"You have to be hyperaware":
PhD Students' Approaches to Boundary Management When Sharing Research-Related Information on Social Media

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Abstract

What informs the disclosure decisions made by early-career scientists when they share their research on social network sites, such as social media? We conducted 14 interviews to investigate how science PhD students in the United States and the Philippines perceive and manage boundary turbulence when they share research-related information online. Through a qualitative analysis that applied Petronio's theory of Communication Privacy Management (CPM) we identify major themes from our interviews. These themes include participants' perceptions of the risks, benefits, and ways of minmizing risks when sharing research-related information on social media. We discuss the implications of these findings for our interviewee population, and connect it to broader implications for stakeholders in science communication and CPM.

1 Introduction

Early career scientists face expectations from higher education institutions, funders, and potential employers to communicate their research findings beyond a scientific audience, even when they do not feel prepared for doing so [13]. Social network sites (SNSs) offer scientists the opportunity to share their work and engage with the public, but using such systems can also expose them to others in ways that they do not desire or anticipate [6]. Using Petronio's theory of Communication Privacy Management (CPM), we investigated how science PhD students in the United States and the Philippines perceive and manage their privacy boundaries when they share

research-related information on social media. Specifically, we interviewed a purposive sample of 14 PhD students in the life sciences about their usage of social media, and conducted a bottom-up, qualitative analysis of their perceptions related to disclosures of research-related information on social media.

Our analysis shows that participants were able to identify benefits and risks of using social media to share research-related information, and sought to minimize what they perceived as negative outcomes. However, participants were not always able to effectively manage their privacy boundaries and prevent boundary turbulence. Specifically, they struggled to define clear privacy boundaries when information was not explicitly related to published data. The perceived obligation to maintain a visible social media presence, often communicated by senior scientists, appeared to strongly motivate participants' decisions to make disclosures online. We discuss the implications of these findings for early career scientists, as well as broader implications for Communication Privacy Management theory.

2 Related Work

Previous work on scientists' use of social media found that while scientists acknowledged the benefits of social media, they also expressed concerns that using social media could lead to loss of privacy, negative impacts to their reputation, and loss of research time (e.g. [2,4,14]). These studies were focused primarily on describing scientists' attitudes, not on how scientists approached addressing these concerns when they actually disclosed their research — if they addressed them at all.

Boundary metaphors, as described in Communication Privacy Management theory, are a useful way to conceptualize privacy management on social media [3,9]. All owners of private information seek to establish and control privacy boundaries — systems of rules and conditions that determine not only who owns and controls information, but when and how that private information is revealed to others [8]. When certain conditions prevent coordination of privacy boundaries

and unwanted disclosure of private information occurs, this leads to 'privacy turbulence' that could make the owner of the revealed information vulnerable. The structure of social media presents users with particular challenges for maintaining control over their privacy, as ambiguous boundaries and complex networks formed of social ties and flows of information created by the system can easily lead to unintentionally revealing information [11, 12].

We applied communication privacy management theory in an investigation of how PhD students in the United States and the Philippines balance privacy and disclosure when they share research-related information on social media. We focused on PhD students as a subset of scientists because they are likely to already be users of SNSs and are at a point in their careers where privacy turbulence could have a greater impact, making it more urgent to manage privacy effectively.

3 Method

Eligible respondents indicated their area of study was in the life sciences, were already engaged in preparing for or completed dissertation work, and indicated that they either held legal citizenship or permanent residence in the country in which they were pursuing their PhD degree. Potential Philippine participants were sent a link to a screening survey on Qualtrics through the university's graduate school office. Of 2200+ graduate students, 39 responded to the survey and 25 were eligible. Potential U.S. participants received the link through the university's registrar. Of 1100+ graduate students, 52 responded and 35 were eligible. We used purposive sampling to select a range of ages, genders, area of study, and number of social media sites used to share research-related information. In total, the first author completed 14 remote interviews, including 7 participants from the Philippines (P1-P7: 5 women, 2 men, mean age 35 y.o.), and 7 participants from the United States (U1-U7: 3 women, 4 men, mean age 26 y.o.). Participants received a $25 USD Amazon gift card (USA) or PhP 500 in Gcash (PH). All interviews were conducted over the Zoom teleconferencing platform in August-September 2021 (Philippines) and November 2021 (United States).

The semi-structured interview protocol included questions pertaining to what types of information they chose to share or not to share about their work, why they chose to use some sites to talk about their research but not others, and who they expected to view and respond to any research-related information they shared. They were asked to share their screen and think out loud while they drafted a hypothetical post about their work, then describe or show actual times they had shared their research within the past nine months. All interviews were conducted in English, but as the interviewer was a native speaker, Philippine participants were given the option to request translation of any questions, or respond to questions in Filipino. Before data analysis, the interviews were transcribed and then edited to remove identifying information and errors. As necessary, portions of the interviews in Filipino

were translated by the first author.

Following Saldana [10], we conducted rounds of iterative qualitative analysis of the interview transcripts to identify themes that related to concepts from communication privacy management theory, including privacy rules, boundary management, and boundary turbulence. All thematic analysis and coding for the interviews was conducted by the first author in several rounds of coding, discussion with the second author, and recoded.

The study was reviewed by the US university's institutional review board and determined to be exempt from review. As our sample was limited to the students who filled in the screening survey and those who actually appeared for the interview, the age/gender composition in our purposive sampling is not statistically representative of the general PhD student population.

4 Findings

In Communication Privacy Management theory, benefits and risks form part of an individual's privacy calculus: criteria that inform what information people choose to disclose or not to disclose. To better understand the dynamics of how our participants made disclosure decisions related to research-related information on social media, we asked their perceptions of benefits, risks, and approaches to managing risks. All participants articulated desirable outcomes (benefits) that motivated them to use social media to share research-related information, undesirable outcomes (risks) that they sought to avoid, and approaches they took to minimize or avoid boundary turbulence caused by sharing this information. We did not define research-related information for participants. What they discussed included research activities they were currently or previously engaged in, publications, field activities, professional achievements, or talks.

4.1 Benefits and Risks of Sharing Research-Related Information

Benefit: career advancement and visibility. Participnts felt that engaging with social media could increase recognition of their work, give them validation from their peers ("even people I don't necessarily know directly are seeing my work and thinking about it," U1), and provide potential employers and funders with evidence of their professional competence. Social media also gave participants access to other scientists in their field ("I can get close to people who I really admire," U7). Broadly, participants hoped to use social media's "wide reach" (P3) to share their work (typically research findings or media related to field activities) with a "larger audience" (U4) and "more readers" (P5). These outcomes are substantially similar to perceived benefits of using social media described in prior work on social media usage by higher education academics [1].

Benefit: fulfillment of obligations. To several participants, using social media for research was considered to be "expectation" (U3) for scientists that they had to fulfill. As opposed to career advancement, the motivation to disclose information was to meeting standards of behavior. Participants described different ways this sense of expectation was conveyed to them, including personal observation of other scientists' use of social media, interactions with other scientists, or explicit instructions from senior scientists to create social media accounts. Other participants noted how their academic departments emphasized the need to use social media as a part of their professional careers.

> ...upon joining the lab I'm in, it was made more apparent that having a Twitter kind of dedicated to science and scientific communication would also be beneficial down the road when looking for jobs or something like that, to kind of have something to point to like, 'Hey, this is how I am interacting with the scientific community outside of simply publishing a paper.' (U6)

Even for participants that felt reluctant or skeptical about social media's benefits, just the consciousness that future employers might look for it was sufficient incentive to maintain an online presence to represent themselves:

> I'm thoroughly convinced that no one is ever going to read the stuff that I post, but I'm doing it just in case somebody is curious about dry beans and wants to know what it's about. Or, if somebody wants to know who I am, then they can go on my Twitter and see, oh, she's interested in these topics as a scientist. And, she's not saying anything horrible. So, I can hire her. (U5)

Risk: negative impact on professional career. Several participants considered disclosing unpublished research data on social media to be dangrous, as it put them at risk of experiencing a privacy violation with a profoundly negative impact on their professional careers: having their research published and claimed, or "scooped", by other scientists. The repercussions participants expected from this occurring were twofold: first, the effort they put into their research and the results of their work would be devalued if they were not the first to describe them, and second, it could hurt their relationships with their colleagues or institutions. None of the participants interviewed had personal experience of being scooped (and could therefore not describe what they did in response to such an event) but they all cited warnings from mentors and peers as as a cautionary tale of the potential consequences.

> [My friend] just basically ... not lost, because he learned, he gained experience, and all of that, but ... in the PhD life he really lost two years. Because

he start over the project, another project. Because some other people just get it first, and it just happens sometimes. (U2)

Other examples of disclosures on social media participants perceived as less risky, but still to be avoided, included sharing one's personal political opinions, personal struggles as a PhD student or with academia. Participants suggested that making such disclosures might be viewed as undesirable conduct by senior scientists and potential employers, and diminish their future career prospects. Excessive posting about one's own achievements without a clear connection to research was also viewed poorly, as this could come across as "self-congratulatory" (U7) or a "humble brag" (P4).

Risk: loss of control over context. Participants anticipated that any information they shared could be interpreted or used in a way that they did not intend, and perceived this as an inevitable outcome of using social media to make these disclosures. The range of outcomes envisioned included screenshots of posts being shared with an unintended recipient (P1), or information from posts about controversial scientific work being used to "destroy the business or industry in that particular area" (P7). Other examples included not being able to prevent how other social media users might respond to the information they shared online, making participants reluctant to let other users "have my information" (U4). The participant might unintentionally "look stupid" (P6), provoke "antagonistic comments" (P5), or "open [their work] up for critique" (U7). These concerns over loss of control echo findings from previous work on social media and context collapse (e.g. [7, 15]).

4.2 Approaches to Managing Risks

Making disclosures that are 'correct' and 'factual'. Most participants reasoned that once some information was shared on social media, losing control over it was an inevitable outcome. Thus, their aim was not to prevent others from accessing that information entirely, but to communicate only information that was factual or verifiable. Publication was a common standard: published work could and should be shared, or participants could "look into papers" (P6) and work done by others to support their claims. Participants believed it would "be a mistake" (U5) to post about something if they felt unqualified to speak on a subject, and might opt not to share information at all. This "be mindful" (P7) approach was not always enough to prevent negative outcomes, particularly interpersonal conflicts. U3 described an incident where, after sharing her experiences with doing research at a previous institution, a former advisor had an extremely negatvie response. The main point of contention appeared to be the difference in what she and her former advisor considered appropriate information to disclose, and it made her reconsider how she might approach similar disclosures in the future.

I talked about my experience with that research, but I didn't tell them that I was writing about it because it was about my story. And they're very sensitive about research sharing. They don't really like talking about their work or they don't like other people talking about their work. So that actually ended up being a really, really big conflict and was a very negative experience for me. So that's made me really cautious.(U3)

Awareness of when and where disclosures are appropriate. Appropriate disclosures were disclosures that participants considered to be unlikely to cause boundary turbulence. Unpublished research, in particular, appeared to have strict, well-defined boundaries for preventing unwanted disclosures, but these boundaries could be relaxed after certain conditions were met. Nearly all participants expressed the belief that sharing research data on social media before publication was not appropriate, but it could be shared freely after the 'safety of already having published' (U6). Perceptions of what constituted appropriate disclosure often depended on a participant's own privacy boundaries. When the appropriateness of disclosure was ambiguous, participants erred on the side of caution and refrained from any kind of disclosure at all, even when information was directly connected to their experiences as researchers (e.g. broader issues in academia). More senior scientists (advisors, professors, or students farther in the program) were perceived as being able to post more freely. Some participants attributed this to "scientific status" with academic colleagues:

> [Professors] are not afraid to speak up, and they can speak up among them in that way. But I feel that science has a lot of egos, and grudges. Like, "Oh, you are a grad student. You are just undergrad." Or whatever. They have levels. So when you are a professor you have that, I don't want to say power, but you are in that position of saying whatever you want to say. (U2)

Another way that participants sought to maintain privacy boundaries was to make selective disclosures through the "compartmentalization of personal and professional life" (P3). Typically, this was achieved through only posting research information to different social media accounts or using features to make individual research-related posts more or less visible. Among our participants, Twitter, LinkedIn, and ResearchGate were considered more 'professional' sites used by more professional audience, leading participants to favor them for sharing research-related information. Previous work with non-scientists found, similarly, that users elected to disclose information differently on different social media sites because they perceived them to have different social networks and audiences [5]. Participants expressed not wanting to share research on platforms they primarily perceived to be for

personal contacts, or at least taking care to make sure that research was communicated in a way where it could be relevant to who they expected to see it. For example, to avoid alienating friends who were not researchers, P6 took extra care to avoid posting constantly about her research on Facebook.

5 Discussion

Our findings affirm previous work on the challenges social media presents for boundary management, while identifying some unique aspects of boundary turbulence in our study population. Participants' decisions to disclose information on social media were frequently informed by the perception of social media as a necessity to their career goals, creating an unavoidable tension between expectations to disclose information, which could be incongruent with their own privacy boundaries. While participants were able to devise approaches to manage potential boundary turbulence, they were also keenly self-aware of the vulnerability of their position as PhD students. Compliance with privacy boundaries set by others was the surest way to avoid unintentional disclosures or boundary mistakes, which participants perceived could cost them more compared to more senior, established scientists like their advisors.

> When you have the stakes that high and that your funding's going to go down or someone's funding is going to get hurt, or that someone's going to lose their job, or you're not going to get a job, then you have to be hyperaware. (U7)

As research is a fundamentally collaborative endeavor, privacy boundaries around research-related information can be difficult to define. Disclosing research-related information on social media subjects all owners of that information to the risks of boundary turbulence that comes with any disclosure on social media, and ambiguous privacy boundaries may amplify existing power dynamics and place vulnerable (more likely to be impacted by boundary turbulence) members of the group in privacy dilemmas. While our findings focused on PhD students, they have implications for how disclosures of research-related information may affect any stakeholder in the outcomes of public science communication, such as senior scientists, educational institutions, funders, and potential employers. Placing the onus on individual PhD students to remain hypervigilant appears to be an ineffective long-term approach for identifying and managing privacy boundaries when communicating science online, as they perceive themselves to have relatively lesser power to influence disclosures compared to other stakeholders. Future research could expand on our findings by identifying how to provide PhD students with the means to clearly define and effectively enforce their desired privacy boundaries, and coordinate desired privacy management outcome with other stakeholders in disseminating research.

Acknowledgments

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