, 2024)*	"To what degree should we rely on / How much influence should / To what degree should the government rely on / How willing are you to take advice related to science policies from … scientists like the one you saw earlier when making decisions about public issues related to [astronomy/ geosciences]?" "The government should increase funding for [astronomy/geosciences] research / I would sign a petition advocating for more this kind of research / I would sign a petition supporting scientists' funding." (seven items)	.91	3.38 (0.92)

Science Information-Seeking Intentions *(Zhang & Lu, 2024)*	"I would like to seek out more information about / I am interested in learning more about / These posts made me curious about … the [astronomy/ geoscience] topics in these posts." (three items)	.90	3.36 (1.15)
Perceived Self-Promotion	The scientist whose posts you viewed earlier: "is describing their scientific success"/"talks about a successful research project." (two items)	r_{SB} = .84	3.27 *(1.26)*
Perceived Supplication	The scientist whose posts you viewed earlier: "is posting about an unsuccessful research experience"/ "talks about a failed research project." (two items)	r_{SB} = .88	3.23 (1.32)
Presence of Narrative Contextualization	"The scientist whose posts you viewed earlier: "talks about their struggles in the data collection and funding processes / shares a narrative in their posts about the struggles that occurred during this research process / describes in their posts how they faced difficulties and challenges leading up to their research outcome." (three items)	.82	3.60 (1.03)

Results

Main Effects: Perceptions of Scientists

First, we employed a series of three-way analysis of variance (ANOVAs) to test the effects of the experimental conditions (self-presentation of research outcomes, self-presentation of research processes, and scientific context) and their two-way and three-way interactions on perceptions of the scientist—their (1) competence, (2) benevolence, (3) integrity, and (4) openness. We found significant main effects of the self-presentation of research outcomes on perceived benevolence ($F(1, 1851) = 16.31$, $p < 0.001$, partial $\eta^2 = .009$), integrity ($F(1, 1851) = 44.34$, $p < 0.001$, partial $\eta^2 = .023$), and openness ($F(1, 1851) = 38.89$, $p < 0.001$, partial $\eta^2 = .020$). Post hoc comparisons showed that scientists who shared their failures were perceived as higher in

benevolence, integrity, and openness. These results provide support for H1b, H1c, and H1d; H1a (perceived competence) was not confirmed. **Table 4.2** provides a summary of all findings.

We also found significant main effects of the self-presentation of research processes on scientists' perceived benevolence ($F(1, 1851) = 4.39$, $p < 0.05$, partial $\eta^2 = .002$). Post hoc comparisons showed that the scientists whose X threads included narrative contextualization were perceived as lower in benevolence. These results do not provide support for H2, which stated that scientists who share narrative contextualization of their research processes (vs. those who do not) will be seen as less competent but more benevolent and open, and as having more integrity. Next, we found significant main effects of the scientific context on perceived benevolence ($F(1, 1851) = 6.82$ $p < 0.01$, partial $\eta^2 = .004$). Specifically, the geosciences context increased the perceived benevolence of the scientist. Finally, we found no interaction effects between both self-presentation types, addressing RQ1.

Expectancy Violation and Identification as Mediators

Next, we used Hayes' PROCESS 4.0 macro (2018) for IBM SPSS Statistics for our mediation analyses, with 95% confidence intervals (CIs) based on 5,000 bootstrapped samples. We created three categorical variables to represent each of the three manipulations, where the reference groups were the "success" condition for research outcomes (success = -1, failure = 1), "absent" for research process (narrative contextualization absent = -1, narrative contextualization present = 1), and "astronomy" for scientific context (astronomy = -1, geosciences = 1).

Specifically, we used Model 4 to examine whether identification and expectancy violation would serve as parallel mediators for the relationship between the experimental manipulations (self-presentation of research outcomes and of research processes) and the four perceptions. Our results showed that identification was a significant mediator for self-presentation of research

Table 4.2 Summary of Findings.

Hypotheses / Research Question		Outcome
H1	Scientists who engage in supplication (vs. self-promotion) of their research outcomes will be seen as (a) less competent but more (b) benevolent and (c) open, and as having more (d) integrity.	(a) Not supported (b) Supported (c) Supported (d) Supported
H2	Scientists who share narrative contextualization of their research processes (vs. those who do not) will be seen as (a) less competent but more (b) benevolent and (c) open, and as having more (d) integrity.	Not supported.
RQ1	How will the self-presentation of research outcomes interact with the self-presentation of research processes to influence perceptions of scientists?	No interaction effects
RQ2	How will expectancy violation mediate the relationships between the self-presentation of (a) research outcomes and (b) of research processes, and perceptions of scientists?	(a) Decrease in expectancy violation, thus decreasing perceptions of benevolence, integrity, and openness. (b) No mediation effects.
H3a	Identification will mediate the relationship between the self-presentation of research outcomes and perceptions of scientists. Specifically, supplication (v. self-promotion) will lead to increased identification, which will be associated with more positive perceptions of scientists.	Supported.
H3b	Identification will mediate the relationship between the self-presentation of research processes and perceptions of scientists. Specifically, the presence (v. absence) of narrative contextualization will lead to increased identification, which will be associated with more positive perceptions of scientists.	Not supported.
H4	Positive perceptions will be positively associated with stronger (a) support for science and (b) science information seeking intentions.	(a) Supported. (b) Only supported for benevolence and openness.

outcomes and competence ($b_{indirect}$ = 0.037, $SE_{indirect}$ = 0.013, 95% CI = [0.032, 0.061]), benevolence ($b_{indirect}$ = 0.042, $SE_{indirect}$ = 0.011, 95% CI = [0.032, 0.064]), integrity ($b_{indirect}$ = 0.053, $SE_{indirect}$ = 0.014, 95% CI = [0.028, 0.071]) and openness ($b_{indirect}$ = 0.044, $SE_{indirect}$ = 0.013, 95% CI = [0.032, 0.059]). Expectancy violation was also a significant mediator between self-presentation of research outcomes and benevolence ($b_{indirect}$ = -0.009, $SE_{indirect}$ = 0.002, 95% CI = [-0.013, -0.003]), integrity ($b_{indirect}$ = -0.003, $SE_{indirect}$ = 0.001, 95% CI = [-0.007, -0.000]) and openness ($b_{indirect}$ = -0.004, $SE_{indirect}$ = 0.002, 95% CI = [-0.008, -0.001]). Thus, the sharing of failures (compared to successes) increased identification with the scientist, which subsequently led to an increase in perceived competence, benevolence, integrity, and openness. As such, we find support for H3a. However, the sharing of failures also increased expectancy violation, leading to a slight decrease in perceived benevolence, integrity, and openness, addressing RQ2a. Finally, neither identification (H3b) nor expectancy violation (RQ2b) mediated the relationships between the self-presentation of research processes and the four perceptions.

Sequential Mediation

Lastly, as an exploratory step, we employed a customized model following the pathways in Figure 4.1 to examine the full sequential mediation model. Specifically, we employed two parallel mediators (identification and expectancy violation) as the first part of the sequential mediation model, the four perceptions (competence, benevolence, integrity, and openness) as subsequent parallel mediators, and support for science and science information seeking intentions as our outcome variables. The full model results are presented in **Figure 4.2.**

We found that all four perceptions influenced support for science, while only perceived benevolence and openness influenced science information-seeking intentions. Specifically, perceived benevolence of the scientist increased both support for science (b = 0.14, SE = 0.04, p <

0.01) and science information-seeking intentions ($b = 0.14$, $SE = 0.06$, $p < 0.01$), as did perceived openness for both support for science ($b = 0.12$, $SE = 0.04$, $p < 0.01$) and science information-seeking intentions ($b = 0.23$, $SE = 0.05$, $p < 0.01$). Perceived competence ($b = 0.24$, $SE = 0.03$, $p < 0.01$) and perceived integrity ($b = 0.24$, $SE = 0.04$, $p < 0.01$) also increased support for science . Therefore, H4 was partially supported. The indirect effect results for both support for science and science information seeking intentions also revealed that the self-presentation of research outcomes indirectly influenced support for science through expectancy violation, identification, perceived benevolence, integrity, and openness. The self-presentation of research outcomes also indirectly influenced science information seeking intentions through expectancy violation, identification, and perceived openness (see **Appendix C** for full results of the indirect effects).

Lastly, the results for the sequential mediation analyses showed that the self-presentation of research outcomes indirectly influenced support for science through identification and then all four perceptions, as well as through expectancy violation and then both perceived benevolence and openness. Similarly, the self-presentation of research outcomes indirectly influenced science information seeking intentions through expectancy violation and then both perceived benevolence and openness, as well as through identification and then both perceived benevolence and openness.

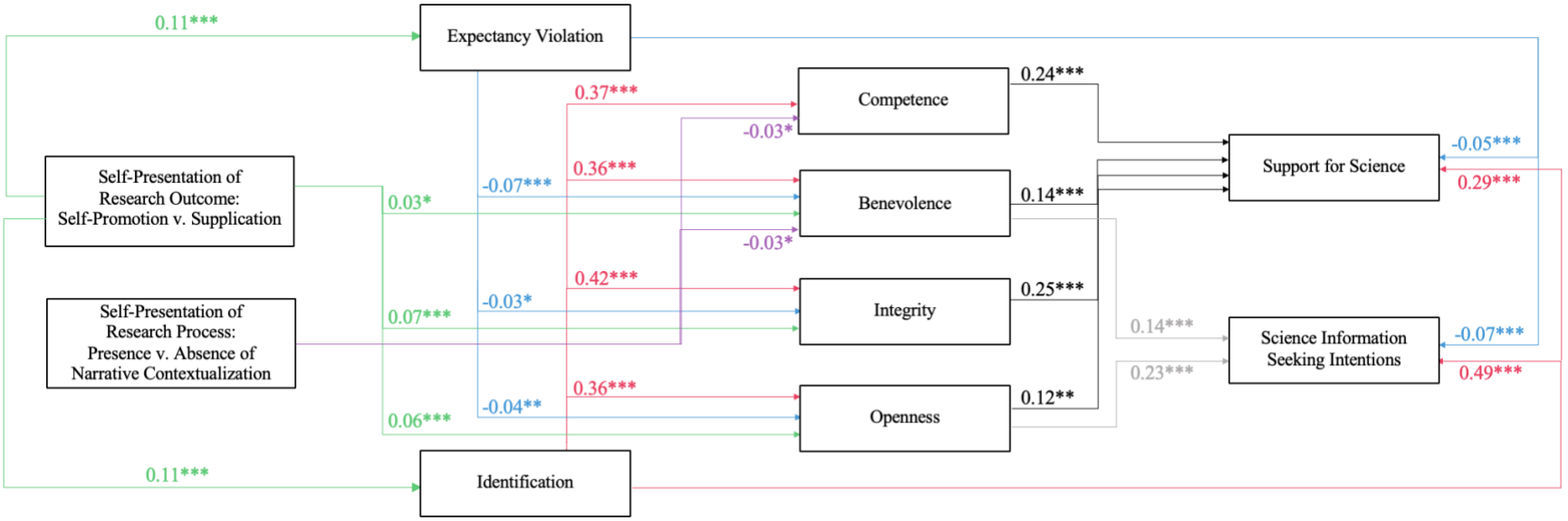

Figure 4.2 Full model with unstandardized coefficients. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Discussion

Recommendations to "be human" and to "bring the public alongside the scientific process" have generated a plethora of such interactions on social media; from LinkedIn to X, scientists, experts, and other professionals are increasingly sharing vulnerabilities and struggles, generating millions of views and interactions (Orgad, 2024). As more and more scientists are expected to step into public engagement and even advocacy roles on social media, and in a culture where experts seek to increase their influence by emphasizing their credentials and evidence of expertise, the question remains: how might these interactions and their self-presentations influence how scientists and experts are actually perceived by the public? Our study revealed that (a) sharing failures may be a useful strategy for scientists and experts to employ, (b) promoting identification with scientists can improve perceptions of those scientists, and (c) fostering these positive perceptions has important implications for support for science and information-seeking intentions.

First, we found that both the self-presentation of scientists' research outcomes and research processes can directly influence audiences' impressions of the scientist as well as support for science and information-seeking intentions. The use of supplication (e.g., sharing failures) compared to self-promotion (e.g., sharing successes) led to more positive impressions as well as support for science. Sharing and being transparent about failures in science may be a way to counteract existing stereotypes (Fiske & Dupree, 2014) and to promote positive attitudes toward scientists in policy and society. Even within the scientific community itself, scientists have been grappling with the "file drawer effect," which refers to sharing null results and more information about their research (McNutt, 2016). These findings suggest that sharing these "failed" attempts will not necessarily lead scientists to be seen as less competent; rather, audiences view them as

more benevolent and open, as well as possessing more integrity, than those who only promote their research successes.

But while the self-presentation of research outcomes (e.g., sharing failures) had significant effects on audience perceptions, the self-presentation of research processes (e.g., sharing narrative contextualization of struggles) decreased perceptions of benevolence and did not significantly impact the other perceptions. One possibility is that failures in research outcomes are more discrete and concrete events that can be easily framed as learning experiences, which may elicit feelings of sympathy and reinforce perceptions of scientists as resilient and transparent. In contrast, sharing research process struggles that lack resolution and instead highlight ongoing challenges may instead evoke pity or frustration. Future research could, then, examine whether certain emotions serve as mediators that may further explain these differences. In addition, the struggles presented within the narrative contextualizations in our study primarily involved external obstacles (e.g., slow data collection, funding difficulties) rather than scientific problem-solving or perseverance, which may have made the scientist appear more as a victim of circumstance rather than an active agent overcoming challenges. Additional work could also explore whether different types of struggle narratives, especially those demonstrating persistence or creativity, may lead to more positive perceptions. Still, the lack of uniform results does suggest that scientists face a fine balance in navigating how to portray themselves and their research on social media.

Next, we found that only the self-presentation of research outcomes indirectly influenced source perceptions through expectancy violation and identification. Supplication led to increases in both expectancy violation and identification compared to the use of self-promotion, while narrative contextualization had no impact on either expectancy violation or identification. Subsequently, expectancy violation led to slightly decreased perceptions of the scientist's

benevolence, integrity, and openness. But these decreases were counteracted by identification with the scientist, which increased all four perceptions. Our results suggest that identification with scientists may more strongly influence perceptions than expectancy violation. So while supplication as a self-presentation strategy might not necessarily be seen as the most *appropriate* for a scientist, it may be *expected as normative:* it increases identification with that scientist and still leads to overall positive impressions. In line with Chapter 3, then, this might suggest a potential norm shift in how audiences view scientists—how they can act and communicate, what and how they should communicate—perhaps as a result of their increasing presence across different social media platforms.

In other words, scientists on social media may be able to leverage certain self-presentation strategies or other tactics that might not be seen as traditional "science communication" or even as "appropriate" for stereotypical scientists, such as those used by other users and influencers (Zhang & Lu, 2023), especially if those strategies can help to increase identification with scientists. However, a critical consideration to note is the cultural context in which these interactions occur: the participants in this study were from the United States, where cultural norms around success and failure, such as the "winner culture" (Duina, 2011), may influence how audiences perceive narratives about scientists' struggles or failures. In collectivist cultures, perceptions of scientists' struggles might evoke greater empathy or different interpretations (i.e., viewing personal struggles as a reflection of broader societal or institutional challenges) compared to individualistic cultures that value individual resilience and self-reliance (Satterwhite & Luchner, 2016). Future research could examine whether different cultural expectations about success and failure shape how scientists' self-presentation may influence public perceptions and engagement.

Finally, the sequential mediation analyses revealed the impacts of perceptions on support for science and science information-seeking intentions. All four perceptions (perceived competence, benevolence, integrity, and openness) increased support for science; that is, to endorse scientists' role and involvement in policy. People who perceived scientists as such, then, were more likely to state they would advocate for their role in science and public policy, and to follow their scientific policy recommendations. However, only benevolence and openness influenced science information-seeking intentions.

That the other two perceptions (competence and integrity) had no effect suggests an important distinction between the two outcome variables: science advocacy can be conceptualized as a more passive support for science (e.g., a belief about its role in public policy), while science information-seeking intentions are a more active form of engagement (e.g., a behavioral intention to seek out more information). Audiences may respect and support scientists who demonstrate competence and integrity, influencing their attitudes towards science advocacy, yet may still perceive an interpersonal or social distance that might not foster engagement with science. On the other hand, scientists who are seen as warmer, more relatable, or more transparent (e.g., more relational qualities) may foster a sense of accessibility and approachability that reduces barriers to information seeking, increase perceived relevance, and promote curiosity (Abitbol et al., 2022; Lin-Siegler et al., 2016).

As with any study, we note a few important limitations to consider. First, our manipulation for the self-presentation of research processes condition was not as clear as that for the research outcomes condition; just over a half point difference (on a 5-point Likert-type scale) existed between threads that excluded and those that included narrative contextualization; for self-promotion versus supplication, this difference was over one and a half points. While the

differences for both were significant at a 0.05 level, this may have minimized the effects of narrative contextualization observed. One potential reason for this smaller induction for narrative contextualization may be due to audiences perceiving the supplication condition alone as a form of a struggle; that is, people might think scientists who are discussing failures (without the explicit struggle narrative) are still describing a form of struggle. Thus, future studies could seek to disentangle these effects by isolating narrative contextualization in the stimuli itself. Similarly, as briefly discussed already, the particular framing of the narrative contextualization (external difficulties) may impact impressions differently had they instead highlighted personal setbacks and challenges. Again, isolating the locus of responsibility could be an area of interest for future research to fully understand how different self-presentation strategies employed by scientists can influence various attitudes about them. Finally, the cross-sectional nature of this study warrants additional research, such as utilizing longitudinal studies or manipulating relevant mediators, to further examine these sequential pathways.

Conclusion

Altogether, this study contributes to the broader theories of science communication and public engagement in three key ways. First, this research underscores the growing significance of scientists on social media as pivotal players in shaping how science issues are received and responded to across these platforms. That is, how scientists perform their identity as publicly-identifiable scientists, how they foster trust in themselves as individuals and relationships with the public, and how they humanize science as a field, are all related to the broader "processes by which the culture and knowledge of science are absorbed into the culture of the wider community" (Bryant, 2003, p. 357). Their self-presentation therefore plays an integral role in shaping the landscape, and our understanding, of contemporary science communication. And as more people

turn toward social media as a source for science, health, and environmental issues, understanding *how* these strategies operate "help us better understand the structure of the online social formation in which [scientists and science] are situated, as well as the cultural values circulating within the ecosystem" (Caliandro, 2018, p. 566).

Second, these findings add important empirical evidence to the aforementioned recommendations to "be human" and scientists' self-presentational goals from Chapter 2, as well as practical implications for scientists and other experts seeking to engage with the public on social media. Sharing failures in research and academia not only represent accessible and authentic ways in which scientists as well as other relevant stakeholders can present themselves on social media, but can also help audiences form impressions of scientists as possessing competence, benevolence, integrity, and openness. In reading posts about scientists who have faced failed experiments and research projects and in seeing that scientists—like them—can fail, audiences might be more likely to identify with them. Supplication as a self-presentation strategy, then, represents a potential way in which scientists can "escape the ivory tower" and even counteract the "mixed" stereotype of scientists as "cold but competent" (Chinn et al., 2023; Fiske & Dupree, 2014). However, scientists should also be strategic in how they frame these narratives. Emphasizing perseverance, lessons learned, or problem-solving approaches may mitigate potential negative reactions, particularly when discussing ongoing struggles rather than discrete failures. In addition, given the role of identification in shaping perceptions, scientists might consider incorporating relatable elements into their narratives, such as humor, self-disclosures, or engagement techniques from prior literature, to encourage such identification with their audiences.

Finally, we build upon Besley et al.'s (2021) suggestion to advocate for a more nuanced perspective toward examining public perceptions of scientists. Audiences want to find and listen

to scientists who are high in not only competence and ability, but also possess high integrity, are open about their research, and are seen as benevolent. Each of these impressions, too, can have different implications for important science attitudes and behaviors. Thus, understanding what scientists can ethically communicate to foster these impressions based on various communication objectives remains an imperative.

Chapter 5:

Summary and Conclusions

Summary

Throughout the last four chapters, this dissertation has sought to critically examine how social media have (re)shaped our understanding of the public communication of science from the perspective of three key communication components. Across three studies, I looked at (a) visible scientists' self-presentation on social media (*the messenger*), (b) audiences' normative perceptions of scientists' communication on these platforms (*the audience*), and (c) how these dynamics can come together to influence how audiences perceive science and scientists based on different self-presentation strategies (*the message*). In this final chapter, I begin by summarizing each study and its key findings. Then, I reflect on their broader theoretical and practical implications. Lastly, I provide a discussion of future research directions and offer a final few closing thoughts.

In Chapter 2, I conducted interviews with highly-visible scientists on social media to understand how they construct and manage their self-presentation on these platforms. A reflexive thematic analysis revealed that scientists' self-presentation on social media reflects a range of strategic, normative, and identity-driven goals. Very briefly, scientists noted a moral obligation to be present on these platforms, in order to (a) humanize and challenge stereotypes of scientists, (b) build trust and credibility through authenticity, and (c) push back against exclusionary narratives within STEM. These goals, however, were often challenged by at-times competing expectations and tensions from their audiences and the social media environment, including (a) a persistent

stigma towards social media engagement within academia, (b) the emotional labor of sustaining authenticity, and (c) heightened exposure to harassment and trolling, especially for scientists from marginalized identities. To reconcile and manage these constraints, scientists adopted a range of boundary-setting and audience management strategies. An important subsidiary question that this study also aimed to address was the imagined audiences of these scientists. The findings, in line with Litt & Hargittai (2016a), revealed that this "imagined audience" was often quite specific, ranging from personal ties to professional, communal, and even phantasmal ties. Altogether, this chapter foregrounds the lived experiences of scientists to offer rich and nuanced information into how they interpret and position their self-presentation on social media within the broader landscape of science communication and public engagement.

Chapter 3 shifted focus towards the audience, using survey data to understand how audiences' science observation on social media might influence normative perceptions towards scientists' communication on social media. Building on Chapter 2's findings (e.g., the ways in which scientists present themselves to achieve certain self-presentational goals through expressions of warmth, competence, political expression, and public engagement), this study adopted a social media affordances approach to investigate how these platforms might contribute to the formation of the very norms that people perceive about how scientists *should* communicate and interact with the public. Drawing upon a two-wave national panel survey ($N = 878$) conducted in February and March 2025, this chapter tested a theoretical model in which observation of science-related content on social media influenced audiences' normative perceptions of four types of scientists' communication on social media (public engagement behaviors, warmth-oriented strategies, competence-oriented strategies, and political expression), the latter two of which were, in turn, associated with trust in scientists and willingness to be vulnerable to them. Political

ideology was also found to moderate certain relationships, such that increased science observation among conservatives was associated with a significant increase in normative perceptions of warmth-oriented behaviors. Overall, this study centers the roles of the audience and social media affordances in impacting the relationship between science and (social media) publics in increasingly-visible and interactive online environments: that is, shifting audience norms may not only reflect the changing media landscape, but shape the very meaning of being a credible and trustworthy scientist online and beyond.

Lastly, Chapter 4 builds upon the first two studies to examine the persuasive implications of scientists' self-presentation on social media. Specifically, Chapter 2 had revealed that a common strategy for performing authenticity was to embrace transparency about their knowledge boundaries and fallibility in science. Scientists shared how they often publicly corrected their mistakes and were open about their failures and mistakes. Chapter 3 had demonstrated the importance of norms (e.g., what audiences come to see as normative from scientists across a range of communication strategies and behaviors, beyond simply a reflection of personal preference) as key mechanisms that can influence trust in scientists. Through an online between-subjects experiment (N = 1,843), this chapter found that participants rated scientists who shared their failures as more benevolent and open, and as having more integrity, than those who only shared their successes. These perceptions further increased support for science and information-seeking intentions, and were mediated by the extent to which audiences identified with the scientist or perceived an expectancy violation. This study therefore offers important empirical evidence that scientists' self-presentation can indeed become part of the broader "processes by which the culture and knowledge of science are absorbed into the culture of the wider community" (Bryant, 2003, p. 357) and influence key science communication outcomes.

(Re-Thinking) Science Communication in the Age of Social Media

Chapter 1 began with an invitation to critically examine how the rise of social media has reshaped the landscape of science communication. There, I traced the evolution of dominant science communication models over the past fifty years and introduced social media as a communication environment that has complicated many of those assumptions. I made the case for focusing on scientists' self-presentation as a critical yet underexplored dimension of science communication in this changing landscape, and situated this work within the broader sociopolitical and technological shifts that influence relationships between science and society today.

In this section, I return to those opening provocations to reflect on what this dissertation offers in light of that initial framing. By triangulating data from three studies that employ different methodological approaches, I synthesize five key themes that emerged and consider their implications for how we understand and support science communication in the age of social media. Altogether, I offer a perspective that recognizes science communication on social media as a relational, situational practice, one negotiated through (imagined) audiences, evolving norms, and the everyday identity work of scientists operating within highly-visible and often contested online spaces.

The Everyday Performance of Scientific Credibility

I begin with a question that has taken on renewed urgency in an era where public trust in scientific institutions is increasingly contested, and where scientists are often perceived as potential threats (Chinn et al., 2023): **what constitutes scientific credibility and trust on social media and beyond, and how might it be meaningfully cultivated in ways that can resonate across diverse audiences?**

As Chapter 2 showed, many scientists recognized that institutional authority alone was insufficient to generate trust on social media platforms like TikTok or X. Instead, they deliberately sought to foster credibility through (a) performing authenticity and (b) humanizing both themselves and their science. This often meant forgoing conventional authority cues such as institutional titles and lab coats in lieu of candid self-disclosures, transparency about scientific failures, and casual, often humorous, engagement with audiences. These self-presentational practices both serve as markers that can provide access to the "real" self (Marwick & boyd, 2010, 2011) and strategic efforts to offer what one participant called "*a form of expertise that's fallible, willing to admit mistakes, and self-effacing*."

This implies two points: first, authenticity and humanization emerge as relational means through which scientific trust and credibility can be cultivated, particularly in a sociopolitical environment where expertise alone is no longer sufficient, and where longstanding stereotypes cast scientists as competent but emotionally distant or unrelatable (Fiske & Dupree, 2014). Second, authenticity itself can become part of what it means to be perceived as a credible scientist in these online environments. In other words, being authentic about one's identity, positionality, or even the uncertainties or failures in one's research, can become critical elements of scientific credibility.

But performances of authenticity and humanization do not reside solely in the intentions of the communicator; instead, they are as much socially-constructed through audience observation and expectation. Chapter 3 therefore extends this relational view of credibility by examining how audiences who frequently encounter science content on social media come to view these self-presentational practices not as deviations from scientific credibility, but as normative dimensions of how credible scientists are expected to communicate on social media. These findings suggest a

mutually-reinforcing dynamic between scientists' self-presentation and audience norm formation, where authenticity and humanization can become both the *performance* and the *normative standard* for scientific credibility online.

Chapter 4 builds upon these insights to demonstrate how these self-presentational practices can influence audience perceptions of credibility and trust. Scientists who shared failures or contextualized their research challenges (i.e., mirroring the types described in Chapter 2) elicited stronger identification from participants. So in seeking to humanize themselves (by revealing these failures and struggles), scientists can indeed effectively foster a sense of connection and relatability with their audiences that ultimately undergirds their public trust in science. These results therefore provide important empirical evidence for what Chapters 2 and 3 have suggested: scientists' self-presentational performances can indeed shape how they are perceived and hold broader implications for how trust in science can be cultivated and sustained on social media.

Taken together, the findings across this dissertation suggest that scientific credibility on social media is not simply conferred through institutional affiliation or expertise (e.g., traditional heuristics for credibility), but is performed and earned through relational, situated acts of self-presentation. Put simply:

> *Scientists' self-presentation on social media (as it manifests through how they post, what they disclose, and how they engage) can become an everyday performance of scientific credibility and trust not simply because of their institutional affiliations and expertise (and sometimes even in spite of it), but because of how those acts resonate within particular contexts, with particular audiences, and under particular conditions.*

From Institutional to Individual

A key dynamic underlying the importance of scientists' everyday performance of credibility is a (re)configuration of how scientists are positioned, or choose to position themselves, in the social media public sphere. As scientists become increasingly reliant on media platforms to reach public audiences, they also become subject to the logics of those platforms. This shift mirrors broader processes of medialization, in which the media have become a key arena for the public legitimation of science, and where the logics of media become a force that can influence the practices and performances of scientists (Väliverronen, 2021). For example, many participants in Chapter 2 acknowledged a pressure to post consistently and engage strategically with their audiences, so that algorithms could continue to boost their content to wider audiences. This has given rise to a phenomenon in which individual scientists can attain a form of public recognition akin to celebrity; notably, not necessarily through traditional reputation or fame, but through sustained visibility and strategic navigation of platform norms.

Such findings are both in line with and extend research on the concept of "celebrity scientists" (Fahy & Lewenstein, 2021). The authors argue that celebrity scientists are "emblematic of science itself, embodying complex ideas and concepts through their distinctive public personae," that it is precisely *through* celebrity that ideas are represented in public, and scientific ideas and concepts can be circulated and discussed (Fahy & Lewenstein, 2021, p. 44). They offer six salient characteristics of celebrity scientists as follows:

(i) The scientist's represented image features a blurring of his or her public and private lives.

(ii) The scientist is a tradable cultural commodity.

(iii) The scientist's public image is constructed around discourses of truth, reason and rationality.

(iv) The scientist has a structural relationship with the ideological tensions of their times.

(v) The scientists' representations feature the tensions and contradictions inherent in fame.

(vi) The scientists' celebrity status allows them to comment on areas outside their realm of expertise.

Their conceptualization of "celebrity scientists," however, focuses on highly-recognizable public figures (e.g., Dr. Anthony Fauci) whose celebrity status is often supported by institutional or government resources and traditional media platforms. What Chapter 2 has sought to argue is that these dynamics of "celebrity scientist," once attainable only by institutionally-prominent or elite figures, have now filtered into the everyday practices of a broader cohort of scientists who come from diverse backgrounds and experiences. As Chapter 2 extensively detailed, I find support for each of these characteristics among the participants, many of whom are early and mid-career scientists who lack formal media training or infrastructures of support.

Such individualization of science communication has played out more broadly, as a large number of these scientists engage with audiences on platforms like TikTok, Instagram, and X. While they may not possess celebrity status in the traditional sense (i.e., the broad public or cultural recognition), they increasingly embody the same hybrid role: they speak *as scientists* and represent science in the public sphere, but they also speak *for themselves*, shaped by their individual self-presentational goals.

The individual scientist, then, becomes a critical locus through which credibility, trust, and even the very boundaries of science communication are negotiated. Chapter 3 demonstrated that audiences increasingly come to understand what scientists should do based on the landscape of

science on social media, towards which these individual scientists online often contribute (e.g., Costas et al., 2020; and as demonstrated in Chapter 2). Chapter 4 reveals that even in the absence of traditional celebrity status, individual scientists' self-presentation on social media can still meaningfully influence how scientists and science at large are perceived and received. These findings provide empirical support in response to Fahy and Lewenstein (2021), who observed that while the cultural prominence of celebrity scientists may enable them to circulate scientific ideas and shape public discourse, the actual impact of such figures on public attitudes and awareness has remained largely unexamined. Altogether:

> *The individual scientist on social media occupies a dual role: they are at once a symbolic representative of science and a public persona whose credibility and authenticity are shaped by their individual self-presentation performances.*

The Public Negotiation of Norms on Social Media

Norms about how scientists should speak, behave, and engage with the public have traditionally been defined through institutional standards (McKaughan & Elliott, 2018). These expectations often privilege neutrality and objectivity, which are reinforced through formal training and academic convention. As Chapter 2 illustrated, these norms can come into tension not only with how scientists communicate on social media, but with the very idea of being a scientist *on* social media. Many scientists pointed towards a persistent stigma within academia, such that their social media engagement was often trivialized as a distraction from "real" science or as a "lesser" form of scholarly contribution. In this context, self-presentation on social media becomes a site of norm negotiation, where scientists have to make strategic decisions about what to share and how to share it, but also reckon with these academic and institutional constraints.

At the same time, social media introduces a different consideration for how science communication norms might emerge and evolve. In contrast to the top-down, hierarchical nature of institutional norm-setting, norms on social media can emerge through (relatively more) decentralized and participatory processes. In particular, Chapter 3 demonstrates how audiences form their own normative expectations of how scientists should communicate through observation of science content on social media. These normative perceptions, then, are no longer exclusively dictated by professional standards but instead can be influenced by observations facilitated through social media affordances such as visibility or social presence. These platform-mediated observations thus help construct a different and parallel set of norms, grounded in audience interpretation rather than disciplinary consensus.

This shift holds important implications for science communication: if the goal is to rebuild public trust and meaningfully engage diverse audiences, then their expectations and evolving normative perceptions of scientific communication must be acknowledged as central to effective engagement. After all, violations of these norms can lead to lower levels of trust, diminished support for science, and reduced interest in seeking scientific information, as Chapter 4 revealed. Audiences' normative perceptions are not simply arbitrary preferences, but can influence how scientists are perceived, how their messages are received, and whether engagement efforts ultimately are effective or not (and for whom). All told,

> *Norms about scientists' communication, which carry real consequences, are no longer dictated solely by institutional or academic standards, but emerge through ongoing negotiations between scientists and audiences on social media. Scientists must navigate and reconcile often-competing expectations about what counts as "appropriate" or "credible."*

The Politics of Visibility in Science Communication

While this sort of public negotiation of communication norms is often facilitated by the visibility of scientists' self-presentation on social media, that same visibility can also amplify scientists' exposure to significant risks, and even more so for those who challenge persistent stereotypes about who can be a scientist or what a scientist can say and do (e.g., Chambers, 1983, Women and Minorities in the S&E Workforce, 2018). Women, scientists of color, and those from other marginalized backgrounds often bear a disproportionate share of the emotional and reputational costs of public science communication. Chapter 2 revealed that for these scientists, visibility often invited harassment, professional repercussions, and personal attacks. These scientists described self-censoring or disengaging altogether from certain platforms to protect themselves, while others strategically curated their self-presentation to reduce these risks.

More so, these risks have only become amplified under Donald Trump's second presidential term, highlighting how this visibility does not occur in a vacuum either, but is deeply situated within and influenced by the current sociopolitical landscape. That is, scientists' visibility is entangled in a broader contest over what kinds of scientific knowledge are deemed credible and who has authority to speak as a public representative of science. This complicates the findings from Chapter 4, which found that scientists who were transparent and vulnerable about their challenges and failures could elicit identification and trust with their audiences. Notably, the scientist featured within the experimental manipulation in that chapter was a white woman, a factor that may have influenced how participants perceived the scientist. Women in science often face gendered stereotypes that undermine their authority (e.g., Banchefsky et al., 2016; King, 2021), although more recent work has found that women scientists are perceived as more likable than

men scientists, and that this likability can in turn increase perceptions of competence and trust in science (Hubner & Bullock, 2025).

However, this increased likability may not extend to all women: while the aforementioned study intentionally selected a racially ambiguous women to avoid race-related effects, women of color often have unique experiences due to their intersecting identities of race and gender (Cole, 2009). The concept of intersectionality holds that interlocking systems of oppression exist for those who have more than one subordinate identity (e.g., Black women) and these identities should be considered simultaneously rather than independently (Crenshaw, 1989). As such, self-presentational strategies that may be effective for white women may be received quite differently when performed by scientists from other minoritized groups. Additionally, the experiment in Chapter 4 was conducted in summer 2024, prior to the escalation of political hostility towards scientists and experts that followed Trump's reelection. Future research should thus explore how scientists' social identities might influence public perceptions of trustworthiness and legitimacy, particularly across changing sociopolitical contexts.

Thus, when science communication scholars and institutions advocate for greater visibility, transparency, or vulnerability, we must also reckon with the fact that not all scientists can safely or equally engage in these performances. After all, such self-presentation may not be a viable or sustainable communication choice for all scientists: what can foster trust and identification on one hand can, on the other, function as a site for heightened exposure and risk for different scientists.

But just as scientists' identities shape how visibility is experienced, so too do audience characteristics shape how visibility is interpreted. Chapter 3 demonstrates that audience perceptions of scientists' behaviors are not necessarily uniform, but can be at times filtered through partisan lenses. For example, scientists' use of warmth-oriented strategies was generally seen as a

normative communication strategy by more liberal participants, while conservative audiences were less likely to view it as normative, unless they had high levels of science observation. So on the audience's side, the same act of self-presentation can be perceived as normative and credible by some yet inappropriate by others.

Broadly, then, it is not enough to simply increase the reach of scientific content or assume that visibility of scientists' self-presentation leads to trust, understanding, or engagement. Instead, visibility must be understood as a politically and socially situated phenomenon that produces disparate outcomes for scientists, depending on who they are and who is observing them. These findings underscore the following:

> *The lived experiences and public reception of scientists' self-presentation are shaped by intersecting sociopolitical, cultural and identity-based factors. The very conditions of visibility that make social media a space for participatory engagement also render it a site of (asymmetric) risk, especially for those whose identities or messages challenge dominant stereotypes.*

Social Media Platforms as Architectures of Participation

Finally, I want to offer a few comments on social media platforms as a backdrop for the themes described above. First, this dissertation holds the premise that social media opens up certain possibilities for scientific visibility, credibility, and engagement, but how those possibilities are interpreted and enacted depends on sociopolitical and cultural contexts. As Chapter 3 articulated, social media affordances such as visibility, association, social presence, and personalization can structure the possibilities for how audiences observe science. This in turn influences audiences' normative expectations around scientists' self-presentation and communication behaviors. Yet,

this influence is contingent on how and whether audiences choose to engage with science content, as well as shaped by broader factors such as political ideology.

Similarly, scientists in Chapter 2 described actively interpreting and responding to platform norms and logics. Those prominent on TikTok, for example, recognized how they could leverage platform features such as the reply and stitch functions to engage with audiences in a casual, conversational, but strategic, way. As one participant acknowledged, "*There's a different level of trust when you can see someone answering questions, showing you around the lab, or explaining how a vaccine is made*." These features therefore became a means to achieve specific communicative and self-presentational goals (e.g., building trust) in ways that felt appropriate and sustainable on the platform. Broadly, then:

> *Social media platforms are best understood as sociotechnical environments whose meaning and impact are shaped through use (by scientists, and by public audiences). Scientists and audiences come together to co-construct the norms, meanings, and practices that give meaning to social media's role in (re)shaping the public communication of science.*

Practical Implications

This dissertation was motivated by observation of real-world phenomena during the early days of the Covid-19 pandemic, when the visibility of science and scientists suddenly became urgently necessary yet deeply contested, and particularly so on social media. It seems only fitting, then, to return now to the real-world implications of this dissertation. The following are not meant to be prescriptive, but are offered as points of consideration for scientists, institutions, and social media platforms seeking to support more effective and equitable science communication in an online world.

For Scientists and Science Communicators

A key finding of this work is that credibility in online science communication is relational, performative, and context-dependent. Audiences identify with and respond to scientists who share personal stories, behind-the-scenes content, or are transparent about the struggles and failures in their scientific endeavors. Put differently, audiences want scientists who are transparent, humble, authentic, and who at the end of the day, are just another human that they can relate to. Broadly, then, scientists should engage in science communication that feels authentic to themselves; at the same time, they should recognize that this authenticity can still be strategic, and certainly should be sustainable. By that, I mean three points.

First, scientists should set boundaries to protect their well-being. They should feel empowered and be supported in defining what authentic and safe public engagement looks like for themselves. Second, scientists should cultivate reflexive awareness both of their own positionality and of how their communication is received. This could entail recognizing how their identities and experiences shape their self-presentational goals, while also paying attention to how different audiences interpret and respond to their content. Third, scientists may benefit from reframing public engagement not as a one-directional act of persuasion, but as a mutual meaning-making of scientific performance. Of course, persuasion remains a legitimate and necessary goal. What this dissertation argues here is that building relationships with publics does not *preclude* persuasion, but rather *creates* the conditions under which persuasive messages may be more likely to be (effectively) received.

For Institutions

Chapter 2 identified a number of key tensions within scientists' communication on social media, often stemming from within institutions and academia at large. To address these,

institutions could consider (a) legitimizing and incentivizing diverse forms of public engagement, (b) building collaborative engagement ecosystems, and (c) providing formal infrastructure and protection for safe and meaningful engagement.

Institutions and academia should broaden their conceptualizations of outreach and communication to reflect changing realities, and to bridge the gap between traditional academic standards and public-facing communication practices. First and foremost, this entails recognizing that scientists who choose to engage on social media hold an important and legitimate role in building public trust in science. Several scientists advocated for revising evaluation criteria for hiring, tenure, and promotion to either explicitly include, or at least provide space to consider, public engagement on social media. They suggested that public engagement metrics could be included within annual reviews alongside traditional outputs like publications and grants, particularly since these efforts do take significant time and effort (for example, one scientist shared that a single 15-second video can take up to several hours to make, including scripting, shooting, and post-production editing).

Furthermore, while celebrity scientists often benefit from public relations teams, many of these individual scientists (despite being highly visible) often navigate this visibility, and the effort required to maintain that visibility, alone. Some scientists have suggested that institutions could establish a hub that connects scientists with groups of communication scholars, designers, or other staff for training and assistance in platform strategy, audience engagement, and risk navigation. Additional institutional response protocols could also be in place to support scientists who receive targeted harassment or attacks on social media.

For Platforms

Platforms can also play a role in supporting scientists in their public communication of science, be it through platform features and design or values. A number of possibilities emerge, either directly from the findings of this dissertation or more implicitly through the broader dynamics it reveals.

First, platforms could consider how their algorithms and discovery features can amplify (verified) scientists in ways that do not require them to fully conform to social media logics that often prioritize virality over nuance. For example, as several scientists in Chapter 2 noted, their shorter videos were pushed to far wider audiences than their longer, more detailed ones. Scientists acknowledged that within the confines of platform algorithms, they often had to make strategic trade-offs between length of video (and thus nuance) and engagement. Features that enable better contextualization (e.g., annotated or linked posts, pop-ups) could support these nuances and reconcile some of the tensions scientists face on social media.

Moreover, platforms can and should do more to support scientists and minimize the risks they face when communicating publicly. If scientists do not feel safe or supported, they may disengage or migrate to other spaces, therefore diminishing the platform's cultural and civic value as a site for science communication and the public exchange of knowledge.

Future Directions

Who is the Audience?

Throughout this dissertation, I have made numerous references to "audiences." The concept of "the audience", after all, is critical to this research and science communication research more broadly. But, what does the "audience" really mean, and who does it refer to? This concern was also raised by McCarthy & Grant (2024), who noted that "what we mean when we talk about

the audience is not always clear: implied and ambiguous, rather than explicit and precise" (p. 408). Rather retrospectively, "audiences" here refers broadly to individuals who are interacting with science communication content or are actively involved in co-constructing its meaning. This definition thus aligns with McCarthy and Grant's (2024) categorization (one of three) of "audiences as doing," which encompass both interaction- and dynamic-based conceptions.

Nevertheless, even such a definition risks flattening or obscuring important differences, and forces us to reckon with the question of who is *missing* from this definition. For example, in Chapter 3, participants were screened out if they indicated that they were not an active social media user. The "audiences" here therefore excluded people who may be disengaged from these platforms or lack digital access altogether. An important area for future research, then, is to attend to who is included, who is excluded, and how audience positionality may also shape the dynamics of science communication and the implications of the findings here.

Furthermore, "audiences" are not singular nor unified; prior research, as well as the research here, show that factors like political ideology, prior beliefs, trust in institutions, cultural background, and personal experiences can all shape how science communication is interpreted (e.g., Hart & Nisbet, 2012; Zhang & Lu, 2023). Future research could therefore examine how specific and more nuanced audience predispositions (e.g., stereotypes about scientists) moderate the effects of different self-presentation strategies This would allow scholars to identify tailored communication strategies across different subgroups of audiences.

What Counts as "Relatable"?: Relational Strategies and Their Boundaries

Chapter 4 revealed that not all self-presentation strategies are necessarily effective: sharing discrete failures (supplication) increased trust and identification, but contextualizing ongoing research struggles (narrative contextualization) did not influence either. This difference raises

important questions about what kinds of vulnerability or other self-presentational goals are actually perceived as relatable and credible, as opposed to those that may evoke discomfort or doubt. For example, does emotional vulnerability (e.g., burnout, self-doubt) elicit different responses than procedural transparency (e.g., data delays, funding issues)? Future research could also examine mediators like audiences' emotional response (e.g., sympathy, admiration, or pity towards scientists) to explain why these differences may manifest. And while research has already examined how some strategies (like humor, Yeo et al., 2021; Zhang & Lu, 2022) can shape perceptions, a focus on other self-presentational strategies could continue to provide important empirical evidence about their effectiveness and implications.

More importantly, though, these differences point to a key aspect of such relational strategies and authenticity itself: that they are not one-size-fits-all solutions, that authenticity is a socially constructed and context-dependent performance often determined by the audience (Marwick & boyd, 2010). The scientists in Chapter 2 recognized this, too. As one pointed out, "*That's why I don't think the cure to misinformation is one Bill Nye. It's a lot of scientists with 10,000 followers, because people trust different people. There's a relationship that scientists need to build with their audience, and that's going to look different for every scientist and every audience*." With this in mind, future research should broadly consider the boundary conditions of relational science communication: what counts as relational, for whom, and why?

Who Gets to Be "Authentic"? The Role of Identity

Questions of identity—of both the scientists and the audiences—emerged across the three studies. Chapter 2 revealed how scientists from marginalized backgrounds often face heightened risks when engaging in self-presentational practices on social media. For them, their self-

presentation was a constant form of boundary work that sought to challenge persistent stereotypes about who counts as a scientist and what constitutes legitimate science communication.

Future research should continue to explore how minoritized scientists shape these boundaries, and to critically examine the conditions under which visibility on social media can offer new opportunities or reproduce hierarchies of privilege. Additionally, future research could experimentally examine how scientists' identities can influence audiences' attitudes and perceptions. For example, how might different audiences respond to a woman scientist who shares her failures as compared to a man scientist? This work would build upon the growing body of literature that has examined the role of social identity in science communication (e.g., Hubner & Bullock, 2024).

Platforms as Mediating Structures

While this dissertation looks at social media affordances in terms of how they might structure opportunities for science observation, it does not directly examine how audiences perceive these affordances. However, more research is necessary to understand how specific platform logics, cultures, and affordances can play a role in structuring both scientists' communication practices and audiences' interpretations.

For example, TikTok's prioritization of bodily performances and participatory features like stitches and duets may invite scientists to engage in more affective and memetic self-presentation (Zeng et al., 2020). These features and norms offer opportunities to challenge traditional stereotypes of scientists as distant or unemotional and to construct new perceptions of warmth and relatability. Yet these same norms may simultaneously constrain certain kinds of expressions of expertise or increase the emotional labor demanded of science communicators. Future research could therefore tease out these relationships and examine how scientists adapt their strategies

across platforms, and how perceptions of a social media platform's affordances can shape engagement with science content.

Longitudinal and Cross-Cultural Dynamics

Lastly, as has been articulated previously, this dissertation is situated within a very specific sociopolitical and cultural moment: between 2023 and 2025 in the U.S., the most recent months of which have been a period of heightened political tension and widespread instability across institutions and academic settings. Additionally, the samples across all three studies are drawn from a WEIRD (Western, Educated, Industrialized, Rich, Democratic) population. Thus, one important future direction is to examine the extent to which these findings generalize across different cultural and temporal contexts (Henrich et al., 2010).

Future research could also explore cross-cultural differences in attitudes towards and reception of scientists' self-presentation. In the U.S., cultural norms around success and failure, such as the "winner culture" (Duina, 2011), may differentially influence how audiences perceive narratives about scientists' struggles or failures as compared to more collectivist cultures. Similarly, in countries where trust in scientists (or in institutional authorities) may be higher, such relational strategies may have a different impact. Additional longitudinal research is also needed to more carefully examine how the relationships described here may shift over time, especially in response to external events like scientific controversies, or sociopolitical and platform changes, as well as directions of causality. Finally, this dissertation echoes calls within the field and academia more broadly for greater replication and cumulative research (McEwan et al., 2018; Schmidt, 2009). Replication not only allows us to improve the confidence in the empirical claims made here, but also helps to verify hypotheses, control for research artifacts, and test robustness across

populations. Cumulatively, these efforts will allow us to build a more durable understanding towards the science of science communication.

Final Conclusion

In the last few decades, science communication has undergone—and still is going through—a profound shift. Once characterized primarily by institutional gatekeeping and one-directional communication, it is now increasingly shaped by a media environment that privileges visibility, personalization, and interaction. The stakes of these dynamics are intensified in a moment of declining trust in scientific institutions and increasing politicization and polarization of science.

Amidst this changing landscape, social media have become pivotal spaces poised to impact these tensions, for better or for worse. This dissertation has sought to examine how scientists navigate these changes and the implications of so. Across three studies, this work shows that scientific credibility on social media is co-produced through acts of self-presentation, audience interpretation, and platform norms and affordances. It further reveals that audiences play a critical role in shaping what counts as appropriate and trustworthy scientific communication, but that visibility on social media can also come at a cost, and disproportionately so for scientists from marginalized backgrounds.

Taken together, these findings suggest that science communication today must be understood as a relational, situational practice, one negotiated through audiences, norms, and the everyday identity work of scientists operating within highly-visible and often contested online spaces. Altogether, the findings provide a stronger understanding of the science communication landscape and offer a foundation for promoting stronger relationships between science, scientists, and the public.

Appendices

Appendix A:

Supplementary Materials for Chapter 2

Interview Protocol

Introductory Script

Thank you very much for taking the time to talk with me today! My name is Annie, and I am a PhD candidate at the University of Michigan. This study is part of my dissertation and aims to explore how scientists use social media to communicate with the public. If there is any question that you feel uncomfortable answering, you don't have to answer it. You can just tell me to move onto the next question. Again, this interview shouldn't take longer than an hour, and I am happy to answer any questions you might have for me about this project at the end. I will be recording this conversation so I can analyze the audio transcripts. Is that OK with you? Do you have any other questions before we start?

Interview Questions

So, to sort of outline where we're headed the next hour, we'll be starting off by talking about your general experiences on social media and what you post on your accounts. Then we'll pivot to talking about your audiences & what role they might play, before wrapping up looking more big picture at the state of science comm on social media.

1. So to start off, can you just me a little bit about yourself and what you do?

General

2. So how did you get started with your social media account?
    a. (What motivated you to make this account?)
    b. (How long have you had this account?)
    c. How regularly do you post?
    d. What other platforms do you use regularly?
3. What does your day to day look like?
    a. What do you usually post about in a typical day or week?
    b. Probe: Do you have a specific content strategy or plan, or is it more spontaneous?
4. Can you describe the "you" that is on social media overall? When someone sees your social media, who do you want them to see?
    a. Do you have any goals or expectations regarding your social media use? Is there anything that you want to get out of it?
5. How does having such a platform make you feel?
    a. Has your perception of your social media presence changed as your audience has grown?

6. What have been some of the biggest opportunities, like the most exciting or memorable thing, that have come with this visibility? What are you most proud of?
    a. Are there any unexpected benefits you've experienced?
7. On the flip side, what have been some of the biggest challenges?
8. Have you had to set any personal boundaries for yourself?
9. Have you ever felt the need to take a break from social media?
10. Do you think your social media presence has impacted your career? How do you see it to your career as a scientist?
    a) How does it fit into your daily or weekly routine alongside your other responsibilities?
    b) Have you ever considered making this a full-time endeavor?
    c) Do you generate any income from your social media presence?

Posting (General)

11. What strategies or approaches have you found effective in engaging your audience?
12. Are there any boundaries or guidelines you adhere to in terms of personal versus professional information shared on social media?
13. Do you ever post about controversial or sensitive topics?
    a. Can you give me an example that is particularly memorable to you?
    b. What strategies do you have for dealing with these topics?
    c. How do you think these strategies influence how people perceive you?
14. Do you post personal content?
    d. What type of content does that look like?
    e. Are there any specific reasons why you choose to post such content?

f. *If it comes up*: has sharing personal information or experiences ever impacted the way your audience perceives you as a scientist?

Audiences & Expectations

15. When you think about your audience, and who's reading your posts, who do you think of?
    a. Are there any specific groups you intend to reach? Or want to reach?
    b. Does that impact what you choose to post?
    c. What factors (barriers) do you see that might impact how you engage with them?
16. Do you try to intentionally build trust and credibility with your followers?
    a. What does look like for you?
    b. How does it feel to have this audience surrounding your posts and your account?
17. Have you ever felt pressure to meet certain expectations from your audience?
    a. Where do you see these expectations coming from?
    b. How do you manage them? Do you ever feel like you have to "perform" a certain version of yourself online?
18. Are there any potential ethical considerations that you take into account when using social media as a scientist? Professional considerations? Institutional policies?
19. Do you ever take into consideration what your colleagues might think about your social media posts? Your employers? What about the general public? People from different political backgrounds?
    a. (*If yes*) How so?
    b. Do you see any differences between how others might think of your posts and how you want to be seen online?
    c. (*If yes)* How do you manage them?

20. Do you feel a sense of community with other scientists or science communicators on social media?

Science Communication on Social Media More Broadly

21. Next, I want to shift towards thinking about science communication on social media more broadly. What impact, if any, do you see your social media presence having on science communication or public engagement with scientific topics?
    a. Probe: can you share an example?
    b. How does that make you feel?
22. How would you say being on social media has impacted *you*: how you view yourself as a scientist, a science communicator, or otherwise?
23. In your opinion, do you believe social media has influenced the public's perception and understanding of science? What about public perceptions of scientists?
    a. In what ways?
    b. What do you view as your role in helping to impact conversations surrounding science?
24. What strategies or approaches do you think will be most effective in reaching and engaging with diverse audiences in the future?
    a. Are there any aspects of social media in particular that have helped you in reaching these audiences? In what ways?
    b. What tools do you think would help you more effectively communicate with your audiences?
25. Has your experience on social media changed since you first started posting?
    a. *If yes*: How do you view these changes?

b. Have you tried to adapt to these changes? How?

26. Looking forward, what role do you perceive social media to have in how scientists communicate with the public?
    a. Do you perceive any benefits or challenges associated with this?

Note: 10 minutes before an hour, ask if participant is ok going a little longer than anticipated.

Wrapping Up

27. Is there anything else about this topic that we didn't cover that you would like to add before we finish?

Table A.1 Participant demographic and social media information, arranged by date of interview.

Pseudonym	*Race*	*Gender*	*Pronouns*	*Platform(s)*	*Followers*	*Field*	*Career Stage*
Zoey	White	Woman	she/her	X	1	1	1
Kennedy	Black	Woman	she/her	X, TikTok	1	2	1
Timothy	White	Man	he/him	X	1	2	2
James	White	Man	he/him	TikTok	2	3	3
Megan	White-Hispanic	Woman	she/they	TikTok	1	3	1
Harold	White	Man	he/him	X	1	4	1
David	White	Man	he/him	X, TikTok, Instagram	2	1	2
Heather	White	Woman	she/her	X, TikTok	1	1	2
Rose	White	Woman	she/they	TikTok, Instagram	2	2	1
Arby	White	Man	he/him	TikTok, Instagram	2	2	1
Caroline	White	Woman	she/her	TikTok	2	3	1
Aaron	White	Man	he/him	TikTok, Instagram	3	3	1
Andrew	White	Man	he/him	TikTok, Instagram	3	2	2

Astrid	White	Woman	she/her	TikTok, Instagram	2	1	1
Charlie	Black	Woman	she/her	X	1	1	1
Luke	White-Hispanic	Man	he/him	X	1	5	1
Juno	Asian	Woman	she/her	X, Instagram	2	1	1
Roxy	Black	Woman	she/her	X, TikTok, Instagram	2	2	1
Michelle	Asian	Woman	she/her	X	1	5	1
Kateryna	White	Woman	she/her	TikTok, Instagram	2	2	1
Ashley	Black	Woman	she/her	TikTok	1	1	1
Kristen	White	Woman	she/her	TikTok, Instagram	2	1	2
Mike	White	Man	he/him	X	1	5	2
Amarachi	Black	Woman	she/her	X	1	5	1

Notes.
Followers: 1 = Micro-influencer (10,000 – 100,000 followers), 2 = Macro-influencer (100,000 – 1 million followers), 3 = Mega-influencer (Over 1 million followers).
Field: 1 = Physical & Environmental Sciences, 2 = Life Sciences & Biotechnology, 3 = Health & Biomedical Sciences, 4 = Computer & Data Sciences, 5 = Social & Behavioral Sciences.
Career Stage: 1 = Early career (currently PhD student or 1 – 10 years post PhD), 2 = Mid-career (11 – 20 years post PhD), 3 = Senior Career (More than 20 years post PhD).

Appendix B:

Supplementary Materials for Chapter 3

B.1 Results Examining Different Content-Types of Science Observation Separately

While a composite index of science observation was employed in the main chapter to reflect the range of science content on social media, I was also interested in how these relationships might hold (or, how different types of science content may be specifically driving these relationships) by categorizing science observation into three sub-types (informational, advocacy, and provocative science observation) to provide further nuance to the findings.

To briefly summarize the findings, the results show that advocacy science observation is associated with stronger normative perceptions towards political expression and use of warmth-oriented strategies. Different from the findings of the main manuscript are the associations between provocative science observation and political expression. Higher provocative science observation was associated with decreased normative perceptions of political expression but increased normative perceptions of public engagement. For the interaction with political ideology, the only significant interaction was with informational science observation. Similar to the findings of the main manuscript, as informational science observation on social media increased, so did participants' expectations of scientists' use of warmth strategies; however, these differences were only significant as political ideology increased.

Informational science observation consisted of two items that reflect content aimed at informing or educating audiences about scientific topics (in other words, more traditional,

knowledge-based forms of science communication): “Reports on new discoveries, research findings, or expert analyses / Science explained in simple, engaging ways (e.g., infographics, science reels)” (M = 2.71, SD = 0.97, r_{SB} = .76).

Advocacy science observation consisted of three items that encompass content in which individuals express opinions, promote activism, or encourage political action related to science topics, reflecting a more strategic or mobilizing aspect of science communication : “Personal opinions or commentary on science topics / Science-related activism content / Posts encouraging political action on science-related issues” (M = 2.56, SD = 0.92, α = .79).

Provocative science observation included three items, which consisted of emotionally charged, polarizing, or misleading science content (that is, content which may generate heightened emotional arousal or engagement with scientific topics, regardless of its objectivity): “Controversial or politicized science issues that generate public debate, Misinformation about science that spread false, exaggerated, or misleading information related to scientific topics, Emotionally-charged science content that frame these issues in ways meant to provoke outrage, fear, excitement, or moral concern” (M = 2.44, SD = 0.92, α = 0.80).

Table B.1 Three sub-types of science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2).

	Normative Perceptions of Scientists' Communication on Social Media							
	Political Expression		**Warmth Strategies**		**Competence Strategies**		**Public Engagement**	
	B	**(SE)**	**B**	**(SE)**	**B**	**(SE)**	**B**	**(SE)**
Age (W^1)	-0.01	0.00**	0.00	.00$^{\#}$	0.00	0.00$^{\#}$	0.00	0.00
Gender (Women) (W^1)	-0.06	0.06	0.07	0.04	-0.05	0.04	0.06	0.05
Race (White) (W^1)	-0.13	0.07$^{\#}$	-0.00	0.05	-0.00	0.04	-0.06	0.05
Political Ideology (W^1)	-0.16	0.02***	-0.04	0.01**	-0.04	0.01***	-0.04	0.02**
Science Interest (W^1)	0.13	0.04***	0.05	0.02*	0.10	0.02***	0.11	0.03***
Informational Science Observation (W^1)	0.05	0.05	0.03	0.03	0.04	0.03	0.06	0.04$^{\#}$
Advocacy Science Observation (W^1)	0.21	0.06***	0.09	0.04*	-0.02	0.04	-0.02	0.05
Provocative Science Observation (W^1)	-0.11	0.05*	0.04	0.04	0.05	0.03	0.09	0.04*
Constant	3.17	0.19***	3.09	0.13***	3.55	0.12***	3.33	0.16***

Note. Unstandardized coefficients reported. $^{\#}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table B.2 Interaction of political ideology and the three subtypes of science observation on social media (wave 1) predicting normative perceptions of scientists' communication on social media (wave 2).

	Normative Perceptions of Scientists' Communication on Social Media							
	Political Expression		**Warmth Strategies**		**Competence Strategies**		**Public Engagement**	
	B	**(SE)**	**B**	**(SE)**	**B**	**(SE)**	**B**	**(SE)**
Age (W^1)	-0.01	0.00**	0.00	.00	0.00	0.00$^{\#}$	0.00	0.00
Gender (Women) (W^1)	-0.06	0.06	0.07	0.04	-0.05	0.04	0.06	0.05
Race (White) (W^1)	-0.13	0.07$^{\#}$	0.00	0.05	-0.00	0.04	-0.06	0.06
Political Ideology (W^1)	-0.19	0.06**	-0.14	0.04***	-0.09	0.04*	-0.13	0.05**
Science Interest (W^1)	0.13	0.04***	0.05	0.02*	0.10	0.02***	0.11	0.03***
Informational Science Observation (W^1)	-0.09	0.09	-0.13	0.06*	-0.02	0.06	-0.03	0.08
Advocacy Science Observation (W^1)	0.38	0.13**	0.19	0.09*	-0.02	0.08	0.04	0.11
Provocative Science Observation (W^1)	-0.17	0.11	-0.06	0.07	0.05	0.07	-0.01	0.09
Ideology x Informational Science Observation	0.04	0.02$^{\#}$	0.04	0.01**	0.02	0.01	0.02	0.02
Ideology x Advocacy Science Observation	-0.04	0.03	-0.03	0.02	0.00	0.02	-0.02	0.03
Ideology x Provocative Science Observation	0.02	0.03	0.02	0.02	-0.00	0.02	0.03	0.02
Constant	3.33	0.31***	3.52	0.20***	3.74	0.19***	3.70	0.25***

Note. Unstandardized coefficients reported. $^{\#}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

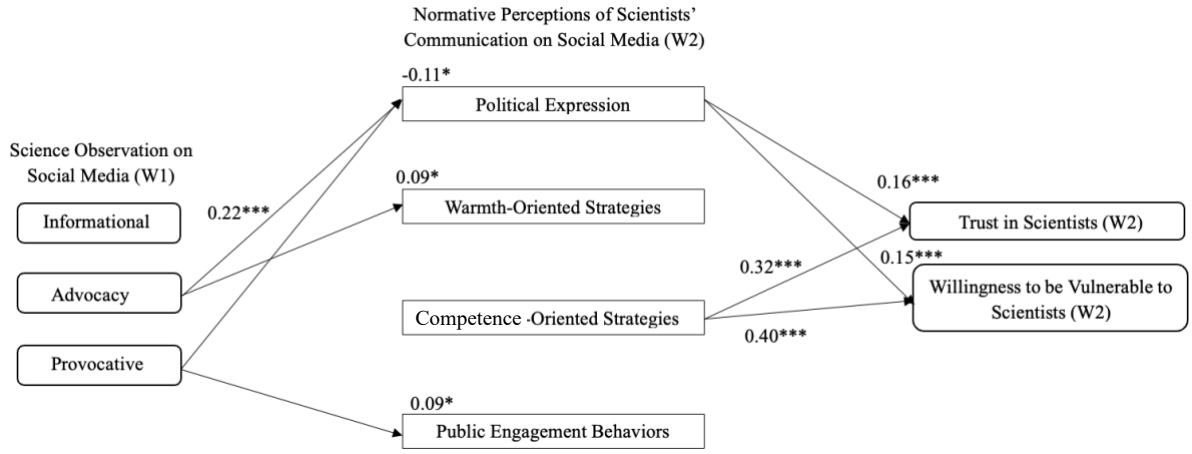

Figure B.1 Full constructed model with unstandardized coefficients. All non-significant paths are not shown. *$p < .05$, **$p < .01$, ***$p < .001$.

B.2 Exploratory Factor Analysis

An Exploratory Factor Analysis (EFA) was conducted using Principle Component Analysis (PCA) for extraction and Varimax rotation with Kaiser Normalization, as there is no assumption for correlation between the components. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.89, indicating good suitability of the data for factor analysis. Bartlett's Test of Sphericity was significant, with χ^2 (136) = 4346.07, $p < 0.001$, supporting the factorability of the correlation matrix. Finally, the communalities were all above 0.3, further confirming that each items shared some common variance with other items (Table B.1). Eigenvalues greater than 1 were used to interpret the number of factors in the data set; factor loadings are from the rotated component matrix.

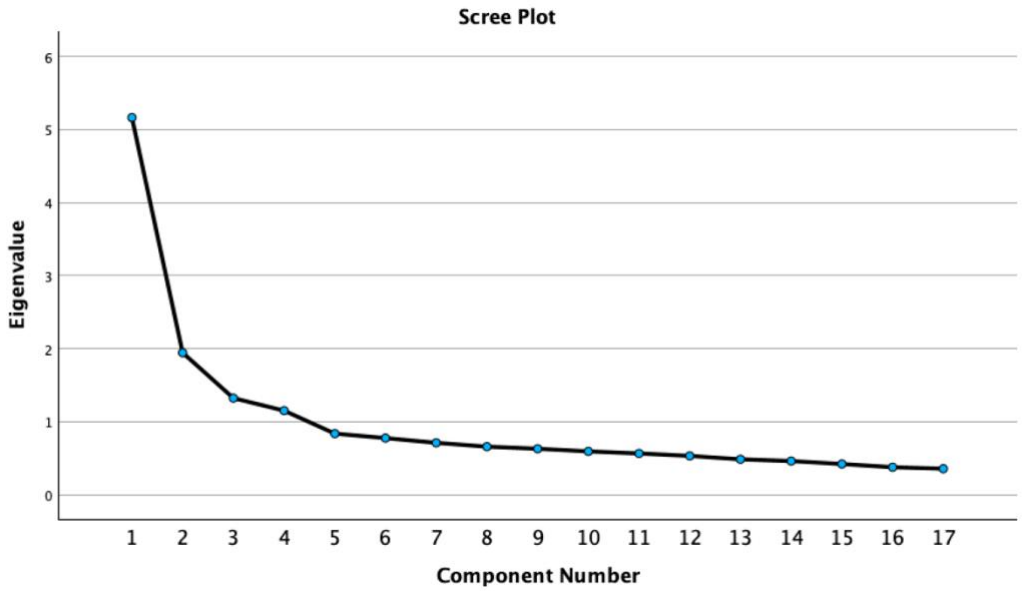

Figure B.2 Scree Plot

Table B.3 Communalities for EFA of normative perceptions of scientists' communication on social media.

Item No.	Items	Communalities
1	Scientists on social media should reply to comments and questions from the public about science.	.69
2	Scientists on social media should engage in discussions about science topics with public audiences rather than just posting information.	.70
3	Scientists on social media should encourage audience participation by asking questions, responding to feedback or inviting discussion.	.69
4	Scientists on social media should interact with the public rather than primarily communicating with other scientists.	.56
5	Scientists on social media should use a conversational, friendly tone rather than a formal or academic one.	.62
6	Scientists on social media should incorporate humor, memes, or pop culture references.	.55
7	Scientists on social media should prioritize accuracy and evidence-based communication over engagement tactics.	.50
8	Scientists on social media should present themselves as authoritative, knowledgeable experts in their field.	.45
9	Scientists on social media should use precise, technical language when necessary to convey scientific accuracy.	.61
10	Scientists on social media should express their opinions on political and societal issues related to science.	.68
11	Scientists on social media should express their opinions on political and societal issues unrelated to science.	.56
12	Scientists on social media should correct misinformation about science even when it may cause public conflict.	.49
13	Scientists on social media should share aspects of their personal lives unrelated to science (e.g., hobbies, daily life).	.48
14	Scientists on social media should make science feel approachable and relatable to non-experts.	.58
15	Scientists on social media should share personal experiences or updates to their science or research.	.59
16	Scientists on social media should maintain professional neutrality and objectivity when discussing scientific topics.	.47
17	Scientists on social media engage people who reject or misrepresent science, rather than ignoring them.	.37

Table B.4 Factor Loadings from Rotated Component Matrix.

Item No.	Items	Factor 1	Factor 2	Factor 3	Factor 4
1	Scientists on social media should reply to comments and questions from the public about science.	.80			
2	Scientists on social media should engage in discussions about science topics with public audiences rather than just posting information.	.79			
3	Scientists on social media should encourage audience participation by asking questions, responding to feedback or inviting discussion.	.79			
4	Scientists on social media should interact with the public rather than primarily communicating with other scientists.	.67			
5	Scientists on social media should use a conversational, friendly tone rather than a formal or academic one.			.78	
6	Scientists on social media should incorporate humor, memes, or pop culture references.			.56	
7	Scientists on social media should prioritize accuracy and evidence-based communication over engagement tactics.		.64		
8	Scientists on social media should present themselves as authoritative, knowledgeable experts in their field.		.58		
9	Scientists on social media should use precise, technical language when necessary to convey scientific accuracy.		.72		
10	Scientists on social media should express their opinions on political and societal issues related to science.				.82
11	Scientists on social media should express their opinions on political and societal issues unrelated to science.				.68
12	Scientists on social media should correct misinformation about science even when it may cause public conflict.		.57		
13	Scientists on social media should share aspects of their personal lives unrelated to science (e.g., hobbies, daily life).				.65
14	Scientists on social media should make science feel approachable and relatable to non-experts.			.58	
15	Scientists on social media should share personal experiences or updates to their science or research.	.68			
16	Scientists on social media should maintain professional neutrality and objectivity when discussing scientific topics.		.53		
17	Scientists on social media engage people who reject or misrepresent science, rather than ignoring them.			.44	

B.3 Loading Patterns

As depicted in Table B.1 and Figure B.1, the analysis identified four factors to which items loaded on, explaining 56.4% of the total variance. The first factor, broadly aligned with public engagement, accounted for 18.8% variance and included items 1, 2, 3, 4, and 15. The second factor, aligned with competence-oriented strategies, accounted for 13.7% variance and included items 7, 8, 9, 12 and 16. The third factor, aligned with warmth-oriented strategies, accounted for 12.7% variance and included items 5, 6, 14, and 17. The last factor, aligned with political expression, accounted for 11.2% variance and included items 10, 11, and 13. Two important differences lie in the factor loadings and the final items for each scale. First, although item 15 loaded on to the Public Engagement factor, conceptually it was a competence-oriented strategy; that is, the other four items are purely engagement related, while item 15 is a type of content-oriented strategy. As such, the decision was made to move item 15 into the competence-oriented scale. Second, item 13 loaded onto the political expression subscale. A possibility for those items loading together was that these types of disclosures (political and personal) may belong to a broader category of "non-science" related disclosures. However, the focus of this study was on political expression as its own dimensions; furthermore, personal self-disclosure conceptually belonged in the warmth-oriented strategy. As such, the decision was made to include item 13 into the warmth-oriented strategy.

B.4 Factor Correlations

Table B.5 Factor Correlations for EFA analysis.

Factor	1	2	3	4
1	—			
2	.22	—		
3	.35	.04	—	
4	-.37	-.08	-.24	—

B.5 Direct Effects and Variance Explained

Table B.6 The associations of demographics, science observation on social media, and normative expectations with trust in scientists.

	Trust in Scientists (W^2)			
	B	**(SE)**	**B**	**(SE)**
Age (W^1)	0.00	0.00	0.00	0.00*
Gender (Women) (W^1)	0.01	0.05	0.04	0.04
Race (White) (W^1)	0.10	0.05*	0.12	0.05**
Edu (W^1)	0.00	0.02	-0.00	0.02
Political Ideology (W^1)	-0.17	0.01***	-0.13	0.01***
Science Interest (W^1)	0.12	0.03***	0.07	0.02**
Science Observation (W^1)	0.03	0.03	-0.02	0.03
Normative Perceptions of Scientists' Communication on Social Media				
Political Expression (W^2)			0.17	0.02***
Warmth Strategies (W^2)			-0.01	0.04
Competence Strategies (W^2)			0.32	0.05***
Public Engagement (W^2)			-0.02	0.04
Constant	3.76	0.15***	2.20	0.20***
	$R^2 = .21$		$R^2 = .32$	

Note. Unstandardized coefficients reported. $^{\#}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table B.7 The associations of demographics, science observation on social media, and normative expectations with willingness to be vulnerable to scientists.

	Willingness to be Vulnerable to Scientists (W^2)			
	B	**(SE)**	**B**	**(SE)**
Age (W^1)	-0.00	0.00$^{\#}$	-0.00	0.00$^{\#}$
Gender (Women) (W^1)	-0.06	0.06	0.03	0.05
Race (White) (W^1)	0.19	0.06**	0.21	0.06***
Edu (W^1)	0.02	0.02	0.01	0.02
Political Ideology (W^1)	-0.25	0.02***	-0.21	0.02***
Science Interest (W^1)	0.10	0.03***	0.04	0.03
Science Observation (W^1)	0.09	0.04**	0.05	0.04
Normative Perceptions of Scientists' Communication on Social Media				
Political Expression (W^2)			0.15	0.03***
Warmth Strategies (W^2)			-0.00	0.05
Competence Strategies (W^2)			0.40	0.06***
Public Engagement (W^2)			-0.01	0.04
Constant	3.79	0.18***	2.16	0.25***
		R^2 = .29		R^2 = .37

Note. Unstandardized coefficients reported. $^{\#}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Appendix C:

Supplementary Materials for Chapter 4

C.1 Main Study Stimuli

The full stimuli (formatting removed for readability) for each manipulation are included here. Table C.1 present an overview of experimental conditions.

Table C.1 Overview of experimental conditions, as well as *n* for each condition.

	Self-Presentation of Research Outcome	Self-Presentation of Research Process (Narrative Contextualization)	Scientific Context
Condition 1 (*n* = 239)	Self-Promotion	Present	Astronomy
Condition 2 (*n* = 230)	Self-Promotion	Absent	Astronomy
Condition 3 (*n* = 235)	Supplication	Present	Astronomy
Condition 4 (*n* = 216)	Supplication	Absent	Astronomy
Condition 5 (*n* = 234)	Self-Promotion	Present	Geosciences
Condition 6 (*n* = 221)	Self-Promotion	Absent	Geosciences
Condition 7 (*n* = 229)	Supplication	Present	Geosciences
Condition 8 (*n* = 239)	Supplication	Absent	Geosciences

Self-Promotion/Narrative Struggle:

- **Astronomy:**
    - Some exciting news: we've been successful in finetuning a new tool for identifying habitable planets like ours!
    - Honestly, the whole process was no easy feat. Our goal was to use advanced machine learning in order to remove noise from star activities, which let us successfully detect potential exoplanets like Earth and that have a sun similar to ours.
    - For some context, we spent several months navigating through a slow data collection process and were held back by funding obstacles. We felt frustrated, and it was quite a struggle to try to push through those setbacks.
    - So, I'm proud of the work we did! I hope this tool will contribute to the field of exoplanet research and the search for life beyond our planet.
- **Geoscience:**
    - Some exciting news: we've been successful in finetuning our new method for examining seismic activity!
    - Honestly, the whole process was no easy feat. Our goal was to use advanced statistical methods to analyze seismic activity, which let us successfully look at the different causes of a newly-emerged zone of high seismic potential (meaning more earthquakes) in the southwestern part of the U.S.
    - For some context, we spent several months navigating through a slow data collection process and were held back by funding obstacles. We felt frustrated, and it was quite a struggle to try to push through those setbacks.

- So, I'm proud of the work we did. I hope this project will contribute to the field of seismic research and help us better understand earthquakes.

Self-Promotion/No Narrative Struggle:

- **Astronomy:**
  - Some exciting news: we've been successful in finetuning a new tool for identifying habitable planets like ours!
  - Our goal was to use advanced machine learning in order to remove noise from star activities, which let us successfully detect potential exoplanets like Earth and that have a sun similar to ours.
  - So, I'm proud of the work we did. I hope this tool will contribute to the field of exoplanet research and the search for life beyond our planet.
- **Geoscience:**
  - Some exciting news: we've been successful in finetuning our new method for examining seismic activity!
  - Our goal was to use advanced statistical methods to analyze seismic activity, which let us successfully look at the different causes of a newly-emerged zone of high seismic potential (meaning more earthquakes) in the southwestern part of the U.S.
  - So, I'm proud of the work we did. I hope this project will contribute to the field of seismic research and help us better understand earthquakes.

Supplication/ Narrative Struggle:

- **Astronomy:**

    - Some disappointing news: we've unfortunately been unsuccessful in finetuning our new tool for identifying habitable planets like ours.
    - Honestly, the whole process was no easy feat. Our goal was to use advanced machine learning in order to remove noise from star activities. This would let us detect potential exoplanets like Earth and that have a sun similar to ours, but we weren't successful.
    - For some context, we spent several months trying to navigate through a slow data collection process and were held back by funding obstacles. We felt frustrated, and it was quite a struggle to try to push through those setbacks.
    - It's upsetting that we weren't able to get the outcomes we wanted, but I hope our work can eventually still contribute to the field of exoplanet research and the search for life beyond our planet.
- **Geoscience:**
    - Some disappointing news: we've unfortunately been unsuccessful in finetuning our new method for examining seismic activity.
    - Honestly, the whole process was no easy feat. Our goal was to use advanced statistical methods to analyze seismic activity. This would let us look at the different causes of a newly-emerged zone of high seismic potential (meaning more earthquakes) in the southwestern part of the U.S., but we weren't successful.
    - For some context, we spent several months trying to navigate through a slow data collection process and were held back by funding obstacles. We felt frustrated, and it was quite a struggle to try to push through those setbacks.

- It's upsetting that we weren't able to get the outcomes we wanted, but I hope this project can eventually still contribute to the field of seismic research and help us better understand earthquakes.

Supplication/ No Narrative Struggle:

- **Astronomy:**
  - Some disappointing news: we've unfortunately been unsuccessful in finetuning our new tool for identifying habitable planets like ours.
  - Our goal was to use advanced machine learning in order to remove noise from star activities. This would let us detect potential exoplanets like Earth and that have a sun similar to ours, but we weren't successful.
  - It's upsetting that we weren't able to get the outcomes we wanted, but I hope our work can eventually still contribute to the field of exoplanet research and the search for life beyond our planet.
- **Geoscience:**
  - Some disappointing news: we've unfortunately been unsuccessful in finetuning our new method for examining seismic activity.
  - Our goal was to use advanced statistical methods to analyze seismic activity. This would let us look at the different causes of a newly-emerged zone of high seismic potential (meaning more earthquakes) in the southwestern part of the U.S., but we weren't successful.
  - It's upsetting that we weren't able to get the outcomes we wanted, but I hope this project can eventually still contribute to the field of seismic research and help us better understand earthquakes.

C.2 Sample X Profile (Main Study)

Below is a sample X profile that participants viewed. Each profile contained a recent thread where the content of the tweets varied depending on the particular condition. The name, photo, and username were held constant across all conditions, with the bio varying depending on the scientific context (astronomy or geosciences).



C.3 Pre-Test Results

Upon consenting to the experiment, participants ($N = 301$) were randomly assigned to one of eight conditions. The conditions were: (A1) astronomy/self-promotion/struggle narrative, (A2) astronomy/self-promotion/no struggle narrative, (A3) astronomy/supplication/struggle narrative, (A4) astronomy/supplication/no struggle narrative, (G1) geosciences/self-promotion/struggle narrative, (G2) geosciences/self-promotion/no struggle narrative, (G3) geosciences/supplication/ struggle narrative, and (G4) geosciences/supplication/no struggle narrative.

For each condition, participants saw a X profile containing the thread, for which they rated each on the following characteristics: perceived self-promotion, perceived failure, presence of struggle narrative (see **Table 4.1** in main body for exact measures for each manipulation).

Table C.2 Ratings for the stimuli in the astronomy conditions.

	Perceived Self-Promotion	**Perceived Supplication**	**Presence of Struggle Narratives**
A1	4.22	1.79	3.99
A2	4.48	1.53	2.33
A3	1.39	4.37	4.33
A4	1.65	4.61	3.64

Table C.3 Ratings for the stimuli in the geosciences conditions.

	Perceived Self-Promotion	**Perceived Supplication**	**Presence of Struggle Narratives**
G1	4.22	1.68	3.98
G2	4.37	1.52	2.02
G3	1.92	4.36	4.24
G4	1.65	4.51	3.62

C.4 Induction Check Results

We performed three independent sample t-tests to examine our manipulation of the self-presentation types on perceived self-promotion, perceived supplication, and perceived presence of struggle narratives. Participants in the self-promotion condition perceived the X thread as higher in perceived self-promotion (M = 3.98, SD = 0.85) than the profiles without self-promotion (M = 2.56, SD = 1.20), $t(1840) = 29.29$, $p < 0.001$. Similarly, participants in the supplication condition perceived the X threads as higher in perceived supplication (M = 4.08, SD = 0.92) than the profiles without supplication (M = 2.38, SD = 1.10), $t(1838) = -35.85$, $p < 0.001$. Finally, participants in the struggle narrative (present) condition rated the X threads as higher in perceived presence of struggle narratives (M = 3.99, SD = 0.79) than the profiles without struggle narratives (M = 3.20, SD = 1.09), $t(1839) = -17.68$, $p < 0.001$. As such, the t-tests indicated successful manipulations of the experimental conditions.

C.5 Full Results for Indirect Effects

Table C.4 Indirect effects for support for science.

Independent Variable	Mediator	*b*	*SE*	95% *CI*s
Outcomes	EV	-0.01	0.00	-0.01 to -0.00
Processes		-0.00	0.00	-0.01 to 0.00
Scientific Context		-0.00	0.00	-0.01 to 0.00
Outcomes	ID	0.03	0.01	0.02 to 0.05
Processes		0.00	0.01	-0.01 to 0.02
Scientific Context		0.01	0.01	-0.01 to 0.02
Outcomes	C	-0.00	0.00	-0.01 to 0.00
Processes		-0.00	0.02	-0.01 to 0.00
Scientific Context		-0.00	0.00	-0.01 to 0.00
Outcomes	B	0.03	0.01	0.00 to 0.06
Processes		-0.00	0.01	-0.01 to 0.00
Scientific Context		0.01	0. 00	0.00 to 0.01
Outcomes	I	0.02	0.00	0.01 to 0.03
Processes		-0.00	0.00	-0.01 to 0.00
Scientific Context		-0.00	0.00	-0.01 to 0.00
Outcomes	O	0.01	0.00	0.00 to 0.01
Processes		-0.00	0.00	-0.01 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00
Outcomes	EV → C	-0.00	0.00	-0.00 to 0.00
Processes		-0.00	0.00	-0.01 to 0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00
Outcomes	EV → B	-0.00	0.00	-0.00 to -0.00
Processes		-0.00	0.00	-0.00 to 0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00
Outcomes	EV → I	-0.00	0.00	-0.00 to 0.00
Processes		-0.00	0.00	-0.01 to 0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00
Outcomes	EV → O	-0.00	0.00	-0.00 to -0.00
Processes		-0.00	0.00	-0.00 to 0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00

Outcomes		0.01	0.00	0.01 to 0.02
Processes	ID → C	0.00	0.00	-0.00 to 0.00
Scientific Context		0.00	0.00	-0.01 to 0.00
Outcomes		0.01	0.00	0.00 to 0.01
Processes	ID → B	0.00	0.00	-0.00 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00
Outcomes		0.01	0.00	0.01 to 0.02
Processes	ID → I	0.00	0.01	-0.00 to 0.00
Scientific Context		0.00	0.01	-0.00 to 0.00
Outcomes		0.00	0.00	0.00 to 0.01
Processes	ID → O	0.00	0.00	-0.01 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00

Notes. EV = expectancy violation; ID = identification; C = competence; B = benevolence; I = integrity; O = openness. Reference group is the "success" condition for research outcomes and "absence of struggle narratives" condition for research processes, and "astronomy" for the scientific context.

Table C.5 Indirect effects for science information-seeking intentions.

Independent Variable	Mediator	*b*	*SE*	95% *CI*s
Outcomes	EV	-0.01	0.00	-0.02 to -0.00
Processes		-0.00	0.00	-0.01 to 0.00
Scientific Context		-0.00	0.03	-0.01 to 0.00
Outcomes	ID	0.06	0.01	0.03 to 0.08
Processes		0.00	0.01	-0.02 to 0.03
Scientific Context		0.00	0.01	-0.01 to 0.00
Outcomes	C	-0.00	0.00	-0.00 to 0.00
Processes		-0.00	0.00	-0.01 to -0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00
Outcomes	B	0.00	0.01	-0.00 to 0.01
Processes		-0.00	0.00	-0.02 to -0.00
Scientific Context		0.00	0.00	0.00 to 0.01
Outcomes	I	0.00	0.00	-0.01 to 0.01
Processes		-0.00	0.00	-0.01 to 0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00
Outcomes	O	0.01	0.01	0.01 to 0.03
Processes		-0.01	0.00	-0.01 to 0.00
Scientific Context		0.00	0.00	-0.01 to 0.01
Outcomes	EV → C	-0.00	0.00	-0.00 to 0.00
Processes		0.00	0.00	-0.00 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00
Outcomes	EV → B	-0.00	0.00	-0.00 to -0.00
Processes		-0.00	0.00	-0.00 to 0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00
Outcomes	EV → I	-0.00	0.00	-0.00 to 0.00
Processes		0.00	0.00	-0.00 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00
Outcomes	EV → O	-0.00	0.00	-0.00 to -0.00
Processes		-0.00	0.00	-0.00 to 0.00
Scientific Context		-0.00	0.00	-0.00 to 0.00
Outcomes	ID → C	0.00	0.00	-0.00 to 0.01
Processes		0.00	0.00	-0.00 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00

Outcomes		0.01	0.00	0.00 to 0.01
Processes	ID → B	0.00	0.00	-0.00 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00
Outcomes		0.00	0.00	-0.00 to 0.01
Processes	ID → I	0.00	0.00	-0.00 to 0.00
Scientific Context		0.01	0.00	-0.00 to 0.00
Outcomes		0.01	0.00	0.00 to 0.02
Processes	ID → O	0.00	0.00	-0.00 to 0.00
Scientific Context		0.00	0.00	-0.00 to 0.00

Notes. EV = expectancy violation; ID = identification; C = competence; B = benevolence; I = integrity; O = openness. Reference group is the "success" condition for research outcomes and "absence of struggle narratives" condition for research processes, and "astronomy" for the scientific context.

Bibliography

Abitbol, A., Lee, N. M., & VanDyke, M. S. (2022). Examining the perceived transparency of DTC genetic testing company communication and its impact on consumer trust, attitude and behavioral intentions. *Journal of Communication Management*, *26*(3), 315–330. https://doi.org/10.1108/JCOM-01-2022-0006

Afifi, W. A., & Metts, S. (1998). Characteristics and consequences of expectation violations in close relationships. *Journal of Social and Personal Relationships*, *15*(3), 365–392. https://doi.org/10.1177/0265407598153004

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

Akin, H. (2017). *Overview of the Science of Science Communication* (K. H. Jamieson, D. M. Kahan, & D. A. Scheufele, Eds.). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190497620.013.3

Alabrese, E., Capozza, F., & Garg, P. (2024). *Politicized Scientists: Credibility Cost of Political Expression on Twitter* (SSRN Scholarly Paper 4922427). Social Science Research Network. https://papers.ssrn.com/abstract=4922427

Algan, Y., Cohen, D., Davoine, E., Foucault, M., & Stantcheva, S. (2021). Trust in scientists in times of pandemic: Panel evidence from 12 countries. *Proceedings of the National Academy of Sciences*, *118*(40), e2108576118. https://doi.org/10.1073/pnas.2108576118

Americans' Attitudes about Science and Scientists. (2017, December 29). *Research!America*. https://www.researchamerica.org/blog/americans%E2%80%99-attitudes-about-science-and-scientists-2017

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

Basch, C. H., Yalamanchili, B., & Fera, J. (2022). #Climate Change on TikTok: A Content Analysis of Videos. *Journal of Community Health*, *47*(1), 163–167. https://doi.org/10.1007/s10900-021-01031-x

Bauer, M. W., Allum, N., & Miller, S. (2007). What can we learn from 25 years of PUS survey research? Liberating and expanding the agenda. *Public Understanding of Science*, *16*(1), 79–95. https://doi.org/10.1177/0963662506071287

Bayer, J. B., Triệu, P., & Ellison, N. (2020). Social Media Elements, Ecologies, and Effects. *Annual Review of Psychology*, *71*(1), 471–497. https://doi.org/10.1146/annurev-psych-010419-050944

Baym, N. K. (2018). Playing to the Crowd: Musicians, Audiences, and the Intimate Work of Connection. NYU Press.

Besley, J. C., Lee, N. M., & Pressgrove, G. (2021). Reassessing the Variables Used to Measure Public Perceptions of Scientists. *Science Communication*, *43*(1), 3–32. https://doi.org/10.1177/1075547020949547

Bowman, T. D. (2015). Differences in personal and professional tweets of scholars. *Aslib Journal of Information Management*, *67*(3), 356–371. https://doi.org/10.1108/AJIM-12-2014-0180

boyd, danah. (2002). *Faceted Id/entity: Managing representation in a digital world* [Massachusetts Institute of Technology]. https://www.media.mit.edu/publications/faceted-identity-managing-representation-in-a-digital-world/

boyd, danah. (2007). *Why Youth (Heart) Social Network Sites: The Role of Networked Publics in Teenage Social Life* (SSRN Scholarly Paper 1518924). Social Science Research Network. https://papers.ssrn.com/abstract=1518924

boyd, danah, & Heer, J. (2006). Profiles as Conversation: Networked Identity Performance on Friendster. *Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06)*, *3*, 59c–59c. https://doi.org/10.1109/HICSS.2006.394

boyd, danah m., & Ellison, N. (2007). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, *13*(1), 210–230. https://doi.org/10.1111/j.1083-6101.2007.00393.x

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806

Brossard, D. (2013). New media landscapes and the science information consumer. *Proceedings of the National Academy of Sciences*, *110*(supplement_3), 14096–14101. https://doi.org/10.1073/pnas.1212744110

Brossard, D., & Lewenstein, B. (2009). A Critical Appraisal of Models of Public Understanding of Science: Using Practice to Inform Theory. In *Communicating Science*. Routledge.

Brossard, D., & Nisbet, M. C. (2007). Deference to Scientific Authority Among a Low Information Public: Understanding U.S. Opinion on Agricultural Biotechnology. *International Journal of Public Opinion Research*, *19*(1), 24–52. https://doi.org/10.1093/ijpor/edl003

Bryant, C. (2003). Does Australia need a more effective policy of science communication? *International Journal for Parasitology*, *33*(4), 357–361. https://doi.org/10.1016/S0020-7519(03)00004-3

Bucchi, M., & Trench, B. (Eds.). (2014). *Routledge Handbook of Public Communication of Science and Technology* (0 ed.). Routledge. https://doi.org/10.4324/9780203483794

Bucchi, M., & Trench, B. (2021). Rethinking science communication as the social conversation around science. *Journal of Science Communication*, *20*(3), Y01. https://doi.org/10.22323/2.20030401

Bukvova, H. (2011). Online Impression Management for Scientists. *All Sprouts Content*, *11*(140). https://aisel.aisnet.org/sprouts_all/455

Bunquin, J., & Zhang, A. L. (2025, October). "POV: You're a scientist on TikTok": Engagement strategies of scientists and science communicators on TikTok. *AoIR2025*. The 26th Annual Conference of the Association of Internet Researchers, Rio de Janeiro, Brazil. http://spir.aoir.org.

Büntgen, U. (2024). The importance of distinguishing climate science from climate activism. *Npj Climate Action*, *3*(1), 1–2. https://doi.org/10.1038/s44168-024-00126-0

Burgoon, J. K. (1993). Interpersonal Expectations, Expectancy Violations, and Emotional Communication. *Journal of Language and Social Psychology*, *12*(1–2), 30–48. https://doi.org/10.1177/0261927X93121003

Burgoon, J. K. (2015). Expectancy Violations Theory. In *The International Encyclopedia of Interpersonal Communication* (pp. 1–9). American Cancer Society. https://doi.org/10.1002/9781118540190.wbeic102

Burgoon, J. K., & Hale, J. L. (1988). Nonverbal expectancy violations: Model elaboration and application to immediacy behaviors. *Communication Monographs*, *55*(1), 58–79. https://doi.org/10.1080/03637758809376158

Burns, T. W., O'Connor, D. J., & Stocklmayer, S. M. (2003). Science Communication: A Contemporary Definition. *Public Understanding of Science*, *12*(2), 183–202. https://doi.org/10.1177/09636625030122004

Byrne, D. (2022). A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality & Quantity*, *56*(3), 1391–1412. https://doi.org/10.1007/s11135-021-01182-y

Caliandro, A. (2018). Digital Methods for Ethnography: Analytical Concepts for Ethnographers Exploring Social Media Environments. *Journal of Contemporary Ethnography*, *47*(5), 551–578. https://doi.org/10.1177/0891241617702960

Carpenter, S., Kanver ,Duygu, & and Timmons, R. (2017). It's About Me: A study of journalists' self-presentation of their visual and verbal selves. *Journalism Practice*, *11*(10), 1246–1266. https://doi.org/10.1080/17512786.2016.1245587

Carr, C. T., & Hayes, R. A. (2015). Social Media: Defining, Developing, and Divining. *Atlantic Journal of Communication*, *23*(1), 46–65. https://doi.org/10.1080/15456870.2015.972282

Chambers, D. W. (1983). Stereotypic images of the scientist: The draw-a-scientist test. *Science Education*, *67*(2), 255–265. https://doi.org/10.1002/sce.3730670213

Cheplygina, V., Hermans, F., Albers, C., Bielczyk, N., & Smeets, I. (2020). Ten simple rules for getting started on Twitter as a scientist. *PLOS Computational Biology*, *16*(2), e1007513. https://doi.org/10.1371/journal.pcbi.1007513

Chinn, S., Hart, P. S., & Soroka, S. (2020). Politicization and Polarization in Climate Change News Content, 1985-2017. *Science Communication*, *42*(1), 112–129. https://doi.org/10.1177/1075547019900290

Chinn, S., & Hasell, A. (2024). How Different Uses of Social Media Inform Perceptions of Offline Social Norms and Changes in Vaccine Intentions. *Health Communication*, *39*(6), 1198–1208. https://doi.org/10.1080/10410236.2023.2207284

Chinn, S., Hasell, A., Roden, J., & Zichettella, B. (2023). Threatening experts: Correlates of viewing scientists as a social threat. *Public Understanding of Science (Bristol, England)*, 9636625231183115. https://doi.org/10.1177/09636625231183115

Chinn, S., Hiaeshutter-Rice ,Dan, & and Chen, K. (2024). How Science Influencers Polarize Supportive and Skeptical Communities Around Politicized Science: A Cross-Platform and Over-Time Comparison. *Political Communication*, *41*(4), 627–648. https://doi.org/10.1080/10584609.2023.2201174

Choi, Y. H., & Bazarova, N. N. (2015). Self-Disclosure Characteristics and Motivations in Social Media: Extending the Functional Model to Multiple Social Network Sites. *Human Communication Research*, *41*(4), 480–500. https://doi.org/10.1111/hcre.12053

Cialdini, R. B., & Goldstein, N. J. (2004). Social Influence: Compliance and Conformity. *Annual Review of Psychology*, *55*(Volume 55, 2004), 591–621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance. In *The handbook of social psychology, Vols. 1-2, 4th ed* (pp. 151–192). McGraw-Hill.

Cohen, J. (2001). Defining Identification: A Theoretical Look at the Identification of Audiences With Media Characters. *Mass Communication and Society*, *4*(3), 245–264. https://doi.org/10.1207/S15327825MCS0403_01

Collins, K., Shiffman, D., & Rock, J. (2016). How Are Scientists Using Social Media in the Workplace? *PLOS ONE*, *11*(10), e0162680. https://doi.org/10.1371/journal.pone.0162680

Cologna, V., Knutti, R., Oreskes, N., & Siegrist, M. (2021). Majority of German citizens, US citizens and climate scientists support policy advocacy by climate researchers and expect greater political engagement. *Environmental Research Letters*, *16*(2), 024011. https://doi.org/10.1088/1748-9326/abd4ac

Cologna, V., Mede, N. G., Berger, S., Besley, J., Brick, C., Joubert, M., Maibach, E. W., Mihelj, S., Oreskes, N., Schäfer, M. S., van der Linden, S., Abdul Aziz, N. I., Abdulsalam, S., Shamsi, N. A., Aczel, B., Adinugroho, I., Alabrese, E., Aldoh, A., Alfano, M., … Zwaan, R. A. (2025). Trust in scientists and their role in society across 68 countries. *Nature Human Behaviour*, 1–18. https://doi.org/10.1038/s41562-024-02090-5

Cologna, V., & Siegrist, M. (2020). The role of trust for climate change mitigation and adaptation behaviour: A meta-analysis. *Journal of Environmental Psychology*, *69*, 101428. https://doi.org/10.1016/j.jenvp.2020.101428

Costas, R., Mongeon, P., Ferreira, M. R., van Honk, J., & Franssen, T. (2020). Large-scale identification and characterization of scholars on Twitter. *Quantitative Science Studies*, *1*(2), 771–791. https://doi.org/10.1162/qss_a_00047

Côté, I. M., & Darling, E. S. (2018). Scientists on Twitter: Preaching to the choir or singing from the rooftops? *FACETS*, *3*(1), 682–694. https://doi.org/10.1139/facets-2018-0002

Coulehan, J. (2011). "A Gentle and Humane Temper": Humility in Medicine. *Perspectives in Biology and Medicine*, *54*(2), 206–216. https://doi.org/10.1353/pbm.2011.0017

Cuddy, A. J. C., Fiske, S. T., & Glick, P. (2008). Warmth and Competence as Universal Dimensions of Social Perception: The Stereotype Content Model and the BIAS Map. In *Advances in Experimental Social Psychology* (Vol. 40, pp. 61–149). Academic Press. https://doi.org/10.1016/S0065-2601(07)00002-0

Cuddy, A. J. C., Kohut, M., & Neffinger, J. (2013). Connect, then lead. *Harvard Business Review*, *91*(7–8), 54–61, 132.

Davies, S. R., Halpern, M., Horst, M., Kirby, D., & Lewenstein, B. (2019). Science stories as culture: Experience, identity, narrative and emotion in public communication of science. *Journal of Science Communication*, *18*(5), A01. https://doi.org/10.22323/2.18050201

Davies, S. R., & Horst, M. (2016). *Science Communication: Culture, Identity and Citizenship* (2016th edition). Palgrave Macmillan.

De Graaf, A., Hoeken, H., Sanders, J., & Beentjes, J. W. J. (2012). Identification as a Mechanism of Narrative Persuasion. *Communication Research*, *39*(6), 802–823. https://doi.org/10.1177/0093650211408594

D'Errico, F. (2020). Humility-Based Persuasion: Individual Differences in Elicited Emotions and Politician Evaluation. *International Journal of Communication*, *14*(0), Article 0.

Dibble, J. L., Hartmann, T., & Rosaen, S. F. (2016). Parasocial Interaction and Parasocial Relationship: Conceptual Clarification and a Critical Assessment of Measures: Parasocial Interaction and Parasocial Relationship. *Human Communication Research*, *42*(1), 21–44. https://doi.org/10.1111/hcre.12063

Dr. LaShawn Faith Washington [@ShawnTheScholar]. (2024, March 18). *PhD Rejections: UCLA USC Harvard UPenn U Michigan (3 hour interview as a finalist then rejected 😑) Acceptance: UW-Madison ♡🤌 (Fully funded) 6 years later: I'm a Tenure-Track Assistant Professor at a R1… P.S. no regrets 😉👌 #GodsGlory* [Tweet]. Twitter. https://twitter.com/ShawnTheScholar/status/1769623677136420903

Dudo, A., & Besley, J. C. (2016). Scientists' Prioritization of Communication Objectives for Public Engagement. *PLOS ONE*, *11*(2), e0148867. https://doi.org/10.1371/journal.pone.0148867

Duffy, B. E., & Chan, N. K. (2019). "You never really know who's looking": Imagined surveillance across social media platforms. New Media & Society, 21(1), 119–138. https://doi.org/10.1177/1461444818791318

Duina, F. (2011). *Winning: Reflections on an American Obsession*. Princeton University Press. https://www.jstor.org/stable/j.ctt7s521

Effing, R., van Hillegersberg, J., & Huibers, T. (2011). Social Media and Political Participation: Are Facebook, Twitter and YouTube Democratizing Our Political Systems? In E. Tambouris, A. Macintosh, & H. de Bruijn (Eds.), *Electronic Participation* (pp. 25–35). Springer. https://doi.org/10.1007/978-3-642-23333-3_3

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The Benefits of Facebook "Friends:" Social Capital and College Students' Use of Online Social Network Sites. Journal of Computer-

Mediated Communication, 12(4), 1143–1168. https://doi.org/10.1111/j.1083-6101.2007.00367.x

Ellison, N., Gibbs, J. L., & Weber, M. S. (2015). The use of enterprise social network sites for knowledge sharing in distributed organizations: The role of organizational affordances. *American Behavioral Scientist*, *59*(1), 103–123. https://doi.org/10.1177/0002764214540510

Ellison, N., & Vitak, J. (2015). Social network site affordances and their relationship to social capital processes. In S. Sunder (Ed.), *The Handbook of the Psychology of Communication Technology* (pp. 205–227). Wiley-Blackwell.

Evans, S. K., Pearce, K. E., Vitak, J., & Treem, J. W. (2017). Explicating Affordances: A Conceptual Framework for Understanding Affordances in Communication Research. *Journal of Computer-Mediated Communication*, *22*(1), 35–52. https://doi.org/10.1111/jcc4.12180

Fahy, D., & Lewenstein, B. (2021). Scientists in popular culture: The making of celebrities. In *Routledge Handbook of Public Communication of Science and Technology* (3rd ed., pp. 33–52). Routledge.

Fahy, D., & Nisbet, M. C. (2011). The science journalist online: Shifting roles and emerging practices. *Journalism*, *12*(7), 778–793. https://doi.org/10.1177/1464884911412697

Fischhoff, B. (2013). The sciences of science communication. *Proceedings of the National Academy of Sciences*, *110*(supplement_3), 14033–14039. https://doi.org/10.1073/pnas.1213273110

Fiske, S. T., Cuddy, A. J. C., & Glick, P. (2007). Universal dimensions of social cognition: Warmth and competence. *Trends in Cognitive Sciences*, *11*(2), 77–83. https://doi.org/10.1016/j.tics.2006.11.005

Fiske, S. T., Cuddy, A. J. C., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology*, *82*(6), 878–902. https://doi.org/10.1037/0022-3514.82.6.878

Fiske, S. T., & Dupree, C. (2014). Gaining trust as well as respect in communicating to motivated audiences about science topics. *Proceedings of the National Academy of Sciences*, *111*(supplement_4), 13593–13597. https://doi.org/10.1073/pnas.1317505111

Fiske, S. T., & Neuberg, S. L. (1990). A Continuum of Impression Formation, from Category-Based to Individuating Processes: Influences of Information and Motivation on Attention and Interpretation. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 23, pp. 1–74). Academic Press. https://doi.org/10.1016/S0065-2601(08)60317-2

Fiske, S. T., & Taylor, S. E. (1991). *Social cognition, 2nd ed* (pp. xviii, 717). Mcgraw-Hill Book Company.

Fox, J., & McEwan, B. (2017). Distinguishing technologies for social interaction: The perceived social affordances of communication channels scale. *Communication Monographs*, *84*(3), 298–318. https://doi.org/10.1080/03637751.2017.1332418

Fox, J., & Moreland, J. J. (2015). The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances. *Computers in Human Behavior*, *45*, 168–176. https://doi.org/10.1016/j.chb.2014.11.083

Funk, C. (2017, September 20). Science News and Information Today. *Pew Research Center's Journalism Project*. https://www.pewresearch.org/journalism/2017/09/20/science-news-and-information-today/

Funk, C., Hefferon, M., Kennedy, B., & Johnson, C. (2019, August 2). Partisanship influences views on the role, value of scientific experts. *Pew Research Center Science & Society*. https://www.pewresearch.org/science/2019/08/02/partisanship-influences-views-on-the-role-and-value-of-scientific-experts-in-policy-debates/

Gauchat, G. (2012). Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010. *American Sociological Review*, *77*(2), 167–187. https://doi.org/10.1177/0003122412438225

Gibson, J. J. (1977). The theory of affordances. In R. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing: Toward an ecological psychology* (pp. 67–82). Erlbaum.

Gil-Lopez, T., Shen, C., Benefield, G. A., Palomares, N. A., Kosinski, M., & Stillwell, D. (2018). One Size Fits All: Context Collapse, Self-Presentation Strategies and Language Styles on Facebook. *Journal of Computer-Mediated Communication*, *23*(3), 127–145. https://doi.org/10.1093/jcmc/zmy006

Goffman, E. (1959). *The Presentation of Self in Everyday Life*. Anchor.

Goodell, R. (1977). The Visible Scientists. *The Sciences*, *17*(1), 6–9. https://doi.org/10.1002/j.2326-1951.1977.tb01494.x

Greszki, R., Meyer, M., & Schoen, H. (2015). Exploring the Effects of Removing "Too Fast" Responses and Respondents from Web Surveys. *The Public Opinion Quarterly*, *79*(2), 471–503.

Hall, N. (2014). The Kardashian index: A measure of discrepant social media profile for scientists. Genome Biology, 15(7), 424. https://doi.org/10.1186/s13059-014-0424-0

Hara, N., & Chae, S. W. (2025). Social media affordances for mediated science communication during the COVID-19 pandemic. In N. Hara & P. Fichman (Eds.), *Social Informatics* (1st ed., pp. 211–225). Routledge. https://doi.org/10.4324/9781032678542-16

Hart, P. S., Feldman, L., Choi, S., Zhang, A. L., & Hegland, A. (2023). The Influence of Flooding Imagery and Party Cues on Perceived Threat, Collective Efficacy, and Intentions for Political Action to Address Climate Change. *Science Communication*, *45*(5), 627–664. https://doi.org/10.1177/10755470231199972

Hart, P. S., & Nisbet, E. C. (2012). Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization About Climate Mitigation Policies. *Communication Research*, *39*(6), 701–723. https://doi.org/10.1177/0093650211416646

Hayes, A. F. (2018). Partial, conditional, and moderated moderated mediation: Quantification, inference, and interpretation. *Communication Monographs*, *85*(1), 4–40. https://doi.org/10.1080/03637751.2017.1352100

Hegland, A., Zhang, A. L., Zichettella, B., & Pasek, J. (2022). A Partisan Pandemic: How COVID-19 Was Primed for Polarization. *The ANNALS of the American Academy of Political and Social Science*. http://journals.sagepub.com/eprint/NRYQZXMRDDCWFZ93ZHQK/full

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, *466*(7302), 29. https://doi.org/10.1038/466029a

Hermida, A. (2012). Social Journalism: Exploring how Social Media is Shaping Journalism. In *The Handbook of Global Online Journalism* (pp. 309–328). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118313978.ch17

Hogan, B. (2010). The Presentation of Self in the Age of Social Media: Distinguishing Performances and Exhibitions Online. *Bulletin of Science, Technology & Society*, *30*(6), 377–386. https://doi.org/10.1177/0270467610385893

Hollenbaugh, E. E. (2021). Self-Presentation in Social Media: Review and Research Opportunities. *Review of Communication Research*, *9*, 80–98.

Hong, H.-Y., & Lin-Siegler, X. (2012). How learning about scientists' struggles influences students' interest and learning in physics. *Journal of Educational Psychology*, *104*, 469–484. https://doi.org/10.1037/a0026224

Horton, D., & Wohl, R. (1956). Mass Communication and Para-Social Interaction. *Psychiatry*, *19*(3), 215–229. https://doi.org/10.1080/00332747.1956.11023049

Huber, B., Barnidge, M., Gil de Zúñiga, H., & Liu, J. (2019). Fostering public trust in science: The role of social media. *Public Understanding of Science*, *28*(7), 759–777. https://doi.org/10.1177/0963662519869097

Hubner, A. Y., & Bullock, O. M. (2024). Why Science Should Have a Female Face: Female Experts Increase Liking, Competence, and Trust in Science. *Science Communication*, 10755470241295676. https://doi.org/10.1177/10755470241295676

Hwong, Y.-L., Oliver, C., Van Kranendonk, M., Sammut, C., & Seroussi, Y. (2017). What makes you tick? The psychology of social media engagement in space science communication. *Computers in Human Behavior*, *68*, 480–492. https://doi.org/10.1016/j.chb.2016.11.068

Irwin, A., & Horst, M. (2016). Communicating trust and trusting science communication — some critical remarks. *Journal of Science Communication*, *15*(6), L01. https://doi.org/10.22323/2.15060101

Jahng, M. R., & Lee, N. (2018). When Scientists Tweet for Social Changes: Dialogic Communication and Collective Mobilization Strategies by Flint Water Study Scientists on Twitter. *Science Communication*, *40*(1), 89–108. https://doi.org/10.1177/1075547017751948

Jamieson, K. H. (2018). Crisis or self-correction: Rethinking media narratives about the well-being of science. *Proceedings of the National Academy of Sciences*, *115*(11), 2620–2627. https://doi.org/10.1073/pnas.1708276114

Jarreau, P. B. (2020, March 31). I'm a scientist and I want to use social media. Now what? *Hindawi*. https://www.hindawi.com/post/im-scientist-and-i-want-use-social-media-now-what/

Jarreau, P. B., Cancellare, I. A., Carmichael, B. J., Porter, L., Toker, D., & Yammine, S. Z. (2019). Using selfies to challenge public stereotypes of scientists. *PLOS ONE*, *14*(5), e0216625. https://doi.org/10.1371/journal.pone.0216625

Jones, E. E., & Pittman, T. S. (1982). Toward a general theory of strategic self-presentation. In J. Suls (Ed.), *Psychological perspectives on the self* (Vol. 1, pp. 231–262). Hillsdale.

Jünger, J., & Fähnrich, B. (2020). Does really no one care? Analyzing the public engagement of communication scientists on Twitter. *New Media & Society*, *22*(3), 387–408. https://doi.org/10.1177/1461444819863413

Kahan, D. M., Peters, E., Wittlin, M., Slovic, P., Ouellette, L. L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate

change risks. *Nature Climate Change*, *2*(10), 732–735. https://doi.org/10.1038/nclimate1547

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, *53*(1), 59–68. https://doi.org/10.1016/j.bushor.2009.09.003

Kennedy, B., & Tyson, A. (2023, November 14). Americans' Trust in Scientists, Positive Views of Science Continue to Decline. *Pew Research Center*. https://www.pewresearch.org/science/2023/11/14/americans-trust-in-scientists-positive-views-of-science-continue-to-decline/

Kim, D. H., Jones-Jang, S. M., & Kenski, K. (2021). Why Do People Share Political Information on Social Media? *Digital Journalism*, *9*(8), 1123–1140. https://doi.org/10.1080/21670811.2020.1827966

Kim, D. H., & Ellison, N. (2022). From observation on social media to offline political participation: The social media affordances approach. *New Media & Society*, *24*(12), 2614–2634. https://doi.org/10.1177/1461444821998346

Kim, J., & Song, H. (2016). Celebrity's self-disclosure on Twitter and parasocial relationships: A mediating role of social presence. *Computers in Human Behavior*, *62*, 570–577. https://doi.org/10.1016/j.chb.2016.03.083

Kim, N., Skurka, C., & Madden, S. (2024). The effects of self-disclosure and gender on a climate scientist's credibility and likability on social media. *Public Understanding of Science*, 09636625231225073. https://doi.org/10.1177/09636625231225073

Koivumäki, K., Koivumäki, T., & Karvonen, E. (2020). "On Social Media Science Seems to Be More Human": Exploring Researchers as Digital Science Communicators. *Media and Communication*, *8*(2), 425–439. https://doi.org/10.17645/mac.v8i2.2812

Krämer, N. C., & Haferkamp, N. (2011). Online Self-Presentation: Balancing Privacy Concerns and Impression Construction on Social Networking Sites. In S. Trepte & L. Reinecke (Eds.), Privacy Online (pp. 127–141). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-21521-6_10

Krause, N. M., Brossard, D., Scheufele, D. A., Xenos, M. A., & Franke, K. (2019). Trends—Americans' Trust in Science and Scientists. *Public Opinion Quarterly*, *83*(4), 817–836. https://doi.org/10.1093/poq/nfz041

Kreuter, M. W., Green, M. C., Cappella, J. N., Slater, M. D., Wise, M. E., Storey, D., Clark, E. M., O'Keefe, D. J., Erwin, D. O., Holmes, K., Hinyard, L. J., Houston, T., & Woolley, S. (2007). Narrative communication in cancer prevention and control: A framework to guide research and application. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, *33*(3), 221–235. https://doi.org/10.1007/BF02879904

Kwak, N., Lane, D. S., Weeks, B. E., Kim, D. H., Lee, S. S., & Bachleda, S. (2018). Perceptions of Social Media for Politics: Testing the Slacktivism Hypothesis. *Human Communication Research*, *44*(2), 197–221. https://doi.org/10.1093/hcr/hqx008

Lareau, A. (2021). *Listening to People: A Practical Guide to Interviewing, Participant Observation, Data Analysis, and Writing It All Up*. University of Chicago Press. https://press.uchicago.edu/ucp/books/book/chicago/L/bo114845989.html

Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin*, *107*(1), 34–47. https://doi.org/10.1037/0033-2909.107.1.34

Lee, N. M., & VanDyke, M. S. (2015). Set It and Forget It: The One-Way Use of Social Media by Government Agencies Communicating Science. *Science Communication*, *37*(4), 533–541. https://doi.org/10.1177/1075547015588600

Liang, X., Su, L. Y.-F., Yeo, S. K., Scheufele, D. A., Brossard, D., Xenos, M., Nealey, P., & Corley, E. A. (2014). Building Buzz: (Scientists) Communicating Science in New Media Environments. *Journalism & Mass Communication Quarterly*, *91*(4), 772–791. https://doi.org/10.1177/1077699014550092

Lin-Siegler, X., Ahn, J. N., Chen, J., Fang, F.-F. A., & Luna-Lucero, M. (2016). Even Einstein struggled: Effects of learning about great scientists' struggles on high school students' motivation to learn science. *Journal of Educational Psychology*, *108*, 314–328. https://doi.org/10.1037/edu0000092

Litt, E. (2012). Knock, Knock. Who's There? The Imagined Audience. *Journal of Broadcasting & Electronic Media*, *56*(3), 330–345. https://doi.org/10.1080/08838151.2012.705195

Litt, E., & Hargittai, E. (2016a). The Imagined Audience on Social Network Sites. *Social Media + Society*, *2*(1), 2056305116633482. https://doi.org/10.1177/2056305116633482

Litt, E., & Hargittai, E. (2016b). "Just Cast the Net, and Hopefully the Right Fish Swim into It": Audience Management on Social Network Sites. Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing, 1488–1500. https://doi.org/10.1145/2818048.2819933

Loosen, W., & Schmidt, J.-H. (2012). (Re-)discovering the Audience. *Information, Communication & Society*, *15*(6), 867–887. https://doi.org/10.1080/1369118X.2012.665467

Lou, C., Tandoc Jr. ,Edson C., Hong ,Li Xuan, Pong ,Xiang Yuan (Brenda), Lye ,Wan Xin (Rachelle), & and Sng, N. G. (Trisha). (2021). When Motivations Meet Affordances: News Consumption on Telegram. *Journalism Studies*, *22*(7), 934–952. https://doi.org/10.1080/1461670X.2021.1906299

Lueck, J. A. (2015). Friend-zone with benefits: The parasocial advertising of Kim Kardashian. *Journal of Marketing Communications*, *21*(2), 91–109. https://doi.org/10.1080/13527266.2012.726235

Luzón, M. J. (2013). Public Communication of Science in Blogs: Recontextualizing Scientific Discourse for a Diversified Audience. *Written Communication*, *30*(4), 428–457. https://doi.org/10.1177/0741088313493610

Maccoby, E. E., & Wilson, W. C. (1957). Identification and observational learning from films. *The Journal of Abnormal and Social Psychology*, *55*(1), 76–87. https://doi.org/10.1037/h0043015

Maheshwari, S., & Holpuch, A. (2025, January 17). Why TikTok Is Facing a U.S. Ban, and What Could Happen Next. *The New York Times*. https://www.nytimes.com/article/tiktok-ban.html

Majchrzak, A., Faraj, S., Kane, G. C., & Azad, B. (2013). The Contradictory Influence of Social Media Affordances on Online Communal Knowledge Sharing. *Journal of Computer-Mediated Communication*, *19*(1), 38–55. https://doi.org/10.1111/jcc4.12030

Malhotra, P. (2024). “What You Post in the Group Stays in the Group”: Examining the Affordances of Bounded Social Media Places. *Social Media + Society*, *10*(3), 20563051241285777. https://doi.org/10.1177/20563051241285777

Marder, B., Joinson, A., Shankar, A., & Thirlaway, K. (2016). Strength matters: Self-presentation to the strongest audience rather than lowest common denominator when faced with multiple audiences in social network sites. *Computers in Human Behavior*, *61*, 56–62. https://doi.org/10.1016/j.chb.2016.03.005

Marwick, A., & boyd, danah. (2011a). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society*, *13*(1), 114–133. https://doi.org/10.1177/1461444810365313

Marwick, A., & boyd, danah. (2011b). To See and Be Seen: Celebrity Practice on Twitter. *Convergence*, *17*(2), 139–158. https://doi.org/10.1177/1354856510394539

McCallie, E., Bell, L., Lohwater, T., Falk, J., Lehr, J., Lewenstein, B., Needham, C., & Wiehe, B. (2009). *Many Experts, Many Audiences: Public Engagement with Science*. Center for Advancement of Informal Science Education (CAISE).

McCarthy, E., & Grant, W. J. (2024). What are we talking about when we are talking about the audience? Exploring the concept of audience in science communication research and education. *Public Understanding of Science*, 09636625241280349. https://doi.org/10.1177/09636625241280349

McEwan, B., Carpenter, C. J., & Westerman, D. (2018). On Replication in Communication Science. *Communication Studies*, *69*(3), 235–241. https://doi.org/10.1080/10510974.2018.1464938

McFarling, U. L. (2025, April 24). Day by day, how Trump is roiling science and health. *STAT*. https://www.statnews.com/2025/04/24/trump-100-days-timeline-science-health-nih-cdc-fda-hhs/

McKasy, M., Cacciatore, M. A., Yeo, S. K., Zhang, J. S., Cook, J., Olaleye, R., & Su, L. Y.-F. (2024). Engaging the dismissive: An assessment of humor-based strategies to support global warming action. *Public Understanding of Science*, *33*(2), 227–240. https://doi.org/10.1177/09636625231186785

McKaughan, D. J., & Elliott, K. C. (2018). Just the Facts or Expert Opinion? The Backtracking Approach to Socially Responsible Science Communication. In S. Priest, J. Goodwin, & M. F. Dahlstrom (Eds.), *Ethics and practice in science communication* (pp. 197–213). University of Chicago Press.

McNutt, M. (2016). Taking up TOP. *Science*, *352*(6290), 1147–1147. https://doi.org/10.1126/science.aag2359

Mead, M., & Métraux, R. (1957). Image of the Scientist among High-School Students. *Science*, *126*(3270), 384–390. https://doi.org/10.1126/science.126.3270.384

Mede, N. G., Cologna, V., Berger, S., Besley, J., Brick, C., Joubert, M., Maibach, E. W., Mihelj, S., Oreskes, N., Schäfer, M. S., van der Linden, S., Abdul Aziz, N. I., Abdulsalam, S., Shamsi, N. A., Aczel, B., Adinugroho, I., Alabrese, E., Aldoh, A., Alfano, M., … Zwaan, R. A. (2025). Perceptions of science, science communication, and climate change attitudes in 68 countries – the TISP dataset. *Scientific Data*, *12*(1), 114. https://doi.org/10.1038/s41597-024-04100-7

Mellado, C. (2022). Roles and digital identities on Twitter and Instagram: An ethnographic study of Chilean journalists. *Profesional de la información*, *31*(4), Article 4. https://doi.org/10.3145/epi.2022.jul.14

Messing, S., & Westwood, S. J. (2014). Selective Exposure in the Age of Social Media: Endorsements Trump Partisan Source Affiliation When Selecting News Online. *Communication Research*, *41*(8), 1042–1063. https://doi.org/10.1177/0093650212466406

Metcalfe, J. (2019). Comparing science communication theory with practice: An assessment and critique using Australian data. *Public Understanding of Science*, *28*(4), 382–400. https://doi.org/10.1177/0963662518821022

Meyer, G. (2016). In science communication, why does the idea of a public deficit always return? *Public Understanding of Science*, *25*(4), 433–446. https://doi.org/10.1177/0963662516629747

Miller, J. D. (1983). Scientific literacy: A conceptual and empirical review. *Daedalus*, *11*(2), 9–48.

Miller, S., Fahy, D., & The ESConet Team. (2009). Can Science Communication Workshops Train Scientists for Reflexive Public Engagement?: The ESConet Experience. *Science Communication*, *31*(1), 116–126. https://doi.org/10.1177/1075547009339048

Mitchell, A., & Liedke, J. (2021, August 24). About four-in-ten Americans say social media is an important way of following COVID-19 vaccine news. *Pew Research Center*. https://www.pewresearch.org/short-reads/2021/08/24/about-four-in-ten-americans-say-social-media-is-an-important-way-of-following-covid-19-vaccine-news/

Mojarad, S. (2017). Social media: More scientists needed. *Science*, *357*(6358), 1362–1363. https://doi.org/10.1126/science.aap9655

Nerghes, A., Mulder, B., & Lee, J.-S. (2022). Dissemination or participation? Exploring scientists' definitions and science communication goals in the Netherlands. *PLOS ONE*, *17*(12), e0277677. https://doi.org/10.1371/journal.pone.0277677

Nisbet, E. C., Cooper, K. E., & Garrett, R. K. (2015). The Partisan Brain: How Dissonant Science Messages Lead Conservatives and Liberals to (Dis)Trust Science. *The ANNALS of the American Academy of Political and Social Science*, *658*(1), 36–66. https://doi.org/10.1177/0002716214555474

Nisbet, M. C., Brossard, D., & Kroepsch, A. (2003). Framing Science: The Stem Cell Controversy in an Age of Press/Politics. *Harvard International Journal of Press/Politics*, *8*(2), 36–70. https://doi.org/10.1177/1081180X02251047

Nowogrodzki, J., Basilio, H., Ledford, H., Maher, B., & Witze, A. (2025). 'Scientists will not be silenced': Thousands protest Trump research cuts. *Nature*, *639*(8055), 551–552. https://doi.org/10.1038/d41586-025-00704-0

Ophir, Y., & Jamieson, K. H. (2021). The effects of media narratives about failures and discoveries in science on beliefs about and support for science. *Public Understanding of Science*, *30*(8), 1008–1023. https://doi.org/10.1177/09636625211012630

Ophir, Y., Walter, D., Jamieson, P. E., & Jamieson, K. H. (2023). Factors Assessing Science's Self-Presentation model and their effect on conservatives' and liberals' support for funding science. *Proceedings of the National Academy of Sciences of the United States of America*, *120*(38), e2213838120. https://doi.org/10.1073/pnas.2213838120

Orgad, S. (2024). Posting vulnerability on LinkedIn. *New Media & Society*, 14614448241243094. https://doi.org/10.1177/14614448241243094

O'Sullivan, P. B. (1999). Bridging the Mass-Interpersonal Divide Synthesis Scholarship in HCR. *Human Communication Research*, *25*(4), 569–588. https://doi.org/10.1111/j.1468-2958.1999.tb00462.x

O'Sullivan, P. B., & Carr, C. T. (2018). Masspersonal communication: A model bridging the mass-interpersonal divide. *New Media & Society*, *20*(3), 1161–1180. https://doi.org/10.1177/1461444816686104

Paharia, N., Keinan, A., Avery, J., & Schor, J. B. (2011). The Underdog Effect: The Marketing of Disadvantage and Determination through Brand Biography. *Journal of Consumer Research*, *37*(5), 775–790. https://doi.org/10.1086/656219

Paravati, E., Naidu, E., Gabriel, S., & Wiedemann, C. (2020). More than just a tweet: The unconscious impact of forming parasocial relationships through social media. *Psychology of Consciousness: Theory, Research, and Practice*, *7*(4), 388–403. https://doi.org/10.1037/cns0000214

Peters, H. P. (2014). Scientists as public experts: Expectations and responsibilities. In M. Bucchi & B. Trench (Eds.), *Routledge Handbook of Public Communication of Science and Technology* (2nd ed.). Routledge.

Petty, R. E., Priester, J. R., & Briñol, P. (2002). Mass media attitude change: Implications of the elaboration likelihood model of persuasion. In *Media effects: Advances in theory and research, 2nd ed* (pp. 155–198). Lawrence Erlbaum Associates Publishers.

Petty, R., & Wegener, D. (1999). The Elaboration Likelihood Model: Current status and controversies. In *Dual-process theories in social psychology* (pp. 41–72).

Pornpitakpan, C. (2004). The Persuasiveness of Source Credibility: A Critical Review of Five Decades' Evidence. *Journal of Applied Social Psychology*, *34*(2), 243–281. https://doi.org/10.1111/j.1559-1816.2004.tb02547.x

Prior, M. (2009). Improving Media Effects Research through Better Measurement of News Exposure. *The Journal of Politics*, *71*(3), 893–908. https://doi.org/10.1017/S0022381609090781

Quelle, D., & Bovet, A. (2025). Bluesky: Network topology, polarization, and algorithmic curation. *PLOS ONE*, *20*(2), e0318034. https://doi.org/10.1371/journal.pone.0318034

Rainie, L., Funk, C., & Anderson, M. (2015, February 15). How Scientists Engage the Public. *Pew Research Center*. https://www.pewresearch.org/science/2015/02/15/how-scientists-engage-public/

Rains, S. A., Brunner, S. R., & Oman, K. (2015). Social media and risk communication. In H. Cho, T. Reimer, & K. A. McComas (Eds.), *The SAGE handbook of risk communication* (pp. 228–240). SAGE.

Rein, B. (2023). Making Science Education More Accessible: A Case Study of TikTok's Utility as a Science Communication Tool. *Neuroscience*, *530*, 192–200. https://doi.org/10.1016/j.neuroscience.2023.08.021

Reincke, C. M., Bredenoord, A. L., & van Mil, M. H. (2020). From deficit to dialogue in science communication. *EMBO Reports*, *21*(9), e51278. https://doi.org/10.15252/embr.202051278

Rödder, S. (2009). Reassessing the concept of a medialization of science: A story from the "book of life." *Public Understanding of Science*, *18*(4), 452–463. https://doi.org/10.1177/0963662507081168

Ross, L., Greene, D., & House, P. (1977). The “false consensus effect”: An egocentric bias in social perception and attribution processes. *Journal of Experimental Social Psychology*, *13*(3), 279–301. https://doi.org/10.1016/0022-1031(77)90049-X

Roussin, C. J., & Webber, S. S. (2012). Impact of Organizational Identification and Psychological Safety on Initial Perceptions of Coworker Trustworthiness. *Journal of Business and Psychology*, *27*(3), 317–329. https://doi.org/10.1007/s10869-011-9245-2

Sahneh, E. S., Nogara, G., DeVerna, M. R., Liu, N., Luceri, L., Menczer, F., Pierri, F., & Giordano, S. (2025). The Dawn of Decentralized Social Media: An Exploration of Bluesky’s Public Opening. In L. M. Aiello, T. Chakraborty, & S. Gaito (Eds.), *Social Networks Analysis and Mining* (pp. 422–437). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-78541-2_26

Saks, E., & Tyson, A. (2022, November 10). Americans report more engagement with science news than in 2017. *Pew Research Center*. https://www.pewresearch.org/short-reads/2022/11/10/americans-report-more-engagement-with-science-news-than-in-2017/

Satterwhite, A. K., & Luchner, A. F. (2016). Exploring the relationship among perceived resilience, dependency, and self-criticism: The role of culture and social support. *North American Journal of Psychology*, *18*(1), 71–84.

Schäfer, M. S., & Metag, J. (2021). Audiences of science communication between pluralisation, fragmentation and polarisation. In Routledge Handbook of Public Communication of Science and Technology (3rd ed.). Routledge.

Schiele, B. (2008). On and about the Deficit Model in an Age of Free Flow. In D. Cheng, M. Claessens, T. Gascoigne, J. Metcalfe, B. Schiele, & S. Shi (Eds.), *Communicating*

Science in Social Contexts: New models, new practices (pp. 93–117). Springer Netherlands. https://doi.org/10.1007/978-1-4020-8598-7_6

Schmid-Petri, H., & Bürger, M. (2019). 5. Modeling science communication: From linear to more complex models. In A. Leßmöllmann, M. Dascal, & T. Gloning (Eds.), *Science Communication* (pp. 105–122). De Gruyter Mouton. https://www.degruyterbrill.com/document/doi/10.1515/9783110255522-005/html?lang=en

Schmidt, S. (2009). Shall we Really do it Again? The Powerful Concept of Replication is Neglected in the Social Sciences. *Review of General Psychology*, *13*(2), 90–100. https://doi.org/10.1037/a0015108

Short, J., Williams, E., & Christie, B. (1976). *The Social Psychology of Telecommunications*. Wiley.

Simis, M. J., Madden, H., Cacciatore, M. A., & Yeo, S. K. (2016). The lure of rationality: Why does the deficit model persist in science communication? *Public Understanding of Science*, *25*(4), 400–414. https://doi.org/10.1177/0963662516629749

Steinke, J., Baumel, K., & Turner, M. M. (2024). Cultivating Authenticity as Role Models: Women in STEM Influencers on Instagram. *Science Communication*, *46*(5), 543–583. https://doi.org/10.1177/10755470241239942

Sturgis, P., & Allum, N. (2004). Science in Society: Re-Evaluating the Deficit Model of Public Attitudes. *Public Understanding of Science*, *13*(1), 55–74. https://doi.org/10.1177/0963662504042690

Su, L. Y.-F., Scheufele, D. A., Bell, L., Brossard, D., & Xenos, M. A. (2017). Information-Sharing and Community-Building: Exploring the Use of Twitter in Science Public

Relations. *Science Communication*, *39*(5), 569–597. https://doi.org/10.1177/1075547017734226

Sundar, S. S. (2009). Social psychology of interactivity in human-website interaction. In A. Joinson, K. Y. A. McKenna, T. Postmes, & U.-D. Reips (Eds.), *Oxford Handbook of Internet Psychology* (p. 0). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199561803.013.0007

Taber, C. S., & Lodge, M. (2006). Motivated Skepticism in the Evaluation of Political Beliefs. *American Journal of Political Science*, *50*(3), 755–769. https://doi.org/10.1111/j.1540-5907.2006.00214.x

Tankard, M. E., & Paluck, E. L. (2016). Norm Perception as a Vehicle for Social Change. *Social Issues and Policy Review*, *10*(1), 181–211. https://doi.org/10.1111/sipr.12022

Tao, M., & Ellison, N. B. (2023). "It's Your Finsta at the End of the Day . . . Kind of": Understanding Emerging Adults' Self-Presentational Changes on Secondary Accounts. Social Media + Society, 9(1), 20563051231152812. https://doi.org/10.1177/20563051231152812

Theocharis, Y., Boulianne, S., Koc-Michalska, K., & Bimber, B. (2023). Platform affordances and political participation: How social media reshape political engagement. *West European Politics*, *46*(4), 788–811. https://doi.org/10.1080/01402382.2022.2087410

Tollefson, J., Kozlov, M., Witze, A., & Garisto, D. (2025). Trump's siege of science: How the first 30 days unfolded and what's next. *Nature*, *638*(8052), 865–867. https://doi.org/10.1038/d41586-025-00525-1

Treem, J. W., & Leonardi, P. M. (2013). Social Media Use in Organizations: Exploring the Affordances of Visibility, Editability, Persistence, and Association. *Annals of the*

International Communication Association, *36*(1), 143–189. https://doi.org/10.1080/23808985.2013.11679130

Treem, J. W., Leonardi, P. M., & van den Hooff, B. (2020). Computer-Mediated Communication in the Age of Communication Visibility. *Journal of Computer-Mediated Communication*, *25*(1), 44–59. https://doi.org/10.1093/jcmc/zmz024

Trench, B. (2008). Towards an Analytical Framework of Science Communication Models. In D. Cheng, M. Claessens, T. Gascoigne, J. Metcalfe, B. Schiele, & S. Shi (Eds.), *Communicating Science in Social Contexts: New models, new practices* (pp. 119–135). Springer Netherlands. https://doi.org/10.1007/978-1-4020-8598-7_7

Tyson, A., & Kennedy, B. (2024, November 14). Public Trust in Scientists and Views on Their Role in Policymaking. *Pew Research Center*. https://www.pewresearch.org/science/2024/11/14/public-trust-in-scientists-and-views-on-their-role-in-policymaking/

Valkenburg, P. M., & Oliver, M. B. (2019). Media Effects Theories: An Overview. In *Media Effects: Advances in Theory and Research* (4th ed.). Routledge.

Väliverronen, E. (2021). *Mediatisation of science and the rise of promotional culture*. Routledge Handbooks Online. https://doi.org/10.4324/9781003039242-8-8

van Dijck, J., & Poell, T. (2013). Understanding Social Media Logic. *Media and Communication*, *1*(1), Article 1.

van Eck, C. W., Messling, L., & Hayhoe, K. (2024). Challenging the neutrality myth in climate science and activism. *Npj Climate Action*, *3*(1), 1–3. https://doi.org/10.1038/s44168-024-00171-9

Vidal Valero, M. (2023). Thousands of scientists are cutting back on Twitter, seeding angst and uncertainty. *Nature*, *620*(7974), 482–484. https://doi.org/10.1038/d41586-023-02554-0

Vitak, J., Lampe, C., Gray, R., & Ellison, N. (2012). "Why won't you be my Facebook friend?": Strategies for managing context collapse in the workplace. *Proceedings of the 2012 iConference*, 555–557. https://doi.org/10.1145/2132176.2132286

Walther, J. B. (1995). Relational Aspects of Computer-Mediated Communication: Experimental Observations over Time. *Organization Science*, *6*(2), 186–203. https://doi.org/10.1287/orsc.6.2.186

Walther, J. B. (1996). Computer-Mediated Communication: Impersonal, Interpersonal, and Hyperpersonal Interaction. *Communication Research*, *23*(1), 3–43. https://doi.org/10.1177/009365096023001001

Wang, X., & Song, Y. (2020). Viral misinformation and echo chambers: The diffusion of rumors about genetically modified organisms on social media. *Internet Research*, *30*(5), 1547–1564. https://doi.org/10.1108/INTR-11-2019-0491

Weingart, P. (1998). Science and the media. *Research Policy*, *27*(8), 869–879. https://doi.org/10.1016/S0048-7333(98)00096-1

Weingart, P., & Guenther, L. (2016). Science communication and the issue of trust. *Journal of Science Communication*, *15*(5), C01. https://doi.org/10.22323/2.15050301

Whateley, D. (2024, April 3). How many followers you need on TikTok to get paid as a content creator. *Business Insider*. https://www.businessinsider.com/how-many-followers-on-tiktok-to-get-paid

Wilson, T. (1993). *Watching Television: Hermeneutics, Reception and Popular Culture (Introduction and Chapter One: Section 1 only)*.

Wolf, J. M. (2017). The Multipurpose Tool of Social Media: Applications for Scientists, Science Communicators, and Educators. *Clinical Microbiology Newsletter*, *39*(10), 75–79. https://doi.org/10.1016/j.clinmicnews.2017.04.003

Women and Minorities in the S&E Workforce (Science & Engineering Indicators). (2018). National Science Foundation. https://www.nsf.gov/statistics/2018/nsb20181/report/sections/science-and-engineering-labor-force/women-and-minorities-in-the-s-e-workforce

Wyer, M., Schneider, J., Nassar-McMillan, S., & Oliver-Hoyo, M. (2010). Capturing Stereotypes: Developing a Scale to Explore U.S. College Students' Images of Science and Scientists. *International Journal of Gender, Science and Technology*, *2*(3), Article 3. https://genderandset.open.ac.uk/index.php/genderandset/article/view/78

Wynne, B. (2006). Public Engagement as a Means of Restoring Public Trust in Science – Hitting the Notes, but Missing the Music? *Community Genetics*, *9*(3), 211–220. https://doi.org/10.1159/000092659

Yeo, S. K. (2015, December). *Public engagement with and communication of science in a web-2.0 media environment.* American Association for the Advancement of Science (AAAS).

Yeo, S. K., Cacciatore, M. A., Su, L. Y.-F., McKasy, M., & O'Neill, L. (2021). Following science on social media: The effects of humor and source likability. *Public Understanding of Science*, *30*(5), 552–569. https://doi.org/10.1177/0963662520986942

Zeng, J., Schäfer, M. S., & Allgaier, J. (2021). Research Perspectives on TikTok & Its Legacy Apps| Reposting "Till Albert Einstein Is TikTok Famous": The Memetic Construction of Science on TikTok. *International Journal of Communication*, *15*(0), Article 0.

Zhang, A. L., & Lu, H. (2022). No Laughing Matter: Exploring the Effects of Scientists' Humor Use on Twitter and the Moderating Role of Superiority. *Science Communication*, *44*(4), 418–445. https://doi.org/10.1177/10755470221114352

Zhang, A. L., & Lu, H. (2023). Scientists as Influencers: The Role of Source Identity, Self-Disclosure, and Anti-Intellectualism in Science Communication on Social Media. *Social Media + Society*, *9*(2). https://doi.org/10.1177/20563051231180623

Zhang, A. L., & Lu, H. (2024). Behind the lab coat: How scientists' self-disclosure on Twitter influences source perceptions, tweet engagement, and scientific attitudes through social presence. *New Media & Society*, *26*(10), 5784–5801. https://doi.org/10.1177/14614448221141681

Zhang, A. L., & Lu, H. (2025). When Scientists Share Their Struggles: How Scientists' Self-Presentation on Social Media Influences Public Perceptions, Support for Science, and Information-Seeking Intentions. *Science Communication*. https://doi.org/10.1177/10755470251322902

Zhao, X., Salehi, N., Naranjit, S., Alwaalan, S., Voida, S., & Cosley, D. (2013). The many faces of facebook: Experiencing social media as performance, exhibition, and personal archive. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1–10. https://doi.org/10.1145/2470654.2470656

Zillich, A. F., & Wunderlich, A. (2024). The Impact of Social Norms on Adolescents' Self-Presentation Practices on Social Media. *Social Media + Society*, *10*(4), 20563051241299829. https://doi.org/10.1177/20563051241299829

Zorn, T. E., Roper, J., Weaver, C. K., & Rigby, C. (2012). Influence in science dialogue: Individual attitude changes as a result of dialogue between laypersons and scientists.

Public Understanding of Science, *21*(7), 848–864.

https://doi.org/10.1177/0963662510386292