Testing Waters, Sending Clues: Indirect Disclosures of Socially Stigmatized Experiences on Social Media

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Indirect disclosure strategies include hinting about an experience or a facet of one's identity or relaying information explicitly but through another person. These strategies lend themselves to sharing stigmatized or sensitive experiences such as a pregnancy loss, mental illness, or abuse. Drawing on interviews with women in the U.S. who use social media and experienced pregnancy loss, we investigated factors guiding indirect disclosure decisions on social media. Our findings include 1) a typology of indirect disclosure strategies based on content obviousness, original content creator, and content sharer, and 2) an examination of indirect disclosure decision factors related to the self, audience, platform affordances, and temporality. We identify how people *intentionally* adapt social media and indirect disclosures to meet psychological (e.g., keeping a personal record) and social (e.g., feeling out the audience) needs associated with loss. We discuss implications for design and research, including features that support disclosures through proxy, and relevance for algorithmic detection and intervention. CAUTION: This paper includes quotes about pregnancy loss.

1   INTRODUCTION

Disclosing sensitive personal information and negative experiences can be difficult and even frightening. Particularly on social media, letting people know about difficult experiences such as a job loss [17], an abuse experience [5], a mental illness [25], or a pregnancy loss [4] can be

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daunting due to concerns around social rejection and judgment, additional distress, or other undesirable consequences [12,35,45,49]. Although most Human-Computer Interaction (HCI) and Social Computing research conceptualizes self-disclosure as direct sharing of information about oneself, many disclosures mediated through social media are less clear. Did a friend post a link to an article about living with depression because of a personal struggle? Did a friend re-share someone else's #MeToo social media post as a way of signaling their personal experience of sexual abuse and harassment? Was a meme about cancer posted as a way of disclosing a diagnosis? Was a poem about losing a pregnancy tied to the poster's own experience? Through deliberate ambiguity, posters may hint at their need for empathy or an expression of personal suffering. Indirect disclosures on social media allow for privacy regulation in a networked public, explored in past work on social steganography (hiding information in plain sight) [14] and saving "face" [48].

Self-disclosure is broadly understood as communicating information about oneself to others with much of the foundational literature focused on dyadic, face-to-face communication. Several scholars have proposed more targeted definitions of this concept that focus on intention and directness. Sidney Jourard defines "willful disclosures" as those whose goal is to "let another person know with no shadow of a doubt what you have done, what you feel, etc." [39:16] But disclosures take different forms. Literature on disclosure explores both direct information sharing (i.e., unambiguous content shared by the discloser) [39], as well as ambiguous and indirect styles that may be open to interpretation by the receiver [28]. An additional dimension of indirect disclosure is the involvement of a third party who may buffer the disclosure [36], although the content shared by a third party may not necessarily be ambiguous. Direct disclosures in socially stigmatized contexts (e.g., mental illness, abuse, infertility, pregnancy loss) are complicated by social risk (e.g., appearing needy, disclosing vulnerabilities) and competing impression management goals [52]. A stigmatized identity is one that is socially devalued and associated with negative beliefs and conceptions [31]. Indirect disclosures allow individuals to communicate while limiting personal risk, but because they are often ambiguous, they may also limit eliciting support from others, and may increase the chance of negative or unsupportive responses [10], or of being ignored or misunderstood [7].

Pregnancy loss is an experience that is often hard to disclose, socially stigmatized, traumatizing, isolating, and associated with negative wellbeing effects [71]. In the United States, it occurs in approximately 20% of recognized pregnancies; however, 55% of Americans believe it is rare [66]. Lack of support can cultivate stigma and may increase the risk of depression after a pregnancy loss [75]; however, communicating about the loss is mandatory for receiving support and gradually destigmatizing talking about it. With the exception of a few studies (e.g., [4,37]), research related to pregnancy and technology has largely focused on pregnancies that proceed as hoped. Given the prevalence, impact and lack of prior work on pregnancy loss, pregnancy loss is an important and rich context for investigating indirect disclosures of difficult or socially stigmatized experiences on social media. Prior work provides a systematic Disclosure Decision-Making Framework for *direct* disclosures of pregnancy loss on identified social media (e.g., Facebook) [4]. This framework [4] includes six types of decision factors: self-related, audience-related, societal, platform and affordance-related, network-level, and temporal: Self-related motivations for direct disclosures could include remembrance, taking control of one's parenthood narrative, processing the loss, and eliciting support. Audience-related motivations for direct disclosures are largely of preventive nature (e.g., announcing the loss to avoid potential follow-up questions about the pregnancy). Additionally, sometimes people disclose the loss because they want to be a source of support for others, and other times as a result of feeling less stigma due to others' disclosures (through a phenomena called "network-level reciprocal disclosure"), contributing to network-level disclosure motivations. Moreover, disclosures motivated by societal factors are activist in nature, to fight stigma and raise awareness at the societal level, while temporal factors (e.g., amount of time since the loss) also inform direct

disclosure decisions. Finally, one-to-many communication, asynchronous communication, and prior anonymous participation facilitate direct disclosures of stigmatized experiences on identified social network sites.

In this paper, we investigate indirect disclosures of pregnancy loss on social media platforms. We draw on interviews with women who used social media and had experienced pregnancy loss to describe their indirect disclosures of pregnancy loss experiences on social media, along with their perceived motivations for these disclosures. This research sheds light on the ways in which social technologies mediate sensitive indirect self-disclosures, what considerations contribute to indirect self-disclosures, and how social technology designs can support the needs that individuals may have in face of adversity, distress, and stigma.

2 RELATED WORK

2.1 Indirect and Ambiguous Self-Disclosures in Non–Computer-Mediated Contexts

Research has long recognized directness as an important disclosure dimension [32]. For example, Edgar proposed direct-indirect as one dimension of disclosing stigma, with indirect disclosure as a strategy for limiting stigma [28]. For example, "I just found out that I got a promotion" is more of a direct disclosure than "It's nice to finally have something good happen at work" [56]. Similarly, "I have HIV" is more direct than "I have been sick" [57]. Prior research has noted indirect disclosures of stigmatized content, such as Ponse's observations of statements that implied lesbianism through reliance on inferences [58]. Indirect disclosure of homosexuality also takes the form of dropping hints, clothing that symbolizes gay identity, or jewelry such as freedom rings as a symbol of gay pride [27]. Symbolic disclosures such as tattoos also allow for bypassing verbal disclosure [32]. This way of disclosing information is different from that defined by Jourard [39:16] (i.e., letting the audience know with "no shadow of a doubt" what one is feeling), or from "the matter of fact" disclosures of Goffman [31] in that the information is symbolically or indirectly communicated, and not explicitly and directly.

Indirectness of disclosure can take the form of social coding, as discussed above, or by indirectly delivering a message through others. In a "second-hand" or "third party" disclosure, someone else shares the information [1,13,26]. Indirect disclosures (e.g., hinting, third party) can also reduce the chances of face threat for the discloser or the disclosure recipient: The stigmatizing information that could make both parties vulnerable to bias is detectable only to those who are in the know and most likely sympathetic [15,36]. For example, research shows that indirect disclosures of HIV by men who have sex with men are believed to be an adequate form of disclosure since those who need the information would understand the message and infer their own risk [70]. Recipients too sometimes prefer indirect disclosure as a more discrete way of sharing sensitive information. For example, a study suggests Chinese college students who associate mental illness with stigma prefer to learn of others' experiences with mental illness through indirect disclosures over more direct disclosures [3].

The research above explores the role of indirect disclosures in non-computer-mediated communication, particularly in the presence of social stigma. Next we shift our attention to social media research.

2.2 Indirect and Ambiguous Self-Disclosures on Social Media

Much of the self-disclosure research in computer-mediated communication, HCI, and social computing has focused on direct forms of self-disclosure. This research has explored the content and motivations associated with direct and general self-disclosure on social media (e.g., [21,44,79]), as well as in sensitive contexts including parenthood difficulties [2], transitioning

into society from military [69], gender transition [35], experiencing sexual abuse [5], mental illness [6,25], socio-economic status stigma [63], or romantic relationship breakups [34]. A growing body of research focuses on computationally detecting signals of distress (e.g., mental illness) from social media content (e.g., [23]). Indirect disclosures, however, have not been the focus of much HCI and CSCW scholarship nor have they been conceptualized and described clearly.

A notable exception is boyd and Marwick's discussion of "social steganography" as a way that teenagers code information on social media [14]. Through "hiding in plain sight," social steganography works because the poster knows that different audiences will interpret the message differently [14,55]. By sharing content in a way that only certain audience members can decode, teens enact privacy in public. Strategic ambiguity or vague-booking can also be seen as a type of indirect disclosure, where the message is intentionally vague, and may lead to several interpretations [9]. Research has linked strategic ambiguity to less use of privacy controls on Facebook [20], implying that individuals see it as their own way of managing privacy. What the ambiguous message does *not* say is more important than what it does [38], rendering it an appropriate and helpful medium for disclosing sensitive topics [64]. In the context of grief, bereaved parents' use of strategic ambiguity in sharing about the death on Facebook enables protecting sensitive information and impression [48]. For instance, bereaved parents may garner support and build community by posting abstract content that does not reveal specifics such as cause of death, or any other information they deem sensitive.

This literature suggests that intentionally indirect disclosures, which often require the audience to draw inferences, are a common way to share stigmatizing or sensitive information. However, there has been scant work to examine the factors that inform decisions to engage in indirect disclosures on social media, the ways they are enacted, or the implications of this unique communication behavior for designing social technologies. We build on this body of research by investigating how (i.e., in what ways) and why (i.e., for what motivations and reasons) people indirectly disclose pregnancy loss on social media and discuss potential implications for future social technology designs as well as research (e.g., through design explorations and other means.)

3 METHODS

3.1 Recruitment

Recruitment began with a short screening survey on Facebook and Twitter, disseminated via two of the authors' networks widely shared by individuals outside of their networks. The survey's goal was to find eligible interview participants and yield a strategic sample in terms of demographics and experiences (e.g., age, used social media, disclosure occurrence on social media). The minimal eligibility criteria to patriciate in the survey included having experience with pregnancy loss during the past two years, being 18 or older, using social media, and residing in the United States. The gestational stage of loss was not a recruitment criterion since it does not determine the grief experience [50]. The survey included questions about what social media respondents used and whether they used those social media to talk about their pregnancy loss, as well as demographic and contact information. The survey did not include detailed questions about what disclosure strategy respondents employed, and as such no information about indirect disclosures were evident in that data. The study was open to transgender and non-binary people but none responded. A total of 90 individuals responded to the survey during the period it was active (November 2016–January 2017).

Among survey respondents, 36 had not directly disclosed the loss on any platform, 51 had directly disclosed on one or more, and three could not recall. Among the 51 who had disclosed on one or more platforms, 41 briefly shared how they did so, out of which 22 had shared about

their experience on their Facebook profiles. The first author made several systematic passes through the survey data prior to and during the interview data collection period to select potential interview participants with the aim of covering a wide range of experiences with loss, disclosure, social media use, and age in aggregate. We recruited through an iterative process to ensure participation of a wide age range and inclusion of individuals who had and had not disclosed about their loss on social media. The first author contacted survey respondents selected for interviews with study information and a link to an online consent form. Once the first author had interviewed several people of similar ages, we stopped inviting new interviewees in that age range, and focused on recruiting other age ranges. We stopped recruiting new interview participants well after we reached saturation and uncovered no new themes and experiences. Interview participants were offered a $25 Amazon gift card as a token of appreciation. This study was approved by the IRB at Drexel University.

3.2 Participants

The first author interviewed a total of 27 women, aged between 27 and 42 (average = 33.6). Thirteen of these women reported indirect disclosures of pregnancy loss on Twitter, Facebook or Instagram. This paper solely focuses on indirect disclosures as a distinct and unique behavior; we therefore draw on the interviews with these 13 women (aged between 27 and 39, average = 32.5) and report more details about them in this section and in Table 1. Our sample included participants in age ranges more likely to experience both pregnancy and pregnancy loss [78].

All 13 participants were women in relationships with men. Participants used a variety of platforms including Facebook, Instagram, Twitter, Tumblr, Facebook groups, Reddit, GOMI, Glow, and BabyCenter. All participants used Facebook except one who only used Instagram and Twitter at the time of the interview. Participants had experienced losses in various stages of pregnancy including stillbirth. All participants were raised and lived in the United States. They

Table 1. Participant details. We report on the number of children exactly how participants did, in their words. P16 did not complete the demographics questionnaire after the interview.

	Age	Education	Income	Employment	Religion	Children
P2	36	graduate degree	$75K+	employed full time	agnostic	1 living
P4	28	bachelor's degree	$75K+	employed full time	agnostic / nothing in particular	1
P5	32	graduate degree	$75K+	stay-at-home parent	Catholic	3 (almost, will deliver 1 soon)
P10	35	some college	$75K+	full time mom	agnostic	1
P11	35	graduate degree	$75K+	employed full time	atheist / agnostic	0 (1 on the way)
P13	39	graduate degree	$50K-$74,999	employed part time	nothing in particular	1
P16	35	-	-	-	-	1
P17	35	graduate degree	$50K-$74,999	self-employed	agnostic	1
P18	28	college degree	$75K+	employed part time	nothing in particular	1
P19	29	some college	$30K-$49K	stay-at-home parent	agnostic	4 living
P23	27	college degree	$50K-$74,999	employed part time	Protestant	1
P24	37	college degree	$75K+	employed full time	Catholic	1
P27	27	college degree	$75K+	employed full time	atheist	0

engaged in indirect disclosures across a variety of social media platforms; five individuals also had shared about the loss directly to their Facebook networks, often following indirect disclosures. Four participants did not engage in any direct disclosures across social media platforms (e.g., Facebook, anonymous support groups). Six individuals engaged in direct disclosures on support groups where they felt safer, three of whom had also directly disclosed the loss on Facebook. Finally, one participant wrote a blog post about the loss on a platform where she felt anonymous and was not connected to people who knew her physical world identity.

3.3 Data Collection

This study employed semi-structured interviews so that participants could share their own experiences and take part in shaping the conversation. This was important given the sensitive topic of discussion. The first author conducted all the interviews over a video or Skype call based on the participant's preference. The interviews lasted 98 minutes on average (SD = 10, range: 82-114). The audio was recorded and transcribed for analysis. Prior to recording, the goals of the study were shared and participants' permission was obtained to record the interview. Interviews included questions about the participant's experience of learning about the pregnancy, disclosure of the pregnancy and pregnancy loss in computer-mediated and non-computer-mediated contexts, general use of social media, and reasons and processes leading to decisions about particular disclosures or lack thereof. For example, after a participant finished sharing how she learned that the pregnancy would end or had ended, if she had not already said whether she shared the news with anyone, the interviewer would ask probing questions such as: "What happened next? Did you share this with anyone? Did you use any social media to share about this in any way? Tell me about what you did and what your process was like. Why? [referring to what the participant said they did]?" When possible, participants described and shared specific examples and stories. When participants felt comfortable doing so, they showed us their actual posts. Interview questions addressed unintended pregnancy loss, in line with the study's focus. Taking an ecological perspective, interviews did not focus on any particular platform and included follow ups with what was relevant to participants during the course of the interviews. After the interview, we asked participants to complete to a brief demographics questionnaire. In this paper, we report on themes solely related to indirect disclosures, and not on all the collected data.

3.4 Methodological Orientation and Analysis

Methodologically, this work is concerned with understanding how people perceive the socio-technical factors that contribute to their disclosure decisions from *their* perspective. Our approach in investigating these phenomena was interpretivist and phenomenological. The philosophical foundation for interpretive work is phenomenology [11]. The interpretivist approach views reality as socially constructed, and focuses on how the participant experiences the world around them; in order to understand any phenomenon researchers need to understand the meanings people assign to it [81]. For the phenomenologist, the world is one of intersubjectively constructed meanings; as such, understanding any phenomena requires understanding it in lived experiences [51]. Interpretive work does not have a priori dependent or independent variables, instead it emphasizes complex making practices as the situation emerges [40]. As Wilson [81] puts it: "*Phenomenological ideas underlie virtually all of those schools of thought that hold that it is necessary to understand the meaning attributed by persons to the activities in which they engage, in order to understand their behavior.*" Throughout these approaches there is an interest in understanding the lived experiences of people and the meanings they associate with those experiences. With the assumption that these meanings impact behavior, participants are asked to reconstruct their experience within the topic under

investigation [68]. In this work, we were interested in constructed meaning and how participants made sense of their experiences and the social-technical context in which those experiences took place.

Our data analysis was driven by the constant comparative method central to and popularized by grounded theory. The first author applied line-by-line coding "through which categories, their properties, and relationships emerge automatically taking us beyond description and putting us into a conceptual mode of analysis" [76:66]. The analysis started with open coding and identifying patterns in the dataset of 27 interview transcripts, allowing for flexibility and creativity in analysis [76]. As participants referred to indirect disclosures, the first author created codes related to this concept and iteratively allocated them to larger categories. This process revealed that 13 out of the 27 interview participants had engaged in indirect disclosures of pregnancy loss on social media – which is the focus of this paper. Data analysis and collection were hand-in-hand processes, and recruitment stopped well after our analysis reached saturation with all the presented themes. Two authors met to discuss the emerging themes throughout the analysis process.

3.5 Limitations and Opportunities

We report on the reconstructed experiences of participants, who may recall their decision making process in ways that are idealized or otherwise unreflective of their actual decision making at the time. We aimed to minimize this common liability of retrospective interview-based data by asking participants to view and share their actual posts when possible. Furthermore, this study focuses on the experience of women in the United States; investigating potential cultural differences in indirect self-disclosure of pregnancy loss or other socially stigmatized experiences is an area for future research. Specifically, future work can evaluate our findings and refine the Disclosure Decision-Making Framework [4] that we extended to the context of indirect disclosures to investigate disclosure (direct and indirect) and support seeking behaviors in other contexts often associated with stigma (e.g., HIV, invisible chronic illnesses, substance abuse). Future research could also investigate potential links between personality measures (e.g., introversion) and indirect disclosures on social media. While we sought representation from a wide range of ages and experiences, our sample is not representative of American women who experience pregnancy loss, nor it is expected to be with our methodological orientation. Future work could evaluate these findings with representative samples for surveys or longitudinal studies. Such future work could also investigate potential relationships between a variety of attributes and identity facets (e.g., sexual orientation, gender identification, relationship status, ethnicity/race, socio-economic status, pregnancy history, pregnancy loss history), perceived disclosure motivations, and employed disclosure strategies.

3.6 Ethical Considerations

Due to the sensitivity of pregnancy loss experiences, the interviewer adopted Kasket's guidelines [41] for interviewing bereaved individuals. These guidelines provided the interviewer with knowledge about stress levels and their signs that may occur during such interviews, and ways to respond to them. A summary of our findings will be made available on the first author's website as a service to participants and the general public.

4 FINDINGS

We found that participants used several strategies for achieving indirectness, varying based on content obviousness, and on who created and shared the content (see Table 2). We also found that factors guiding indirect disclosure decisions of pregnancy loss on social media were related to the self, audience, platform and affordances, and temporality (see Table 3 and Figure 1). In

Table 2. Indirect disclosure strategies of socially stigmatized experiences on social media. "Created by self and/or others" refers to posts that *may* be collaborative. "Self" refers to participants. "Others" refers to individuals other than participants.

	Content obviousness	Content created by	Content shared by	Example
Strategy 1	Obvious	Self and/or others	Others	Facebook post **by spouse explicitly** announcing the loss
Strategy 2	Non-obvious	Self	Self	Instagram post **by the individual** about staying at home with **no reference** to the reason (i.e., loss)
Strategy 3	Non-obvious	Self	Others	Painting **created by the individual** that **symbolically** depicts the loss is posted on Facebook **by spouse**. There is **no explicit mention** of the loss.
Strategy 4	Non-obvious	Others	Self	A blog post that **someone else** wrote about pregnancy loss is shared by the individual with **no commentary** about her own experience with pregnancy loss or the reason for posting.

this section, we first discuss indirect disclosure strategies and provide examples, and then we report on factors that guide decisions to engage in indirect disclosures on social media.

4.1 Indirect Disclosure Strategy Typology on Social Media

Disclosure strategies varied by (1) the obviousness of the content, (2) who originally created the content, and (3) by whom the content was shared on social media. Table 2 summarizes these strategies with example summaries.

Participants often decided to share content that was non-obvious with respect to pregnancy loss, lacked ties to their own experience with pregnancy loss, or was symbolic. For example, they shared meaningful content (e.g., dinner photo at the night of the loss) without referencing pregnancy loss, or created symbolic representations of their experience (e.g., painting) and shared those on social media without any explicit and obvious explanation. Participants also invoked others (e.g., spouse) to share content on social media. These third party disclosures were sometimes explicitly and obviously about the loss (e.g., spouse announcing the loss on social media) and sometimes ambiguous (e.g., spouse sharing symbolic art). Participants also shared content that others had created about pregnancy loss (e.g., sharing a blog post that someone else wrote about pregnancy loss). They did so without commentary on their reasons for sharing or any tie to their own pregnancy loss experience – thus rendering it an indirect disclosure. Sometimes participants collaborated with a third party (e.g., spouse) in creating the content that was obviously about the pregnancy loss, but did not share it with others themselves, rendering it an indirect disclosure.

Direct disclosures refer to sharing obvious content about the self and created by the self. By instead identifying *indirect* disclosure strategies on social media, we provide a useful understanding of how they are different from direct disclosures while we add to the conceptual clarity of indirect disclosures in the literature. As a result of this analysis, we define indirect disclosures on social media through the strategies we identified in Table 2. Specifically, we conclude that social media indirect disclosures involve sharing of obvious content by proxy, or of non-obvious content by self or others. Content may be created by self or others. Future work

could investigate how potential responders and audiences interpret and perceive content shared via these strategies, and how a poster's chosen strategy informs an audience's response acts. Future work could also explore potential correlational links between one's chosen disclosure strategy and factors perceived to motivate disclosures.

4.2 Motivations Influencing Indirect Disclosures of Pregnancy Loss on Social Media

Figure 1 shows factors participants perceived to be guiding indirect disclosure decisions on social media including factors related to the self, audience, platform's affordances, and temporality. These high-level categories of considerations overlap with four out of six categories explaining direct disclosures of pregnancy loss on social media explained in prior research [4] (see Figure 1); however, as we will discuss, the details in each category differ from those in direct disclosures, thus extending the Disclosure Decision-Making Framework proposed in prior work [4] to the context of indirect disclosures. As Figure 1 suggests, societal and network-level decision factors are specific to direct disclosures. We will return to this comparison in the Discussion section. Table 3 illustrates a summary of detailed considerations
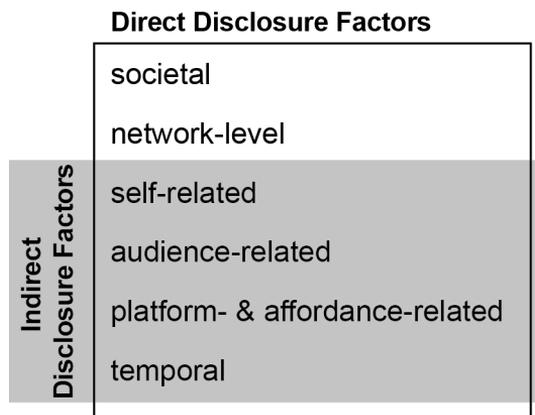

Figure 1. The Disclosure Decision-Making framework illustrates factors guiding direct and indirect disclosure decisions of stigmatized experiences on social media according to participants' perceptions. All six categories inform direct disclosure decisions, while four categories inform indirect disclosure decisions.

Table 3. Factors perceived to inform indirect disclosure decisions of stigmatized experiences on social media.

Self	Keeping a personal record
	Eliciting support and finding similar others
	Self-expression and catharsis
	Solidifying and conveying identity
	Protecting oneself emotionally while sharing the news
Audience	Avoiding judgments by the audience
	Feeling out the audience and testing the waters
Platform and affordance	Seeking anonymity and lack of overlap with everyday networks
Temporality	Amount of time since the event

that participants perceived to have informed their indirect disclosure decisions. In this section we explain how these considerations lead to indirect disclosures of pregnancy loss.

4.2.1 Self-related Factors

Keeping a personal record, eliciting support from certain audience members and finding similar others, self-expression and catharsis, solidifying and conveying identity, and protecting emotional well-being of self while also sharing the news were self-related factors that guided indirect disclosure decisions of pregnancy loss. We describe these motivations related to individual and self-focused considerations below.

Keeping a personal record. Indirect disclosures of pregnancy loss were sometimes motivated by a desire to keep a record of the reality of the experience for the self, without having to put all the information out for others' consumption. For instance, P17 reflected on indirect disclosures on Instagram (Strategy 2):

> *A lot of my posts are during that worst time. I'm posting a picture of something and to me it means a lot more than what the picture is... There's a picture of us having dinner, I know I'm having a miscarriage, and that it's a horrible day and I almost passed out at the restaurant, but for everyone else it's a picture of us eating dinner. I wish I could be more honest about it instead of just put a picture of us smiling. That just feels easier, but I printed the whole feed because to me it's a story that I want a record of, but the real stuff's not even written down with it.*

The same participant also shared happy-seeming photos of a party at which she experienced a second miscarriage. Sharing these photos with no explicit reference to the loss was a private way of capturing what mattered – memories and stories they wished to record. These kinds of disclosures were nearly impenetrably encoded.

Photos are generally believed to be more open to interpretation than text [8] and among our participants, they were used more often than text for indirect disclosures. Sometimes participants shared a photo that reminded them of the time period during which the pregnancy loss happened, or the dark times they had gone through, but explained that their audience would not be able to tell what the image was "really" about. The photos did not obviously depict pregnancy loss, nor did any potential text accompanying them. This content was self-created and directly reminiscent of the loss for the poster but would mean something different to the audience. This allowed participants to meet their self-related need of keeping a personal record and private reminiscence without risking judgments from others (an audience-related consideration) or other unwanted consequences that they feared might result from an alternative direct disclosure.

Eliciting support and finding similar others. Some participants indirectly disclosed the loss to find similar others and find support, perceiving this as a self-related need. By using coded cues, they avoided potential judgement by a broad audience who might not understand their experience while signaling to those who had been through a loss and would be more likely to be supportive and empathetic.

For example, P24 described a post on Facebook in which she had written that she lost somebody special to her one year ago but that she was now blessed with a three week old (Strategy 2):

> *It was like, I want to talk about this but I feel like I'm not supposed to so I'm just going to hint at it. I think I did get out of it what I was hoping for. I had a few people reach out to me, other people that had been through this. It was enough of support and enough of me being able to talk about it. The vagueness and the hinting about it on Facebook, obviously, was enough that some people realized what was going on and the people who wanted to reached out to me and talked about their experiences or asked me about my experience. It was helpful.*

Indirect disclosures allowed some participants to filter their audience and elicit reciprocal disclosures in some cases from invisible similar others. P17 explained her role as an intended recipient:

> *There's definitely things I could see a friend post and I think, 'I bet she's struggling with infertility.' I might reach out. I was also doing that, I was dropping little clues to people to again, connect with those friends that I think will be empathetic and supportive.*

By sending clues in ways that posters thought only those who have been through a similar experience would rightly interpret, participants were able to maintain their desired privacy while disclosing to certain audience members.

Participants also reflected on how their social media connections responded to such indirect disclosures. Their perceptions suggest that those audience members who did not understand the "real" meaning behind the indirect disclosures, either did not respond or responded in a way that confirmed they did not correctly interpret the hint. For instance, when P18 shared a picture of her dog saying how the dog did not like it when she worked from home without stating why she was working from home (i.e., pregnancy loss), some people "liked" the post. P18 said: "*They probably liked it because they liked the picture of the dog...I don't think anyone really knew and nobody probably would have read into it at all.*" However, when the audience included people who already knew about the loss, participants largely felt supported. When people did not find similar others for support, or their message was not decoded, they concluded that the indirectness of the message was the reason. They acknowledged that it was okay because that was the level of risk they were willing to take, and those who would not get the hint were not in the intended audience to begin with. Some audience members who did not know about the loss before, but gauged the meaning behind the posts, reached out to the poster privately and offered their support, or wanted to share their own experiences. Still, the support garnered through indirect disclosures did not satisfy all participants' needs as P24 explained: "*It obviously wasn't enough because I still have that sense of I want to talk about it, but I can't and I'm not.*" The need for direct disclosures and openly sharing about her loss persisted. It is worth noting that this "self-related" need for finding similar others and eliciting support also depends on anticipating supportive audience members in one's network.

Self-expression and catharsis. Sometimes indirect disclosures were driven by a need to express oneself, not to communicate or elicit support. These disclosures were indirect and symbolic with respect to content, and were shared by self or via another person. Some participants created original artistic or expressive pieces about the loss (e.g., poetry, painting, music). On social media, sometimes participants mentioned that they had put up a new post on their blog without saying what it was about or linking to it, so that only those who actively read their blog would know what it was about. Other times, they shared the artwork through others such as their spouse, and some who knew about the loss already or would gather from the post, provided support. For example, P27 said:

> *I had thought about making a post about my experience. One way I grieved was I paint and my husband, he's a musician. He'd play music and I'd paint at the same time. He ended up writing a song for one of our children that had passed away. I ended up painting a painting of the two of us, my husband and I. In the painting, we're looking up at the sky and I made four stars to symbolize our children. My husband said, 'Maybe we should post this on Facebook and let people know what we've been through.' He put it in my mind. I said at the time I wasn't ready for it. I said, 'I don't mind if you post the picture' because he really liked the picture. I was like, 'You can post a picture of the painting if you want. I don't mind that.' He ended up posting the picture and a lot of people really ended up liking it on Facebook. A few of the people that we had told, like our parents said, 'Oh, it's so beautiful. I really like the four stars.' I think people were hinting at it on his Facebook that they supported us and really liked it. That was like a gateway into me feeling a little bit more comfortable sharing our experience on social media. It was a very personal painting to me. The fact that a lot of people really liked it made me feel good. He just posted the photo and said, 'I love this painting that my wife made.' He didn't post anything directly I think more so because I didn't want him to at the time. Maybe he would have if I was okay with it.*

Here, P27 was able to disclose the pregnancy loss indirectly (content-wise) and through her husband via creating and sharing expressive artwork (Strategy 3). When artistic expressions of

the loss were understood and well-received by people who already knew about the loss, participants felt supported and encouraged to share their loss more directly on social media than they did before the indirect disclosure. Indirect disclosures through symbolic expression are a disclosure strategy in non-computer-mediated contexts [32], and catharsis is an established disclosure goal [32]. Here we show how symbolic expression serves indirect disclosure on social media, and how that self-expression relates to needs for support.

Solidifying and conveying identity. A need to be seen and have one's pain and strengths recognized by others also motivated indirect disclosures of pregnancy loss. As P19 reflected:

> *I just remember this one post on Instagram. I said something like, 'It's been really hard, but things are looking better' something like that. That was the most I said about it... maybe a part of me just wants to be known and to be seen. That was the furthest I could go. That was the most I could say about it and still feel comfortable. I guess just feeling good I wanted to share that feeling that day. It was a good day and I was feeling a lot of hope. Things were going to get better, and they were getting better. I took a picture and I wanted to share that good feeling.*

This indirect disclosure (Strategy 2) was not explicitly about the pregnancy loss experience, and there was no obvious reference to the reason the poster has been going through a hard time. However, this type of post still met the need of communicating and reinforcing important aspects of identity, specifically strength and resilience in the context of major difficulty.

Protecting oneself emotionally while sharing the news. Some individuals felt it was important to share news of their loss but were not ready to talk about it. Some had left social media following the loss or were not prepared for an exchange about the loss. For those reasons, they asked others such as a partner to deliver the news of loss. Some participants explained that they were not emotionally prepared to be the point of contact, not able to write out the experience because it was too painful, or expected to break down in conversations. While participants mentioned asking others to share the news via other channels (e.g., email, face-to-face conversations) as well, here we report on disclosures via others on social media.

Some participants did not appear in social settings and left social media after the loss, yet they felt like they had to tell others because they had announced the pregnancy. As P2 said:

> *I took a complete Facebook break while we were in the hospital. I didn't post anything. My husband posted and tagged me so that people I was friends with would also see. We would discuss what was in the post before he posted it, so I was helping him craft. I didn't want to put anything out. It's not that I wanted to be private. I didn't want to be the point of contact. Everything he put out there, he put out for both of us so everyone that I was friends with could see it as well, because we wanted that information out.*

By asking others to communicate on their behalf (Strategy 1), participants tried to protect themselves emotionally while still sharing the news.

In summary, these examples show that indirect disclosures of pregnancy loss were intentional strategies for meeting needs related to the self. Specifically, these indirect disclosures were a means of keeping a personal record, developing a sense of self and solidifying identity, curating a potential safe support network, protecting oneself from more emotional harm, and expressing oneself cathartically without risking a direct disclosure.

4.2.2 Audience-related Factors

Some participants feared that their audience would judge them or their motivations for directly sharing their pregnancy loss, in particular giving the impression that they were "seeking attention" or "fishing for responses." Others feared rejection or other negative reactions to a direct disclosure of the loss. These audience-related factors informed indirect disclosure decisions on social media, as we describe in this section.

Avoiding judgments by the audience. Some participants had concerns around audience judgment or reactions if they directly disclosed the loss; therefore, they engaged in indirect disclosures. For example, P17 said: "*Maybe we send these little clues to people who we think would*

be empathetic and compassionate without opening ourselves up too wide to the people that we think are going to be judgmental." Through indirect disclosures, participants avoided the judgment of some audience members, while also leaving the door open for potential helpful connections.

Similarly, P19 reflected on the lack of trust she felt in her social media networks. She barely knew many of her contacts closely and this made her wary of being judged and rejected. When she wrote an expressive poem about her experience and shared it on her blog (Strategy 2), she simply posted on social media that she had posted a new poem on her blog, without saying what it is about or linking to it:

> *I think there's a fear that I'm not a very good poet. If it's just my close friends that go to look at it, it's like there's no fear of rejection. They will take it to heart no matter how good it is. Since I don't know so many of the people on Twitter and Facebook it feels a little more vulnerable to actually say go look at my blog, or go read the poem I just wrote that's really personal to me. It's probably a fear of rejection, or not being as good as I hope to be.*

She contrasted close friends who would not judge her for the quality of her poem with a large portion of her network whom she thought might critique the quality of her poems. She also gained some degree of privacy and protection by not posting the link or reason for the poem, so only those whom she thought would not judge her would read. Overall, participants explained that direct and obvious disclosures were difficult in part due to concerns around audience judgment and reactions, such as being judged as seeking for attention or fishing for specific kinds of responses; leading to indirect disclosures in some cases.

Feeling out the audience and testing the waters. Indirect disclosures allowed participants to test the waters and gauge what types of responses they *would* get *if* they disclosed directly. This allowed participants to not only speak to the narrower audience who understood their experience and intention without them having to spell it out, but to also gain a better sense of the broader audience without committing to the stigma attached to pregnancy loss. As P5 said:

> *I think that when we really want to share but don't feel comfortable sharing, we flirt with that idea by sharing other things and seeing what happens. Seeing what responses we get. Then we still have the opportunity to say 'Oh, just kidding. No. It was just a quote. I just like this quote.' And not have that stigma of being cheated on or being raped or having miscarriages.*

Indirect disclosure enabled assessing one's social media audience and aided in potential future direct disclosures or rendered future disclosure decision-making processes easier.

4.2.3   Platform and Affordance-related Factors

Participants used a variety of platforms to engage in indirect disclosures. Not surprisingly, support groups and forums explicitly dedicated to discussing pregnancy loss, anonymous or not, were not used for indirect disclosures.

Seeking anonymity and lack of overlap with everyday networks. The ability to post anonymously or pseudonymously was an affordance that enabled indirect disclosure, particularly for those participants who were reticent or perceived a substantial amount of risk. Many wanted to avoid sparking confusion and open questions that might arise on non-anonymous platforms. Feeling more anonymous and a lack of overlap with their day-to-day social networks engendered a sense of safety. While some participants shared content created by themselves, others shared content created by others to indirectly talk about pregnancy loss. These included behaviors such as retweeting a blog post someone else had written or sharing a meme or picture that others had shared online. For instance, P16 reflected on how she felt more anonymous on Twitter compared to Facebook and said:

> *I re-tweeted stories that other women have written about miscarriage but that's like as close as I'd come. It's not my name. On Twitter, I mostly follow people I don't know like writers or whoever. For me, Twitter is sort of low stakes, like I'm not really vulnerable there. It's not attached to my personal public self and so any interaction I have there, I could kind of discount. I just felt like it resonated with me.*

Sharing content created by someone else was a way of indirectly talking about pregnancy loss (Strategy 4). Doing so on a platform where one felt more anonymous provided yet an additional layer of privacy and safety. Participants were able to partially and safely express themselves without risking a direct and obvious disclosure or reciprocal disclosure on their side. While more anonymity was not *required* by all participants for indirect disclosures, it was for some.

4.2.4 Temporal Factors

Sometimes participants disclosed indirectly because they felt too close to the loss experience to directly seek support; they were not ready to process and share their emotions. For example, P18 said she posted a photo of her dog keeping her company as she was working from home, captioning the photo that the dog hated when she worked from home, without saying what the context of the photo was to the audience (Strategy 2). To her the photo was a marker of how she was feeling at the time of the loss, to others – who did not know why she was working from home – it was a photo of her dog and her working from home:

> I don't think anyone really knew and nobody probably would have read into it at all. I don't think at that point anyone could have said anything really. Everything was just awkward because that was pretty soon after. I had support in real life, person to person. It was just awkward and I just hadn't had time to process everything. It wasn't a good time to be seeking support. I think I wasn't ready to really deal with those emotions until I had a baby, until I had what I wanted.

This is an example where the temporal closeness to the loss made it challenging to verbalize thoughts and feelings; but this participant still needed to express feelings associated with the loss somehow. Other times, participants shared emotional expressions that hinted at difficulties, without explicit and obvious references to pregnancy loss. They were able to engage in this type of disclosure as they had started to feel a bit better – due to the passage of time – but were not yet comfortable with direct and explicit or obvious sharing about the loss.

5 DISCUSSION

In this paper we describe how women use social media for indirect disclosures of pregnancy loss and how these disclosures meet psychological (e.g., keeping a personal record) and social needs (e.g., feeling out the audience) associated with loss. The participants *intentionally* disclosed their experiences of loss *indirectly* in accordance with specific psychological and social goals and needs. They deliberately balanced needs for support, validation and expression with those for obscurity, using a variety of indirect methods. Even in cases where their needs for support were not completely satisfied, they still felt in control of the communication and no participants reported feelings of regret for engaging in indirect disclosures or that their strategy broke (e.g., unintended audiences decoding their posts). Yet, we argue that indirect disclosures can help avoid potential regretful experiences that may result from direct sensitive disclosures.

Indirect disclosures are known to be important for conveying stigmatizing information [47], and are not extensively understood in computer-mediated communication, HCI, and social computing scholarship. We contribute a typology of the strategies people employ to engage in indirect disclosures (summarized in Table 2), and describe the factors that are perceived to guide indirect disclosure decisions on social media (summarized in Figure 1, Table 3). We discuss implications of this work for algorithmic detection of distress and supportive interventions. In particular, we explore the possibility of detecting more subtle signals in addition to obvious and direct disclosures in these algorithms and raise questions about what this may mean for future social computing systems and interventions. In doing so, we also raise caveats about needs for anonymity, privacy, and control that may be at odds with such signal detection. The most helpful offerings may be aids that facilitate disclosure and self-initiated, opt-in, support seeking and provision.

5.1 Extending the Disclosure Decision-Making Framework to Indirect Disclosures

We found that factors related to the self, social media audience and affordances, and time motivated individuals to disclose pregnancy loss in an indirect manner. The Disclosure Decision-Making Framework introduced in prior work [4] suggests that these factors, along with network and societal factors, guide decisions to engage in *direct* disclosure of pregnancy loss on social media. Although self, audience, platform, and time shape both direct and indirect disclosure decisions, the ways these factors influence indirect disclosure decisions are distinct from direct disclosures. In what follows, we first explain the absence of network and societal factors in the indirect disclosure context, and then review how indirect disclosures are influenced by self, audience, platform, and time factors in ways that are distinct from the literature on direct disclosures.

Direct vs. indirect disclosures: absence of network-level and societal motivations for indirect disclosures. As noted in Figure 1, there are two categories of direct decision-making factors that do *not* appear in our data about indirect disclosures: network-level and societal. Prior work provides insights and speculations as to why this may be. Specifically, when people disclose due to network-level factors, they are motivated to disclose as a result of reduced stigma and in solidarity with others in their network who disclosed directly [4]; the resulting disclosures are direct and obvious, because their goal is to reciprocate disclosures at the network level with no ambiguity [4]. Similarly, by definition, disclosures guided by societal factors need to be direct in order to be effective [4]. These disclosures often take the form of activism and calling upon one's network for political support on reproductive health issues [4]; their goal is to create change at the societal level, beyond one's audience or network. Although we did not uncover evidence of these two factors in our data about indirect disclosures, future investigations could test our interpretations by remaining sensitive to potential societal and network-level motivations for indirect disclosures.

Direct vs. indirect disclosures: **self, audience, platform/affordance, and temporality-related motivations.** To build a *personal* record, participants shared content that was personally meaningful and directly relevant to their loss but that most viewers would not associate with pregnancy loss (e.g., a photo of working from home with one's dog). Prior research suggests that one function of social media is to keep a personal record and archive meaningful facets of life for the self [67,79,84]; however, these studies did not investigate stigmatized or difficult life experiences and sharing about them on social media. A study about direct relationship breakup disclosures on Facebook observed similar uses of social media for personal record and presentation, where some changed their relationship status and made the status visible only to themselves and not to others [34]. Prior research also suggests that people engage in direct disclosures of pregnancy loss on Facebook to keep a *social* record of their experience [4]. In this work, we showed that some people use social media to keep an encoded *personal* record of their most difficult moments and experiences, and use indirect disclosure strategies to protect their privacy in doing so due to the perceived sensitivity of the content for them.

Indirect disclosures also acted as signals. Abstract images and other signals were emitted with the hope of eliciting support from others (a self-related need) who had experienced pregnancy loss. Finding similar others and social support is a motivator and outcome of social network use [30,43,65], and sometimes people engage in direct stigmatized disclosures on social media to elicit social support from others [4]; but seeking support comes with risks [52]. Prior work describes how teenagers make certain content encoded and understandable only to certain audience members, and not to others; thus enacting privacy in a public space [14]. Similarly, in our study, by indirectly disclosing and signaling *only* to those whom the posters imagined would understand the *real* point of the post, participants sought support without making themselves more vulnerable than they wanted. We found that the ambiguity in social media

indirect disclosures was intentional: If members of the audience did not "get" the message, they probably were not the intended or imagined [46] audience. We see that eliciting social support, a self-related decision factor is closely related to the perception of one's audience as a likely source of support.

Concerns about judgments from the audience, including but not limited to fear of being judged as fishing for support or attention, led some to opt for indirect disclosure strategies as well. We observed that indirect disclosures were guided by a desire to test out the waters and assess their audience's readiness for a potential future direct disclosure. Indirect disclosure allowed participants to get to know their audience better and anticipate the supportiveness of specific individuals and groups. These findings extend previous research on anticipated audience reaction as a factor in direct disclosure decisions [52]. Prior work suggests how anticipating support from the audience is a factor leading to direct disclosures [4]. Additionally, sometimes direct disclosures occur as preventive disclosures [18,44], where one does share information to avoid certain unwanted future interactions (e.g., questions such as "how is the pregnancy going?" in the pregnancy loss context) [4]. Here we show that when such estimations of support and desired interactions cannot yet be made, people may engage in indirect disclosure forms instead of direct.

We find that feeling more anonymous provided an additional layer of safety needed to indirectly share content about pregnancy loss for some. For some participants, this was true even when there was no explicit reference to the participant's personal experience with loss in the post, in an anonymous space. Prior work (e.g., [5,29,77]) has established the importance of anonymity for direct sensitive disclosures or requests for support on social media. It has also discussed how prior anonymous participations (e.g., on platforms such as Twitter that allow pseudonyms) contribute to future direct disclosure decisions in identified contexts (e.g., on platforms such as Facebook) [4]. In this paper, we showed that for some individuals, the risks of talking about a stigmatized experience require some degree of anonymity *and* indirect disclosure in tandem. We highlight that it is not only for direct disclosures of stigmatized experiences that anonymity perceptions can be helpful, but also for more indirect disclosure forms for some social media users who may not be ready to engage in direct disclosures even when they feel anonymous.

Time was also a factor guiding indirect disclosure decisions. Some participants needed to share the news but felt they were too close to the loss and not ready to process their feelings through direct disclosures. Prior research suggests that it is common for direct disclosures of stigmatized experiences such as abuse or pregnancy loss to be delayed [4,59,69]. Here, we see that even indirect disclosures could also be challenging, and sometimes for some participants, the passage of time made it possible to hint at their experience and the difficulties they had endured, without explicitly and directly talking about their pregnancy loss experience. Additionally, in the time after the loss, some had retreated from social media and in-person social settings. These social environments were threatening at that time: participants did not want to be caught off guard and feel pressured into a direct disclosure. Some felt isolated in these settings. For those who had not retreated socially, temporal proximity to the loss still made direct disclosure of loss feel *emotionally* impossible. To limit additional emotional injury, these individuals asked a third party (such as their spouse) to make a direct disclosure. Such disclosure by proxy has also been suggested to be a strategy in sensitive disclosures in non-computer-mediated settings [1,13,26]. These findings indicate the various roles of temporal proximity to the event and where one is in the recovery process as a factor that may lead to indirect disclosures. Future research could explore the variety of disclosure needs and behaviors over long time periods.

We show how the Disclosure Decision-Making Framework developed in prior work [4] that explains direct disclosure decisions of pregnancy loss on social media also explains indirect disclosure decisions. While the considerations within each perceived decision factor are

different for direct and indirect disclosures, we show how the broad perceived decision factors help explain indirect and direct disclosure decision-making of stigmatized experiences on social media platforms by focusing on pregnancy loss as an important example. We provide a systematic and organized way of thinking about self-disclosures on social media that allows us to appreciate the complexity of these behaviors and the tensions that individuals experience when they make disclosure decisions. Future work can evaluate and refine this framework to investigate disclosure (direct and indirect) and support seeking behaviors in other contexts often associated with stigma (e.g., HIV, invisible chronic illnesses, substance abuse) in a systematic manner.

5.2 Indirect Disclosures and Regret

While participants in our study did not report feeling regret after using indirect disclosure strategies, they sometimes engaged in indirect disclosures precisely to avoid the regret that might follow direct disclosure of pregnancy loss on social media. Sometimes indirect disclosures allowed them to test the waters to see how their audience would respond if they did disclose directly in the future.

Prior work provides examples of regretted social media expression and its implications. These include emotional expressions and cathartic content [74,80], as well as audience-related considerations [54,74,80]. Regretful experiences can impact perceptions of ties [82] and can inform future social media behaviors [42,72,82,83]. For example, Facebook users avoid sharing content if they believe sharing would lead to negative consequences [73]. Most recently, Guha et al. have argued for considering social and networked dimensions of regret in the social media context [33]. Taking this literature as a lens to interpret our findings, we extend this body of work by showing how indirect disclosures can be viewed as a strategy that allow people to avoid potential regretful experiences – some of which go beyond self-related considerations – that may result from direct sensitive disclosures (and thus, avoid consequences associated with regret posed by the literature cited above), while not resorting to full non-disclosure as related to sensitive experiences like pregnancy loss.

5.3 Design, Research, and Algorithmic Implications and Futures

Future work could explore opportunities to support indirect disclosure as a way of seeking social support. For example, it may be possible to enable third party disclosures. For some, invoking close friends or partners to disclose difficult news allowed them to share without the emotional burden of follow-up communication that would have ensued had they posted the information themselves. Those who do not have such a proxy might benefit from a service that finds someone to disclose on their behalf or otherwise facilitates the conversation – an area for future research and design. While this work highlights potentials to enrich algorithms with signals of distress in indirect, sometimes image-based, disclosures, we raise important questions about the ethics and value of associated interventions and futures. We discuss these possibilities in the following sections.

5.3.1   Proxy Disclosures

We find that many people who have experienced pregnancy loss want to share their loss directly and explicitly, but are not ready to deliver this news themselves. This is especially true in the time immediately following the loss. Third-party disclosures, usually through spouses who shared the news on social media (Strategy 1), were a helpful strategy for some. While participants in this study were able to have someone else post for them successfully if they wanted to, it is conceivable to think that not everyone who experiences pregnancy loss has someone to provide this voice and role for them (e.g., partners). In fact, extant research confirms that women do not always feel supported or understood by their partners and families after

pregnancy loss (e.g., [22,61]). Additionally, while we did not interview partners, participants alluded that it was also hard for their spouses to engage in such disclosures. Future research could explore ways in which social computing systems can support disclosure needs of those who do not have partners or whose partners are unable or unwilling to assist in the disclosure process. We envision an individual who *wants* to disclose (but is not comfortable doing so directly) might be able to do so with the help of a third party system or a specialized, comment-controlled post.

Art projects provide inspiration for how this disclosure by proxy might be done. As an example, the Humans of New York (HONY), is a photography project where the subject of the photo shares often incredibly intimate and stigmatizing information about themselves to the audience of the photographer, and now perhaps theirs as well by proxy. While this is a different example on several fronts (e.g., the subject does not seek out the photographer), future work or activist research projects could explore potentials for art projects with social media components that help individuals communicate the loss through a third party such as a photographer.

Relatedly, one way third parties have been employed in current technologies is the Facebook legacy contact, drawing on the concept of stewardship [16] where Facebook users can choose an individual to manage their data once they pass away. Facebook recommends that stewards not be close individuals because of the emotional pain these contacts will be going through after the death of the account owner – which may be helpful for those bereaved by a pregnancy loss also. We envision future design and research explorations that allow individuals to choose someone to share the news on their behalf, far in advance of a loss or traumatic event. While designs should be developed in working with relevant user groups, potential ideas include the chosen contact to be able to post on the bereaved individual's profile, and be the primary point of contact for the post, while making it clear to the audience that the account owner did not post the content personally.

Finally, in conjunction with or independent of proxy disclosures, social media sites could experiment with a type of comment-controlled post that is flagged with a message that the poster asks that people hold their comments and refrain from contacting them about the topic. This design choice could help meet the needs of individuals like some participants in this study who used proxy disclosures to protect themselves emotionally (by not being a point of contact) while also sharing the news.

5.3.2 Disclosures, Algorithms, and Ethics

Our findings have implications for socio-technical futures, in particular modeling of psychological behavior and algorithmically generated interventions.

A growing body of scholarly research is concerned with computationally detecting direct and obvious disclosures of distress in social media footprints (e.g., [24]). Social media platforms such as Facebook and Instagram have also explored ways to support those in distress, particularly those with potential suicidal thoughts. For example, in 2016 Facebook added a feature that allows users to flag concerning posts for review by the company. The interface then provides the user with options including sending a private message to the person in distress, or sending a message to another friend to coordinate support. It also notifies the original poster of a friend's concern and provides three options: talk with a friend, contact a helpline, or get tips [19]. The company recently launched artificial intelligence tools to "prevent suicide" by identifying those who show signs of distress [85]. Another example is the Radar app. In 2014, Samaritans – a European charity aimed at providing emotional support to individuals in distress – launched an app named Radar [53,86]. The app monitored Tweets for expressions of distress and alerted users when people they followed posted about suicide or depression. Backlash due to privacy concerns prompted permanent termination of the app.

These algorithmic and intervention approaches largely focus on direct, obvious, verbal disclosures. That said, more recently, researchers have employed machine learning and facial

recognition tools to detect indirect markers of depression from Instagram images claiming to outperform practitioners' success rate for depression diagnosis [60]. We contribute an understanding of how people indirectly disclose stigma and emotional distress on social media by sharing visual and textual content. Rettberg argues that algorithms may be able to detect what Barthes refers to as the "studium" (i.e., the literal content of the photo) but not the "punctum" (i.e., "*the wound*' that makes a photograph poignant to an individual") [62:55]. This may be changing with new computational approaches [60]. Participants in our study shared indicators of both the felt wound (even if it was only discernable to them) along with the literal contents of a photo (be that a picture of a restaurant or a sentence about staying at home). In light of the findings presented here, we ask, how can algorithms understand the emotional experience *underlying* posts and- *should they*? Rettberg writes "Sometimes, our own lists of data and the quantified charts that track aspects of our lives might even give us the sense of punctum that Barthes wrote of seeing in certain photographs, though others would see nothing but a studium." [62:62] If there are conditions under which it is ethical for algorithms to find punctum in photos posted during difficult life events, how can this knowledge be employed to serve users rather than invade their expectations for privacy or bring unwanted feelings (e.g., reminding one of a devastating loss when they were not ready for it) to the surface? One direction for future work could be to identify the language or visual markers of such indirect disclosures and use them as features in machine learning algorithms. This approach could help detect not only overt cries for help, but also the less obvious signs of distress that we found typical of indirect disclosures; however, crucial questions about the efficacy and ethics of this approach remain.

Specifically, many of the participants sought anonymity, privacy, and control—needs that were met through indirect disclosures. We wonder what would be lost if algorithms teased out the distress embedded in indirect disclosures, even if it is with the aim of providing help. We suggest such questions should be considered and discussed in the HCI and CSCW communities about indirect *and* direct disclosures. Are there conditions under which it is ethical for a system that is not *perceived* or *felt* as a support system by a user, to detect vulnerability and/or to offer support or intervene based on their *direct* or *indirect* disclosures? When is it ethical and helpful to use these data to show people content from their past, which they may have intended to hide in plain sight, with the design goal of reflecting on emotions and past? Future studies could investigate relevant expectations and needs from the users' perspective, when considering such algorithms and interventions. Opt-in approaches merit exploration, for example ones that explicitly ask if users want their data analyzed to make inferences about their emotional wellbeing, if they want to be informed of associated results, and if they welcome resulting socio-technical supportive interventions. Opting out should be usable and accessible, and of course it should be clear how these data are stored and distributed. Such a potential approach could experiment with including users in creating their own training datasets with identifying what constitutes a direct or indirect disclosure in their own perspective. We note that these are not proposed solutions, rather speculations in response to our posed open questions aimed at privacy-preserving and ethical algorithmic interventions for wellbeing as a necessary immediate discussion stemming from our results and what they may mean for technological futures. We studied how and why people engage in indirect disclosures of emotional distress and stigma on social media, and brought to light a unique, important, and under-explored social media disclosure behavior. As a result, and in considering what this work means for the ever-increasing algorithmic approaches and interventions to detecting signs of distress through social media data, we pose these immediately relevant and critically open questions and opportunities for the HCI and CSCW communities. We advocate that before jumping to algorithms that detect and intervene with emotional support or trying to reduce the possibility of false positives, researchers grapple with these questions.

6 CONCLUSION

In this paper we investigate the important role of indirect disclosures on social media for women who have experienced pregnancy loss. We report on interviews with women in the United States who use social media and had experienced pregnancy loss, and make several novel contributions to HCI and social computing. We first contribute a typology of indirect disclosure strategies differentiating according to content obviousness, original content creator, and content sharer. We then contribute an understanding of perceived decision factors informing indirect disclosures of sensitive experiences across social media platforms. We find that perceived decision factors are related to the self, audience, platform and affordances, and time. In doing so, we extend the Disclosure Decision-Making Framework proposed in prior work to explain direct disclosures of stigmatized experiences on social media to a distinct disclosure behavior: indirect disclosures. We discuss how people intentionally appropriate indirect disclosures on social media to meet psychological and social needs associated with pregnancy loss. We suggest that indirect disclosures can be viewed as a strategy to avoid potential regretful experiences that may stem from direct sensitive disclosures. We also discuss implications for future research and systems.

Future work should explore specific needs associated with indirect disclosures such as more anonymity, negotiation of emotional trust in social networks, proxy disclosures of sensitive information, and experiments with comment-controlled posts. We discuss implications of this work for algorithmic detection of distress and supportive interventions. In particular, we explore the possibility of detecting more subtle signals in addition to explicit, obvious, and direct disclosures in these algorithms. However, we also raise caveats about needs for privacy, anonymity, and control that may be at odds with such signal detection. The most helpful offerings may be aids that facilitate disclosure and opt-in, self-initiated support seeking and interventions.

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