Sensemaking and Coping After Pregnancy Loss: The Seeking and Disruption of Emotional Validation Online

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Emotional validation describes when one believes that their activities, emotions, beliefs, or other reactions are relevant and meaningful given the circumstance. When people experience distressing, stigmatizing life events, their state of emotional validation and thus their perceived sense of normalcy is often disrupted. Online spaces offer opportunities for coping, managing, and making sense of distress and stigma. In this paper, we focus on pregnancy loss as the context of inquiry and as an important example of a disruptive experience that is also associated with stigma. We examine how online spaces help facilitate or disrupt the process of achieving emotional validation among pregnancy loss survivors. We conducted in-depth interviews with women in the United States who had recently experienced a pregnancy loss. We found that individuals seeking a sense of perceived normalcy after pregnancy loss engage in two forms of validation processes that result in emotional validation – informational and experiential. We identified encounters that disrupt the process of seeking, achieving, and maintaining emotional validation related to: information, designs, algorithms, and interpersonal interactions. We introduce the concept of *algorithmic symbolic annihilation* to describe the representational and emotional harm participants experienced when they felt they were targets of algorithms assuming that all desired pregnancies proceed as expected. Algorithmic symbolic annihilation refers to how algorithms perpetuate normative and stereotypical narratives about phenomena, where what they account for has power and authority, and what they do not account for does not. To aid in seeking, achieving and sustaining emotional validation among pregnancy loss survivors, we suggest designing for 1) *representational belonging* to combat symbolic annihilation and 2) *information avoidance.*

CCS Concepts: • Human-centered computing ~ Collaborative and social computing ~ Empirical studies in collaborative and social computing • Human-centered computing ~ Human computer interaction (HCI) ~ Empirical studies in HCI

KEYWORDS: Validation, emotional validation, informational validation, experiential validation, sensemaking, stigma, symbolic annihilation through design, algorithmic symbolic annihilation, representational belonging, information avoidance, feminist, pregnancy loss, miscarriage, reproductive health, online communities

ACM Reference format:

Nazanin Andalibi & Patricia Garcia. 2021. Sensemaking and Coping After Pregnancy Loss: The Seeking and Disruption of Emotional Validation Online. In *PACM on Human Computer Interaction,* Vol. 5, No. CSCW1, Article 127, April 2021. New York, NY, USA. 31 pages. https://doi.org/10.1145/3449201

1 INTRODUCTION

We all experience disruptive life events at some point, if not multiple times in our lives. Disruptions can take many forms; they can be more on the personal and private side, such as

2573-0142/2021/4 – Art127 $15.00

https://doi.org/10.1145/3449201

experiencing an unexpected loss of a desired pregnancy or being diagnosed with a disease; or they can go beyond our individual lives, such as a public health crisis or a natural disaster. Regardless, disruptive experiences are often accompanied by some degree of loss of control.

Sometimes disruptive events are also stigmatizing, further exacerbating the disruption and its impacts. Stigma broadly refers to an attribute, behavior, or reputation that is in some way socially discrediting [53]. Managing stigma can be challenging; for example, people may find it difficult to express what they are going through, which hinders their ability to find social support and further reinforces stigma [8,53]. The difficulty of managing disruptive stigmatizing experiences hinders people's abilities to make sense of their experiences and can lead to isolation and reduced mental wellbeing [42].

One way to cope with stigma and disruption is to engage in what is commonly referred to as sensemaking. Broadly defined, sensemaking describes how individuals make sense of complex phenomena by constructing mental models that draw on new or existing experiences, information, emotions, ideas, and memories [78,96]. When people experience disruptive stigmatizing events, they often struggle to "make sense" of those events and may feel unsure about their emotional reactions, wondering if the emotions they experience are valid; this is particularly salient when the stigma associated with those experiences complicates one's understandings of their own emotions and reactions. In an effort to validate their emotions, people who are trying to make sense of a disruptive experience often seek narratives of similar experiences to achieve a sense of perceived "normalcy." However, when stigma and a culture of silence is associated with disruptive events, people struggle to find validating narratives, making it more difficult to assess what might be a "normal" reaction to an experience or event [2]. We emphasize that throughout this paper, we do not present normalcy as a universal concept or even an affective experience with shared meaning for everyone. We refer to normalcy as a desired quality among participants and recognize the desire to achieve a sense of *perceived* normalcy as an emotional need, as identified in prior work [52,73].

Social computing systems such as forums or support groups dedicated to specific experiences or conditions can provide spaces for people experiencing similar disruptive stigmatizing experiences or those undergoing life transitions to find support and build solidarity amongst each other (e.g., [25,31,63,70,79]). In this research, we examine the roles that these systems might play in helping individuals experiencing stigma achieve a sense of perceived normalcy through the validation of their experiences and emotions. To do so, we focus on pregnancy loss (commonly referred to as miscarriage) as our context of inquiry. By pregnancy loss we mean an unintentional loss of a pregnancy broadly construed and at any gestational stage. Aligned with feminist accounts of pregnancy and loss [66], we do not focus on the gestational age of loss because research suggests that it does not significantly impact the emotional dimensions of survivors' grief, and further reinforces a medicalized view of loss rather than one that acknowledges the complexity of this experience [76]. The need to cope and grieve after pregnancy loss often leads to a process of seeking validation of one's experiences, emotions, beliefs, and actions in an effort to achieve a sense of perceived normalcy [42,74]. Pregnancy loss is not only an important and powerful, yet under-explored reproductive health complication, it also provides a complicated context to examine what entails achieving some degree of perceived normalcy for individuals seeking this emotion following a loss.

A sense of perceived normalcy is disrupted after a pregnancy loss in large part due to associated stigma [65,74], as well as the common negative or inconsiderate responses to news of pregnancy loss by family, partners, friends, or medical professionals [24,44]; for example, healthcare professionals tend to address clinical needs and not the emotional needs after a loss [41]. Family, friends, or partners remain unsure as to how to appropriately provide support [41,42,74]. Online, one's network often does not know how to respond or provide helpful support, even when they desire to be supportive [11]. Furthermore, with other experiences, such as when one loses a spouse, grief is often an expected emotion – no one will be surprised if a bereaved spouse is extremely sad. Unfortunately, the same open expression of grief is not always expected from pregnancy loss survivors [74,80]; pregnancy loss tends to not be recognized as a type of loss that requires grieving and expectations for "appropriate" bereavement are reinforced by gendered stereotypes [92]. Beyond this emotional dimension, many often feel dissatisfied with the information received or available to them about pregnancy loss or begin the pregnancy journey without enough education about complications that might arise [3,4,44,74].

We conducted interviews with adult women in the United States who had recently experienced a pregnancy loss to examine support needs and coping after loss, and the role of technology in addressing those needs. The analysis presented here focuses on how pregnancy loss survivors used online spaces to find emotional validation, make sense of their experiences, and achieve some degree of perceived normalcy in their coping journeys, as well as how these processes could be disrupted in those very same online spaces.

Our analysis shows that the main motivation for seeking validating information and interpersonal interactions on pregnancy and loss was achieving a sense of perceived normalcy and a state of emotional validation. A state of emotional validation is salient when one believes that an "activity, emotion, belief, sense, or other experience or response" is "relevant and meaningful" given the circumstance [69:358]. While seeking a sense of perceived normalcy was a subjective experience, we identified *informational* and *experiential* validation as two related themes describing the participants' shared experiences and journeys toward achieving *emotional* validation. Participants sought informational validation by actively seeking multiple information sources, converging information across sources, and aligning their personal experiences of pregnancy loss with their unified understanding of the information, striving for a sense of perceived normalcy. They sought experiential validation and a sense of perceived normalcy by seeking interpersonal interactions and others' stories that made them feel seen, understood, and accepted.

In addition to uncovering participants' validating experiences online, we also examined *in*validating experiences and encounters. We identified disruptions to finding and maintaining emotional validation to be related to: information (e.g., information causing distress), design (e.g., pregnancy apps not accounting for loss), algorithms (e.g., ads about pregnancy after loss), and interpersonal interactions (e.g., judgment from others in online spaces); in turn these distinct factors impeded achieving a sense of perceived normalcy and sensemaking. Based on our analysis of validating and invalidating experiences, to reduce harmful information encounters, we suggest exploring how *designing for information avoidance* may help individuals who have experienced disruptive and stigmatizing life events gain more control and agency over the type of content they encounter when using technologies such as support groups or search engines. We also emphasize that algorithms and other technology designs (e.g., apps) should account for the needs and existence of individuals who experience pregnancy losses, recognizing that not all desired pregnancies proceed as desired.

Building on the notion of symbolic annihilation [50,94], previously applied to the context of mobile apps [9], we discuss the absence of diverse pregnancy experiences and limited representations of pregnancy journeys (and loss) in mobile apps as a form of symbolic annihilation

[50,94] that invalidates the experiences of loss survivors. We expand this argument to algorithmic encounters (e.g., ads) that similarly invalidate pregnancy loss experiences; we theorize this as what we call *algorithmic symbolic annihilation.* Algorithmic symbolic annihilation describes the representational and emotional harm participants experienced when they felt they were subject to algorithms assuming that all desired pregnancies proceed as expected. We propose this as a useful concept to examine how algorithms perpetuate normative and stereotypical narratives about phenomena, shaping what constitutes power and authority and what does not. Future research could use algorithmic symbolic annihilation as a critical lens to interrogate other algorithms that engage with humans' identity and personhood. Based on our analysis of disruptions experienced by participants, we propose exploring *designing for representational belonging* [23] as a way to combat design and algorithmic symbolic annihilation. We argue that this design paradigm would help validate the experiences of pregnancy loss survivors and contribute to countering the stigma associated with loss.

2 PRIOR WORK

We begin by providing background information about pregnancy loss and its importance, followed by discussing prior work at the intersection of pregnancy loss and technology. We then shift our attention to theoretical concepts that we draw from in this work, namely sensemaking and emotional validation.

2.1 Pregnancy Loss

Pregnancy loss is a common reproductive health complication that happens in approximately 20% of identified pregnancies in the United States [89]; despite this commonality, 55% of Americans believe it is a "rare" event [89]. It is experienced as a type of loss that requires coping, processing, and grief by many individuals, yet, socially it tends to not be acknowledged as a type of loss requiring grief work [74]. It alters people's sense of self, identity, and social relationships and overall is a life event that disrupts people's sense of control [74]. It is an emotional experience with negative mental health impacts [61] and accompanying difficulty to share feelings such as shame and guilt [68].

Pregnancy loss is often represented as a "non-event" making the survivor feel like an "unperson" in Orwellian terms [81], with "spoiled" identities in Goffman's terms [53] – with many worrying that they can never be "cured" from this spoiled identity [53]. Spoiled identities are those that can cause a person to experience stigma, where stigma is an attribute, behavior, or reputation that is in some way socially discrediting [53]. Pregnancy loss is one such experience associated with stigma [66]. Individuals enduring pregnancy loss often report unsupportive or inconsiderate interactions with healthcare providers [41,74] and others (e.g., family members, coworkers) [74]. More broadly, there are no grief rituals for pregnancy loss in the United States (unlike countries like Japan), further contributing to its absence from societal narratives [57].

In a review article, Fernández-Basanta et al. [43] suggest the overarching metaphor of "*Staying afloat in the storm*" to encompass how people cope with pregnancy loss. They write that "this metaphor symbolizes the emotional storm that these losses represent to parents and how they cope using different strategies to stay afloat." [43]. Coping strategies following pregnancy loss include: searching for the meaning of loss to make sense of and regain the control that was lost due to the loss [21]; sharing about the loss to build connections and feel less alone [21]; looking to the future and seeking closure [64], and avoiding engagement with the loss [1,67]. As noted earlier, pregnancy loss survivors need to construct stories and meaning about their pregnancy and loss [43,74]. Survivors also need to engage in identity repair work to heal from loss [17]. Lastly, achieving some sort of perceived "normalcy" is paramount for coping after loss [17,43,74]. Being able to find validation, whatever form that may take, is an important part of this healing and recovery process; yet remains a challenge [74]. In this paper, we explore how online spaces facilitate or hinder finding validation in the aftermath of a pregnancy loss.

2.2 Pregnancy Loss and Technology

People use technologies such as social media, online forums and groups, and search engines when coping with life events such as loss [8,18], losing jobs [20], or transitioning genders [56] just to name a few. In the context of reproductive health, research has explored needs during and after pregnancy and how technology might be helpful (e.g., [6,14,15,51,84,86,90]) or pregnancy and fertility tracking apps [29,30,60,85]. Research has also examined how people manage health information during pregnancy [54,55] or how parents of preterm infants might track health data [58]. In relation to finding support specifically, prior work has examined to whom pregnant individuals turn to for support during pregnancy [86]; for example, to whom and what people turn to for support tends to be different for those pregnant for the first time compared to others; the first tend to seek out resources like books and healthcare providers, while those who have been pregnant before tend to reach out to their social networks. Much of this literature considers pregnancies that continue as expected and desired, with some exceptions (e.g., [29,30,58]). Next, we shift our attention to scholarship at the intersection of technology and pregnancy loss -- this paper's focus.

Much of what research exploring pregnancy loss and technology has addressed to date includes disclosure and support seeking [8,10,13,61] and how mobile applications account for this experience [9]. For example, we know that internet-based interventions could buffer pregnancy loss's negative mental health impacts such as grief, depression, and anxiety [61], yet we know little about what these interventions might look like. As far as sharing is concerned, many are uncomfortable to share experiences with loss in non-anonymous settings [63]; yet such anonymous participation can be helpful in coping with loss [46]. While anonymous interactions are helpful, they often are not *enough* because individuals can still feel lonely and experience stigma *within* their immediate networks (e.g., family, friends, coworkers) after loss [10], yet disclosing about the loss to one's network of known ties is complicated and never happens for some. In fact, perceptions of difference and stigma are among the top reasons that people do not disclose experiences with loss, which is important as it can inhibit healing and access to support while also reinforcing the societal stigma attached to loss [7]. Furthermore, this prior work highlights how the majority of pregnancy-related mobile apps do not account for pregnancy loss as a possible outcome, contributing to what is described as symbolic annihilation [50,94] through design [9] -- where the experience of pregnancy loss as well as the needs and existence of one group of individuals who use these technologies at some point (while pregnant) are dismissed.

The literature reviewed here provides important insights regarding how people use technologies after pregnancy loss to discuss their experiences and some shortcomings in existing technologies. In the next section, we examine sensemaking in online communities as a theoretical concept guiding this work.

2.3 Sensemaking in Online Communities

Sensemaking describes the active efforts individuals engage in when identifying, interpreting, internalizing, and responding to information in order to address a knowledge gap [22]. Within health informatics, sensemaking is a theoretical frame for describing the purposeful analytic actions that individuals undertake to "make sense" of their health conditions and symptoms [72]. For example, Mamykina et al. describe how individuals engaged in the self-management of chronic diseases utilize three key sensemaking activities: identifying and classifying new information, using inference to develop informed courses of action, and carrying out those actions in their daily activities [72].

While sensemaking can be a very personal and reflective process, research has also shown that individuals engage in collective and collaborative forms of sensemaking that involve groups of individuals co-constructing meaning from new information [49,71]. Online health communities have proven to be a generative context for examining how groups of individuals make sense of health information through processes of collaboration, negotiation, and reconciliation [71,100]. An online health community refers to a virtual space where people living with a shared medical condition can seek support and information [98]. For example, Young and Miller [98] recently studied a private vulvodynia support group on Facebook and found that women dealt with the obscure etiology of the condition by exchanging information and co-constructing an understanding on the condition based on shared experiences and knowledge.

However, the process of seeking support via online health communities can also include tense interpersonal interactions such as public disagreements and the stifling of diverse opinions. Nakikj and Mamykina [77] found that attempts to make sense of a health condition or to seek emotional validation could be interrupted by tensions arising from the conflicting needs of individuals. For example, some individuals seek credible information that can help them make sense of their health condition, while others seek socio-emotional support from individuals with shared experiences. Given these conflicting aims, participants in online health communities may face disagreements over which topics are appropriate for discussion.

We examine how online spaces function as both validating and disruptive environments for pregnancy loss survivors who are seeking to make sense of their experiences and aiming to achieve a sense of perceived normalcy. We align our analysis of participants' sensemaking with the framework proposed by Mamykina and colleagues, which describes how individuals rely on "their general knowledge, knowledge of others and their own past experiences to construct a plausible explanation that can suggest future action" [72:410]. Our analysis was also informed by research [16] that describes sensemaking as a journey or process of recognizing information needs, seeking information, interpreting information, and using the interpretation to address those information need(s). Within the context of life disrupting health events, Genuis and Bronstein [49] describe sensemaking as a journey that begins with an understanding of normalcy as the absence of illness and iteratively moves toward an understanding of a "new normal" that is grounded in the interpretation of various information sources and includes coming to terms with health conditions. As we will see in our results, we identified seeking emotional validation as a key sensemaking activity for coping and healing after pregnancy loss. We review the concept of emotional validation next.

2.4 Emotional Validation

Emotional validation describes the "unambiguous communication" to an individual that an "activity, emotion, belief, sense, or other experience or response" is "relevant and meaningful" given the circumstance [69:358]. Emotional validation avoids the trivialization of a person's response to an event and communicates the inherent validity of emotions through serious attention [69:357].

Emotional validation is also a relational process that involves interpersonal interactions. For the person providing emotional validation, the interpersonal interactions can include actions such as listening patiently, accurately reflecting back the individual's feelings and thoughts, avoiding judgmental responses, respecting differing values, and avoiding any claims of personal superiority [69]. Providing emotional validation also serves as a form of feedback that can encourage change and self-validation, including boosting trust in one's own responses to events [69]. In short, providing emotional validation means communicating to someone that they are visible, seen, and understood.

For the person seeking or needing emotional validation, the goal of the relational process is often to achieve emotional regulation after a significant emotional disclosure, such as feeling understood after disclosing personal rationales for making a difficult decision [45]. For pregnancy loss survivors, emotional validation involves seeking answers to questions like, "Is it *okay* for me to feel this way about my experiences?" or "Am I having a *normal [emotional or physical]* response to what I have experienced?" Furthermore, in addition to seeking validation of primary emotions, validation can also provide acceptance of secondary emotions, or "the emotional response to the emotion" [69:385]. For example, secondary emotions after pregnancy loss include feeling guilty over the jealousy of another person's full-term pregnancy.

In addition to interpersonal interactions, the process of seeking or encountering information related to a personal experience can facilitate or impede one's sense of emotional validation. A state of emotional validation can be reinforced when an individual engages with confirmatory information, defined as information that further supports their activities, emotions, beliefs, senses, or experiences [22]. On the other hand, a state of emotional validation can be impeded when an individual engages with contradictory information that challenges their activities, emotions, beliefs, senses, or experiences [22]. Regardless of whether emotional validation is achieved through interpersonal interactions, information engagements or another source, validation is an impactful emotional state that influences how people cope with and make sense of pregnancy loss experiences [74].

In this study, we categorize achieving the state of emotional validation as a type of emotional need. Prior research [32,33,39] has investigated the important role of emotions and affective states in people's interactions with technologies. We build upon research that has examined how online spaces extend traditional social support networks, including how interactions within those spaces inhibit or facilitate emotional wellbeing [5,19,36,37] to examine how participants seek emotional validation, and what that entails this process for them.

The overarching research question we address in this work is: how do individuals enduring a pregnancy loss use online spaces to seek, achieve, and maintain emotional validation?

3 THIS STUDY

We begin by providing background information about pregnancy loss and its importance, followed by discussing prior work at the intersection of pregnancy loss and technology. We then shift our attention to theoretical concepts that we draw from in this work, namely sensemaking and emotional validation.

3.1 Recruitment

We conducted a series of 9 semi-structured interviews with individuals who had experienced pregnancy loss within the past two years, lived in the United States, were over 18, and used social media. Here, pregnancy loss included the unintentional loss of a pregnancy at any gestational stage. Research suggests that the grief and coping experience is not dependent on the gestational stage of the loss [76]. We began with a screening survey that allowed us to purposefully invite participants for the interview study to cover a range of experiences, demographics, and technology use. The screening survey was shared on the lead researcher's social media accounts and from there shared beyond their network.

3.2 Screening Survey

The minimum requirements that qualified a respondent to participate in the study included: having experienced pregnancy loss within the past two years, living in the United States, using social media, and being at least 18 years old. If a respondent did not fit these criteria the survey ended. Otherwise, the screening survey also included questions about the following: online platforms used in general, online platforms used in relation to pregnancy loss, what participants mainly needed after loss to cope and process, the month and year of the most recent pregnancy loss, age, gender (self-describe), race, ethnicity, whether participants were a member of the LGBTQ community, if they had children (self-describe), relationship status, education level, household income, primary religion, and whether participants lived in an urban (more than 50,000 residents) or rural area (less than 50,000 residents). We chose to ask participants to self-describe their gender rather than using pre-existing categories following guidelines in [91] or small scale studies. We chose to ask participants to self-describe whether they have children or not (and how many), because this can be an emotionally charged question for anyone, but especially for those who have experienced pregnancy losses and may have diverse ideological views on the matter. We recommend that other researchers consider this approach in asking questions of this nature.

The survey received 49 responses. Out of all respondents, 17 unique individuals did not use any type of pregnancy-related technology (this was important to us to gather a range of technology experiences), one unique individual had experienced a loss earlier than 2 years ago, and five unique individuals said they did not need any kind of support in relation to their loss experience. This led to 23 respondents who either did not fit our criteria or whose technology use and experiences were out of the scope of our research focus. Among the rest of the survey respondents, we looked to include a wide range of experiences and demographics to the extent possible. The lead researcher then reached out to them with an online consent form, more information about the study (e.g., what tools and devices they would need to have access to during the interview), to schedule the interview. Nine people finished this process and participated in the study; after analyzing these 9 interviews we decided to not engage in further recruitment efforts because we were able to see recurring themes across data sources. Table 1 shows participants' information.

3.3 Interview Overview

In addition to interview questions (described below), interviews consisted of several activities for which participants used papers and a pen to respond to our prompts, as well as a mobile app prototype (Not Alone) developed in prior work [12] that we used as a probe to uncover other issues relevant to technology and pregnancy loss that may not have surfaced in other parts of the interviews.

Table 1. Participant information. Responses to gender, race/ethnicity, and children were open-ended. For others, we used pre-defined choices with an option to self-describe.

Participant	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**
age	31	34	42	32	37	30	39	31	37
gender	female	female	female	female	female	woman	female	female	female
race	Caucasian	Caucasian	White	Caucasian	Caucasian	Black	White	White	white
ethnicity	White	adopted	Ashkenazi Jewish	Jewish	White	Black American	White	White	White
LGBTQ	no	no	no	no	no	yes	no	no	no
children	N/A	2	1	0	1	N/A	1	1	0
relationship status	married	married	married	married	single	married	married	married	married
education	graduate degree	graduate degree	college	college	some college	graduate degree	graduate degree	graduate degree	college
income	$75K+	$75K+	$75K+	$75K+	$30K-50K	$75K+	$75K+	$75K+	$75K+
religion	Christian	Catholic	Jewish	Jewish	Catholic	Atheist	Agnostic	nothing	Atheist
rural/urban	urban	urban	urban	rural	urban	urban	urban	urban	urban

Interviews were 92 minutes long on average (range: 80 – 104 minutes), and took place using participants' preferred method as long as they could see our screen when we shared it with them. In pilot interviews, we shared the link to the Not Alone prototype with participants instead of sharing our screen with them. That approach proved to be difficult to facilitate; for example, participants would not know what to click on. While issues like that are important to fix, here the prototype was used as a research instrument and a focus on usability issues was not relevant.

3.3 Interview Guide Overview

Interviews included four phases. The first phase began by asking participants to share what their life was like when they found out they were pregnant and what followed. We then asked them to engage in activities where we asked them to illustrate with words or drawing on a piece of paper their general social media use, followed by the same activity but focused on technology use during pregnancy and in relation to loss. We made explicit that others' understanding of their submissions does not matter as they will explain them to us so that we can understand. This activity allowed for flexibility and reflection during and after production by participants. Similar methods have been used in studies about pregnancy support networks and social media use by LGBTQ people [38,86]. We then asked participants to send photos of their work to us once they were done and asked them to describe them in detail while we were both looking at them. They did so according to their method of choice (e.g., text, email, message feature of the software we used to conduct the interview).

The second phase specifically focused on understanding support and coping needs after loss and how those needs were or were not met, along with any attempted technology use to meet those needs. The third phase included questions about an ideal support system in relation to pregnancy loss facilitated by a similar activity where participants used paper and pens and described them to us in great detail afterwards. In the final phase, we went through the different pages of the Not Alone prototype to gather participants' reactions about features that a technology designed for pregnancy loss coping may have, and to elicit needs or concerns that may not have come up in prior phases of the interview. This paper does not report on all the themes emerging from these data (e.g., those relating to the final phase focusing on the prototype) therefore we do not provide details here, yet we included a summary of our whole data collection process here for context. The first author conducted all the interviews.

3.3 Analysis

The interviews were audio-recorded and transcribed. After an initial code set was created by the first author, the first and second author engaged in an iterative process of discussing and refining codes. This refined set of codes was then provided to a coder to familiarize themselves with, ask any questions, and engage in discussions. Once trained, the coder applied the codes to the rest of the data while also adding new codes when they emerged as related to participants' needs after pregnancy loss in addition to perceived benefits and challenges in using social technologies in relation to loss. The coder created no new codes that would not fit under the existing larger code categories. Once the data was coded, the first author sorted them into larger themes. Then both authors discussed and refined the themes and addressed any interpretive convergence and divergence until agreed upon interpretations of the themes was achieved [28]. As a reminder, in this paper, we report themes in response to our research question focusing on emotional validation: how do individuals enduring a pregnancy loss use online spaces to seek emotional validation?

3.3 Limitations and Reflections

We focused primarily on the pregnancy loss experience in the United States to scope this study. The larger context within which pregnancy loss is experienced shapes survivors' experiences. We encourage researchers to explore similar topics in other parts of the world. While we tried to interview a more diverse group of individuals, our sample was primarily white, cisgender, heterosexual, married, educated, urban, and with income above $75,000. This is a limitation because pregnancy loss, similar to other health conditions, impact marginalized individuals in disproportionate ways [99]. While this study contributes to our knowledge about social technologies' roles in the process of finding validation and sensemaking after pregnancy loss, it is likely that individuals who possess one or more marginalized identity facets experience unique challenges that were not captured in the loss experiences of our respondents. In an act of research transparency, we acknowledge that future work could greatly benefit from examining the validation processes described within a more diverse respondent group; nonetheless, we do believe that the findings presented are conceptually significant and grounded in the lived experiences of women who have experienced loss and whose voices deserve to be heard. We hope to build upon this work in the future by exploring ways we can reach to more diverse populations.

Rather than achieving validity through enumeration, interview-based qualitative studies with small sample sizes support interpretative claims through the careful selection of respondents who share meaningful experiences through detailed interviews [34]. However, we recognize that a sample size of 9 individuals, even when data is rich and interviews are in-depth, is a limitation. Given this limitation, the findings are not intended to be generalizable or definitive, rather they are presented as generative conclusions that provide conceptual language for describing validation processes. However, we heard similar themes throughout the interviews, which make us confident in the validity of the themes we report on here.

4 RESULTS

We report on our findings in two main themes: 1) how pregnancy loss survivors use online spaces to make sense of their experiences through seeking, achieving, and maintaining emotional validation when coping with pregnancy loss; and 2) how these emotional validation processes may be disrupted within the same online spaces that also afford seeking, achieving, and maintaining it. We describe how two external validation processes (i.e., informational, experiential) helped participants make sense of their pregnancy loss experiences and move closer to achieving a sense of perceived normalcy and a state of emotional validation.

4.1 Engaging in Sensemaking and Seeking Emotional Validation When Coping with Pregnancy Loss Experiences

Perceived lack of control is a common impact of many disrupting life events including pregnancy loss. Prior research shows that individuals who experience health crises often manage the feelings of anxiety, fear, and lack of control by engaging in activities that help them make sense of their health conditions and symptoms [72]. These sensemaking activities include searching for additional information, creating causal connections between personal actions and health outcomes, and identifying contextual factors and trends from clinical data such as test results, among others [88]. In this study, the participants' accounts revealed a common purpose of engaging in sensemaking activities to achieve a sense of perceived normalcy. This "norm" did not have a single definition for all participants. What each individual interpreted as the norm was based on a synthesis of their personal experiences, the type of information and personal narratives they were seeking online, and their offline support networks.

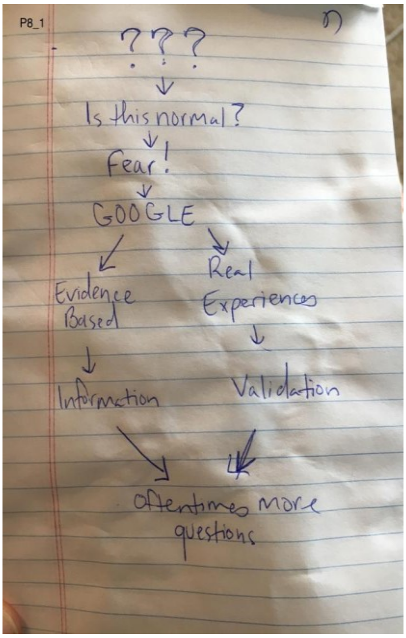
In their study of how individuals make sense of life disrupting health symptoms, Genuis and Bronstein [49] identified a form of *socially constructed* normalcy that is achieved by identifying with the experiences of others who are facing similar health challenges. Their study found that women who were experiencing menopause "expressed validation and relief when they perceived themselves to be normal within the context of other women" [49:756]. Our analysis also found that a key sensemaking activity when dealing with pregnancy loss was seeking online spaces where one could socially construct a sense of normalcy in relation to the experiences of others. For instance, P4 simply shared how the mutual sharing of experiences online helped her make sense of her own experience: "*I found that sharing and the people who shared it made it easier for me to understand what was going on.*"

Further, P8 validated her experiences by socially constructing a sense of normalcy through a synthesis of information she gained from Google, forum responses, and conversations with her husband (see Figure 1 in which P8 depicted how she used technology to cope with her pregnancy loss experience).

P8 noted: *"So I put those question marks because that's how I would feel sometimes, like just all of these questions. Then I would ask myself, I would like ask out loud to my husband and whether is it normal about the loss? Is it normal about the pregnancy? So I said, is this normal? Because I think I was seeking more information. I guess it's so much about pregnancy, especially loss, you just lose so much control in your life…So I think I would just, I wanted to normalize things a little bit. So I think that's what I was doing whenever I had a question, was wondering is this something that I can almost compare myself to, to know if this is the norm. So then I put the arrow down to fear [see Figure 1] because that's what I would worry about."* Similarly, P7 shared how she used a combination of Google and forums to assess if her body's reactions were normal: "*… Just the other day, I weighed myself, and I was like, 'Oh, man, I feel like I'm gaining a lot of weight. I should Google real quick* *what the normal weight gain at this stage is.' Things like that, that I probably could have gotten from a forum, but it was quicker to Google it. But then, I went to the forum, and I was like, 'Oh, I gained this much weight. What do you guys think? Should I call my doctor about it? Is it no big deal?', and then everyone reassured me...It's like the Googling and the forum in combination.*"

On another note, P5 reported that her participation in a pregnancy loss Facebook group validated her experiences by allowing her to feel like pregnancy loss was more "normal" than she had thought: "*So it kind of normalized it, in a way. It opened up the conversation and everything.*"

Others described how participating in pregnancy loss Facebook groups helped them come to terms with the notion that their feelings of sadness and despair are valid, okay, and "normal". For example, P4 shared: "*I was spending my time in pregnancy after loss groups, which, there's a lot of women who experience miscarriage who talk about their experience and offer general support. So, instead of focusing and trying to conceive when I knew I couldn't for at least two weeks, I wasn't ovulating yet, I spent a lot time there, just to know what was normal. Was it normal to feel that sad over something that wasn't a baby yet and didn't have a heartbeat yet. But on the other hand, the second you get a positive test you ... Someone explained it as, it's a broken promise. You become a mom the second you see 2 lines not when you have the baby. I felt like maybe I shouldn't be feeling as sad as I was, and went into that it was completely normal and that it doesn't matter what stage you lose a baby, that is can hurt just as bad.*"



Next, we describe a) how individuals enduring pregnancy loss seek informational validation by consulting varied information sources, and b) how individuals enduring pregnancy loss seek experiential validation through others' personal narratives. Through a sensemaking lens, we show how a complementary relationship between informational and experiential validation helped individuals coping with pregnancy loss achieve emotional validation and provided a sense or perceived normalcy.

Fig. 1. This image shows is P8's drawing of how she used technology to cope with pregnancy loss. This is an illustrative example of the complementary roles of achieving informational validation (e.g., accessing evidence-based information) and experiential validation (e.g., through others' stories) in coping with pregnancy loss and achieving emotional validation, and as a result a perceived sense of normalcy.

4.1.1. Informational Validation: seeking information to make sense of one's own experience and achieve emotional validation

First, seeking and finding evidence-based or practical information to assess one's own experience was sometimes useful and addressed some fears participants faced.

For example, when describing her concept map (See Figure 1) P8 said: "*But especially after having the two miscarriages, for the third pregnancy I was just so much about like, I don't want this to happen again. And just the information seeking to see, to kind of calm my fears a little bit. So I went down to Google and it's all in capitals. I think I did Google a lot. So then there's the two paths and I think two paths, the one on the one side was that the evidence based in terms of, you know,* *things that were actually true like journal article or something that had qualitative and quantitative research and things that I can actually get information and that, in some ways, that led to this down arrow of information, which I think was helpful for me at times.*" This quote illustrates the emotional dimensions of seeking and finding informational validation, with the potential of calming fears and anxiety.

The need to seek additional evidence-based or practical information often stemmed from lingering questions that were unaddressed by medical professionals. For example, P9 shared fears she experienced after being sent home without the detailed clinical information needed to understand the process of miscarrying at home without medical supervision: *"… I needed to know what I was about to experience…I needed to know what I was facing medically, concretely. When you're sent home to miscarry on your own, it's scary, you don't know what you're about to experience.*" Here we see how the interactions with medical professionals were inadequate and contributed to feelings of fear of uncertainty, prompting P9 to turn to online communities for a concrete medical information and support.

P9 further described her engagement with two Facebook groups focused on loss and infertility: "*My story is that five years ago, we learned that we… My husband and I, we were trying, we got pregnant right away, and then we lost the pregnancy at 12 weeks. And I was blindsided because I just didn't like…especially being in a more urban area and being in my 30s, a lot of people that I know in my life do not want children by choice. And so I didn't have a lot of people to talk to because we both want a child and also had just had this loss. So that was when I first turned to kind of online sources to find out how normal this is, what does it mean, that kind of a thing. So those two are both on Facebook and they've been like a real lifeline throughout all of this. It's a way to learn from other people about whether your experience is normal, what you could possibly be doing to fix things. It's huge.*" P9's account so eloquently describes how she was not expecting to experience the loss, in part shaped by visible reproductive choices and experiences around her and the invisibility of loss. Unsure as to how "normal" her experience was, she turned to online spaces.

As another example, P1 shared how asking questions and seeking information from others helped them make sense of their own experiences with respect to the physical aspects of what they were going through: "*I had questions about the healing process, as in the physical healing process. Because I was having pains I never had before and especially when I was having my period. I went from having no cramps ever in my whole life to having huge cramps and mood swings and all sorts of things that I had really no experience to draw on. So that's what my questions were, and from what I remember from the answers, just a lot of people felt the same way.*"

Further, P6 said: "*So, earlier on forums when I just cared what other people believed or other people were even doing or you know, what made people feel like they were being effective, you know it sounds really weird to say it that way. But I just cared to see what people believed because these aren't conversations you have in every day life.*"

What we refer to as information validation exemplified in the quotes above, includes but is not limited to scientific information that allowed participants to compare experiences with others (i.e., be that participants in clinical studies included in a scientific article or communicated about by a medical doctor, or information available through similar others). For instance, participants also learned about what their symptoms might mean through reading others' experiences in online forums. The bottom line is, these activities were about finding information that could have the function of easing anxiety and fear and thus accompanied emotional outcomes – allowing people to achieve emotional validation as a result.

When seeking informational validation, participants converged existing information from their personal experiences, formal (e.g. qualitative and quantitative research) and informal (e.g. pregnancy apps) sources [22], and offline (e.g., medical providers) and online support networks (e.g., others with loss experience in online spaces) to create a unified understanding of their individual pregnancy and pregnancy loss.

4.1.2. Experiential validation: seeking emotional validation through hearing others' stories

Another way that participants made sense of their experience was through comparing their own feelings with that of others who have experienced loss in online spaces such as forums. For example, seeing others also experience fear helped P8 feel that her emotions were valid and "normal." However, because each experience is unique, this route also led to questions rather than a full closure of any sort.

On this note, while describing her map (shown in Figure 1) P8 said: "*But then on the other side was the real experiences and that's what I would find through some of those forums or some of the things…it led to in some ways validation. Real people with real experiences…Even if their experiences don't match up with yours, it would help calm my fear in some ways. It wasn't the information, but it was Oh, other people are freaking out too, or have freaked out, and I'm not alone in that way. So my fears are validated. And then the same thing would come up oftentimes there's more questions because ultimately I am me, and nobody's had the exact same experience. So, it's not the same. So, I think they both helped calm the fears in some ways, but ultimately I was still left questioning*." Because pregnancy loss is an experience that is often dismissed in our society [66,74], feeling like one's experience and emotions were valid was not a given. Through engaging in online spaces participants were able to seek this validation to some extent.

Relatedly, P1 shared her experience in a pregnancy loss-related Facebook group: "*Everybody's very funny, so they're putting funny memes up and … but they're real as well. People will talk about oh, my friend's having a baby shower and I know this is horrible to say, but I feel awful going. And it's a safe place to say that, because a lot of us going to baby showers might be thinking that and then feeling awful for thinking that when really, it's not about feeling bad for the person who's pregnant, it's about feeling how you're feeling and acknowledging it.*" In this case, the participant was able to validate and process complicated emotions related to seeing others' pregnancies proceeding in a healthy way while they had experienced a loss and were trying to cope with that while trying to conceive again.

Similarly, P9 noted: "*I needed to hear people's stories… basically I needed to see that I wasn't the only one going through this...*" On a similar note, P5 shared: "*And they [members of the support group] were like, 'well don't feel bad that you feel this way, because it's normal.*" Emotional validation was relevant when one was coping with the emotional dimensions of the loss experience rather than those more on the informational side (which also had emotional outcomes as described earlier, but required information seeking rather than other types of social interactions such as asking about others' feelings).

Reading others' stories had an added benefit with respect to shifting participants' perceptions about pregnancy outcomes, and specifically the prevalence of loss, therefore shifting perceptions of what the "norm" might be, making them feel less alone in what they experienced. On this note, P5 stated: "*when I first started, I was one, surprised at how many people there are, members who are in that particular group. It was shocking in a way. It seems like, everybody … Again, you know even personally, family and friends and such, have experienced loss. But just seeing it, very similar stories, reading over and over again, it's really shocking to me, because I wasn't aware that it was so prevalent, I guess, in a way. Again, I knew people who have gone through it, but, one, you never really* *think that you're going to, and you think being pregnant, everything's great and everything. But, again, you see that that's not only not always the case, it's probably even more prevalent than carrying through a successful pregnancy, from what it looks like from my understanding. So it definitely opened my eyes to how challenging it was.*" P5's own challenging experience with loss was not enough for her to truly come to terms with and believe that this was a challenging experience. It was only after seeing countless others experiences online that she truly felt that, contextualized her own experience within the broader repertoire of experiences available to her online, and was able to achieve some experiential validation, and thus feeling more emotionally validated.

In this section, we described efforts participants took to achieve a sense of perceived normalcy through emotional validation. Through our analysis we highlight two forms of validation described by the participants: informational and experiential validation. We describe informational validation as converging information from personal experiences, formal (e.g., evidence-based research) and informal information sources (e.g., online support forums) [22], and offline (e.g., medical providers) and online support networks (e.g., others with loss experience in online spaces) to create a unified understanding of one's individual pregnancy and pregnancy loss. We describe experiential validation as seeking others' experiences with pregnancy loss and their emotional responses to the experience to assess and compare one's own emotional response and reactions in relation to pregnancy loss. Taken together, participants achieved emotional validation through distinct processes we describe as informational and experiential validation to aid in sensemaking processes in relation to pregnancy loss.

4.2 Emotional Validation Disruption

While participants leveraged search engines and online support forums and groups for both informational and experiential validation, these efforts were sometimes disrupted and resulted in emotional harm and invalidation. We identified disruptions to finding and maintaining emotional validation to be related to: information (e.g., information causing distress), design (e.g., pregnancy apps not accounting for loss), algorithms (e.g., ads about pregnancy after loss), and interpersonal interactions (e.g., judgment from others in online spaces); in turn, these distinct factors impeded achieving a sense of perceived normalcy and sensemaking. The first disrupts informational validation and the latter three disrupt experiential validation.

4.2.1. Informational validation disruption: information-related disruption

Participants noted how sometimes content in forums did not lead to the informational validation they were seeking because they encountered unwanted, low quality, or hurtful information.

For example, P6 shared how she turned to pregnancy loss forums to find information and support. However, after encountering misinformation she chose to stop her participation: "*I did look at the forum but they drove me nuts and I stopped looking at them. They're a lot of misinformation.*"

On a similar note, P1 described how she turned to BabyCenter blogs and forums to ask questions, but she faced a similar problem with seeing information that she did not think were "factual" and credible: "*As far as Baby Center, I used that a ton right after the ectopic pregnancy because I didn't know who else to ask questions for. There isn't a lot in the baby books you buy about ectopic pregnancies, just ... there's really nothing. There's stuff about miscarriages, but going through ectopic pregnancy and the surgery that I had to go through, I found a lot of helpful things in the Baby Center, but on the other hand you also find things like things that don't seem to be helpful, too,* *because oh... is it real fact? A lot of people are just saying stuff on blogs, too, it seems. So, it's trying to read things with a grain of salt so that you don't work yourself up and start over analyzing and over micromanaging what you're using these things for.*" The impact of encountering misinformation or non-credible information on participants was that they did not find the space productive and useful to meeting their needs, that if met, would have provided them with much needed emotional validation that brought them to the space in the first place. In response, their engagement reduced.

Others noted experiences with feeling more worried as a result of encountering certain content. As P8 said: "*I would say when something was coming up, so I wouldn't just go through and just read through like random things, but say there was something that I was worried about, you know, 'Is this normal?' so you google something and they bring you to, you know, one of the websites on, like, whattoexpect.com or The Bump or something, and then read through on a certain topic...you know ... you want to hear that it's okay. You wanna hear that, you know, especially if I had a question like 'is this normal?' You want to hear 'yes, it's normal.' Then you hear stories of when it's not normal (laughs) and you know someone who did end up ... you know ... having a miscarriage or something so that was hard."* The desired validation experience was sometimes disrupted when participants found information that when applied to their individual situation, produced feelings of anxiety about what the future might hold for them – leading them to conclude that what they are experiencing is perhaps "not normal," however they assessed that normalcy.

Other times perceptions of rarity – developed through reading scientific articles – of one's experience made information gained unhelpful, leading to more questions:

For instance, P8 continued: *"But then after you become a statistic like losing two, and then sometimes the research doesn't mean as much anymore because you realize that you can be a two percent. So, I think in some ways it calmed my fears, in some ways. But down here at the bottom with the conclusion is oftentimes there were still more questions, so I don't think that calmed me too much."*

Participants further shared experiences in encountering content that was not validating, but also further hurtful. For instance, P2 stated: "*The main groups that are about loss. Someone's like, 'I've had three miscarriages and now there's a happy healthy heartbeat. I'm 22 weeks along.' It's like that's great but there are so many people here still sitting and struggling, no one wants to just be smacked in the face with it in a loss and infertility group, especially not in a loss group, that makes it worse because there could be someone that very day who's joining that group having a loss. Like me, when I joined a random loss group on Facebook the same time I was looking into that podcast, the first thing was, 'I lost my baby two years ago today, but here I am 33 weeks.' I was like, 'Shoot.'*"

While gaining information was crucial to achieving informational validation and thus some sort of anticipated, desired, and perceived normalcy, participants experienced disruptions to that end when the accessed information was not reassuring, was not credible, or did not represent the particular experience of the participant seeking that validation. We categorize this type of disruption as information seeking-related disruption. We demonstrate the emotional dimensions of this disruption and how it impacts emotional validation states.

4.2.2. Experiential validation disruption: interpersonal interactions, designs, and algorithms

We identified judgmental and unsupportive interactions as the main type of disruption related to interpersonal interactions that hindered experiential validation and thus emotional validation. We also identified disruptions related to designs and algorithms, both of which contribute to the symbolic annihilation [50,95] of pregnancy loss experiences.

Interpersonal interaction-related disruptions of experiential validation. While online spaces carried benefits such as finding experiential validation, differences in opinions, unsupportive interactions, and judgmental comments were still a challenge for those seeking those benefits.

For example, P5 said: *"And then I guess, as far as the challenges, because we're all in different places, different walks of life and everything, we have different opinions on a lot of things as well. So, you know, these are again very strong opinions and such and everything. Not so much with those Ava loss groups [a Facebook support groups for owners of Ava bracelets for fertility tracking] and everything, that's more or less just a helpful group, but like a lot of the mom groups and stuff you know the breast feeding versus formula feeding, things like that... difference of opinions can turn into arguments and such and everything."*

P2 provided another example: *"And you get cries for help on there and then people being judgmental and rude in return."* When people take the difficult step to seek help and receive unsupportive and judgmental reactions from what is anticipated or desired to be a supportive space, they would be less likely to consider that as an option to find help in the future and their wellbeing can suffer.

While some noted that requests for support were faced with negative reactions, others noted that such reactions were often when one was seeking information to soothe their anxiety about their pregnancy or individual condition. For instance, P8 said: *"I think a lot of that was maybe for some of the questions they have, I'm sure if there, and I probably did read through some things with the losses about like, what was it like to have two losses and that sort of thing. I don't think there was judgment in those, but I think there might've been judgment in things like, ...can you eat this certain thing while pregnant...Whereas, I guess that's an example of something that I look for more information, like when I'm talking about evidence based versus not, like I would want maybe a doctor to say, no, you can't eat this. Whereas if you go to a forum, then you get some people who say, yes, I ate that all through pregnancy. Then you get some people who say, I can't believe you're doing that to your body, that's harmful for you. And you say you get those like online trolls in some ways."* Thus, in the process of seeking information that would validate their experiences, the participants also encountered judgmental reactions that resulted in negative emotions. Specifically, such reactions can evoke feelings of guilt and self-blame, which are already common among individuals surviving a pregnancy loss [68]. They can also make it less likely for those who are in the interaction to engage in the future and can have chilling effects for others' participation who are learning about the community [35]. This is an example of participants preferring to receive information from a medical provider compared to others in online spaces due to such experienced or observed judgmental responses from "online trolls".

Design and algorithm-related disruptions of experiential validation. Participants noted how sometimes the ways technologies were designed and their embedded assumptions that all pregnancies proceed in a healthy and desired way were harmful and disruptive to finding or maintaining experiential and as a result emotional validation.

For example, P7 shared her frustration and the experienced harm both from in-person social interactions ignorant to pregnancy loss as a possibility, and mobile pregnancy-related apps she used: *"But I remember, I have this one colleague who got convinced like, 'It's a baby palooza here. Everybody watch out. Everyone is getting pregnant around here. Everyone's getting pregnant, so easy around here, wonder if there's something in the water, ha, ha, ha.' And I'm like, 'Not everyone. Not me.', in my head. And, I'm telling that little story, because those apps made me feel like that. When I was like, 'Thanks for the additional reminder that that baby doesn't exist.'..."*

P7 further elaborated how in spite of engaging in privacy-preserving activities to avoid ads related to pregnancy such as using incognito modes, she still got ads that assumed she was pregnant anyways – which was undesired on two levels: She had privacy concerns to begin with even if the loss had not occurred, and she experienced emotional harm once the loss did occur due to insensitive ads: *"I was getting ads for maternity clothes. I was just like, 'Oh, please stop.' And I tried ... I was really careful whenever I search for any pregnancy related information. I do it in incognito mode, I really tried very hard to not let that stuff infiltrate... The apps, and also in combination with all of the various ways that the internet knew I was pregnant, there's no way to tell your app, 'I had a miscarriage. Please stop sending me these updates', like, 'this week, your baby's the size of a banana or whatever.' There's no way to stop those."* P7 continued: *"I remember with the Ovia app, I just had to delete it. I was like, 'This thing is making me really mad.', and then when I reinstalled it, 'cause I got pregnant again, I was like, 'I wonder if all my old information is in there.' And the app thinks I had a three-month-old. They're like, whatever name I put in there, a period or something, and it was like, 'Should be starting to roll over now or whatever.' I'm like, 'No.' ...I wasn't signed up for a million things, but I know a lot of other people that were signed up for a million things, and you get these emails forever."* In addition to harmful ads, participants noted how apps they used to manage the pregnancy that was later lost, were inconsiderate of pregnancy losses by sending notifications, updates, prompts, or emails that assumed the pregnancy was healthy and in-progress. They noted how these apps did not provide a sensitive and clear way to report the loss or keep one's data that may be needed if one wanted to try to conceive again or were pregnant in the future.

On a similar note, P8 shared her frustration with an app that did allow her to log a loss: *"On those you have the option of marking that you've lost a pregnancy... So, you can do that. So I would do that and say okay I lost the pregnancy, I would delete the app. But, sometimes you still get emails like 'you're 12 weeks pregnant now.' Well, no I'm not (laughs) I don't have a baby anymore. So I would unsubscribe and everything, but that was always ... that was hard to get. And sometimes they would even continue, like something that wouldn't come as regularly. So it would be like much later and they're like 'oh, you know you're close to giving birth.' I'm like no I'm not. It's hard."* Here we see while this app had a feature to log a loss, it was still harmful because the participant's attempts to unsubscribe from their updates and emails that still assumed that the pregnancy was in-progress and healthy were unsuccessful.

Furthermore, participants recounted experiences with ads they encountered after pregnancy losses and described how they were emotionally harmful and invalidated the existence of their experiences. For example, P9 shared an experience with ads she received on Facebook: "*Facebook ads are shockingly blind to the risks inherent to getting pregnant. Facebook bombards you with ads for baby stuff. Depending on your age, if you're a woman, they bombard you first with engagement rings. Then they bombard you with baby stuff and when you've had a loss, the baby ads can feel really not great. I know some women in my group who get legitimately triggered by them. I don't have that but I do find it in poor taste. Or at least, tone-deaf for them not to realize that there's a whole range of experiences women are having out there and just because you're target demographics fits something, doesn't mean you should just be bombarding someone with this information." How* this participant (or others in her Facebook group) ended up receiving these emotionally harmful ads is not our focus here, although an important question. However, here we see that being targeted based on her demographical information available to Facebook was the reason she believed she was a target recipient for the ad. She remarked that this was problematic as it is simplistic and reductive to the diversity of experiences pregnant individuals may have, including pregnancy losses.

Table 2. Examples of ways participants sought emotional validation through two distinct processes (i.e., informational and experiential) in online spaces and how these processes were disrupted in those same spaces.

	Facilitates	Disrupts
Informational Validation	**Evidence-based research that confirms personal understanding of pregnancy loss** (i.e. "*… things that were actually true like journal article or something that had qualitative and quantitative research…*" (P8) **Data produced through self-tracking in pregnancy apps** (i.e. "*I would go in, I would track my symptoms, I was pretty obsessive…*") (P4)	**Evidence-based research that challenges personal understanding of pregnancy loss** (i.e. "*You want to hear 'yes, it's normal.' Then you hear…it's not normal…*" (P8) **Inadequate clinical information provided by medical professionals** (i.e. "*…When you're sent home to miscarry on your own, it's scary…*" (P9) **Evidence-based research that turned personal experiences into statistical accounts** (i.e. *after [the pregnancy loss] you become a statistic*) (P8)
Experiential Validation	**Similar personal narratives** (i.e. "*I needed to see that I wasn't the only one going through this…*") (P9) **Similar emotional reactions** (i.e. "*other people are freaking out…I'm not alone that way*") (P8) **Prevalence of experience** (i.e. "*I wasn't aware that it was so prevalent*") (P5)	**Dissimilar personal narratives** (i.e. "*…their experiences don't match up*") (P8) **Judgmental interactions** (i.e. "*… difference of opinions can turn into arguments*") (P5) **Designs that contribute to symbolic annihilation** (i.e. "*… there's no way to tell your app, 'I had a miscarriage. Please stop sending me these updates'…*" (P7) **Algorithms that contribute to symbolic annihilation** (e.g., "*I was getting ads for maternity clothes. I was just like, 'Oh, please stop.'*") (P7)

Similarly, P6 noted how she attempted to protect herself against harmful ads that she anticipated she may get by using privacy-preserving browser modes or not seeking information at all in some cases: "*I had already been getting baby related ads following me. No matter how much I cleared my cookies and no matter how much I used incognito, it still followed me.*" She further elaborated that her decision to do so was in part due to having observed others receiving harmful ads: "*I mean, I tried not to google it, because then like, I know all these horror stories of women who have miscarriages, like perhaps in their second trimester. And they already bought baby clothes and things like that. But then you know, the algorithms tracking their internet use assume that they had the baby. So then they had ads following them throughout what was assumed to be the baby's life cycle. So, like five years later they're getting ads for something appropriate for a Kindergartner. So I avoided google, using the internet, or entering information.*" This is an important outcome of algorithmic insensitivity. We see how even though this participant (similar to P7 mentioned earlier) did all she could to protect her privacy, she already received ads she did not desire. We then see how due to the fear of receiving further harmful advertising once she experienced a pregnancy loss, she avoided using the internet or signaling in any way that she had experienced a loss. This, in turn, limited her ability to find validation in ways we described in the first portion of our findings and chilled her participation online.

Table 2 provides examples and summarizes our findings. We see how pregnancy apps' designs and algorithmic encounters such as ads can not only hinder achieving experiential and thus emotional validation, they can also be emotionally harmful when pregnancies do not proceed as desired. This is best illustrated by participants' accounts related to harmful reminders, notifications, ads, or other messages that assumed the pregnancy is ongoing and healthy. Participants experienced these disruptions *even* after they reported a loss in rare cases where that was an option, or *even* after consciously practicing privacy-preserving strategies such as sharing minimal information or using a private browser. We see how while the internet can be a place for seeking information or others' stories that would allow survivors to make sense of their experiences and find emotional validation, it can also be a place for invalidating and harmful encounters such as through ads that assume every pregnant individual will have a baby in nine months. It is important that pregnancy-related mobile apps as well as other technologies that pregnant individuals use in relation to pregnancy (e.g., search engines), recognize pregnancy loss as a possible pregnancy outcome. We interpret this lack of recognition and consideration of pregnancy loss as a form of symbolic annihilation [94] facilitated through the design of algorithms and mobile apps. We will elaborate on this conceptualization in the Discussion section.

5 DISCUSSION

We found that the main mechanisms of seeking emotional validation to cope and make sense of pregnancy loss experiences were through seeking a) informational validation and b) experiential validation. Through these processes, participants achieved a sense of perceived normalcy that was lost due to the loss. Our work contributes a nuanced understanding of perceived "normalcy" among pregnancy loss survivors that is grounded in their experiences and language. Foregrounding the participants' experiences challenges any universal notion of "normalcy" and reveals that the process of seeking normalcy is a subjective experience. However, while we do not present "normalcy" as an affective experience with a universal shared meaning, our work does contribute a conceptualization of the validation processes described by *the participants*. As such, we present informational and experiential validation as forms of emotional validation and sensemaking activities that pregnancy loss survivors engage in when trying to achieve a personal and subjective sense of normalcy. In addition, we provide an understanding of encounters that disrupt the process of seeking, achieving, and maintaining emotional validation in online spaces. These are related to information, designs, algorithms, and interpersonal interactions. We contribute the theoretical concept of *algorithmic symbolic annihilation*, highlighting the emotional and representational harm caused by algorithms that perpetuate normative narratives about phenomena, where what they account for (e.g., a full-term healthy pregnancy) has power, and what they do not account for (e.g., pregnancy loss) does not. We propose this concept as a useful lens to interrogate algorithmic harms in diverse contexts related to human experiences and identities. Lastly, we discuss how designing for *information avoidance* and *representational belonging* (as a response to symbolic annihilation of pregnancy loss) may help validate the experiences of pregnancy loss survivors.

5.1 Seeking Informational Validation by Converging Sources

The process of seeking perceived normalcy through informational validation involved a form of personal level-setting that included searching for information that could serve as comparison points between their experiences and an external "normal" account of pregnancy. As described in the findings, participants expressed "seeking more information" as a strategy for coping with feelings of losing control. As participants searched for comparison points, they fluidly switched between formal and informal information sources. Within a health context, formal information sources describe expert and professional sources such as health professionals, peer reviewed research articles, and medical institutions [47]. For instance, participants described seeking "evidence based" information based on "qualitative and quantitative research." Informal information sources describe non-expert and popular media sources such as health blogs, friends, family, and online forums [47]. For example, participants described consulting "mom groups" on common topics such as the benefits of "breastfeeding versus formula feeding." The process of fluidly switching between information sources aligns with prior research [47] showing that women seeking health information are more likely to trust sources when they can corroborate information across multiple sources and find direct and indirect referrals between sources, such as book recommendations from a trusted health website.

In addition to moving fluidly between formal and informal information sources, the participants also moved between online and offline social support networks. Prior work describes how emerging adults strategically utilize different and distinct groups of people to find the support that they need [82], as well as how women navigate information sources during pregnancies that progress as desired (unlike those in our study) [87]. In our study, the movement between social support networks was influenced by participants' trust in and satisfaction with existing information. For example, participants described how hurtful comments from "online trolls" and judgmental comments on online forums led them to seek information from offline support networks such as doctors; this was challenging because medical professionals are not always the most sensitive to the needs of individuals enduring losses [74].

Importantly, the participants' descriptions of seeking informational validation revealed that they engaged in a form of sense-making where they converged information from their personal experiences, formal and information sources, and offline and online support networks in order to create a unified understanding of pregnancy *and* pregnancy loss. The process of sensemaking through information convergence aligns with the sensemaking framework proposed by Mamykina et al., which describes how individuals rely on "their general knowledge, knowledge of others and their own past experiences to construct a plausible explanation that can suggest future action" [72:410]. Thus, when undertaking actions for achieving a sense of perceived normalcy, participants actively sought multiple information sources, converged information across sources, and aligned their personal experiences of pregnancy loss with their unified understanding of the information.

5.2 Achieving Experiential Validation by Valuing Lived Experiences

Emotional validation involves communicating that an individual's emotional response to a given situation is reasonable [69]. Receiving emotional validation influences how individuals process difficult emotions related to health concerns, such as fear, anxiety, sadness, and anger [40]. Participants described needing "fears" validated by hearing about the "real experiences" of "real people." We called this "experiential validation." For them, achieving emotional validation, in part, required feeling like their emotional response was reasonable based on how others reacted to similar situations and experiences. They found "calm" in knowing that in their or similar situations, others would or have freaked out too, helping them accept their feelings rather than fight them. Thus, in addition to seeking health information from others who have experienced pregnancy loss, participants also wanted to corroborate the information they gained from formal sources with the *experiences* of others who had experienced pregnancy loss.

Previous work [48] demonstrates the important role of interpersonal information interactions in supporting health management decisions, especially when those decisions require making sense of evolving health information. For example, Patel, et al. [83] found that men living with male-factor infertility actively sought online spaces where emotional vulnerability could feel less risky through the anonymous sharing of comparable experiences. The results from our study did not reveal a strong preference for anonymity from other community members or fear of emotional vulnerability, which further reveals the gendered aspects of seeking support online. However, the participants in our study did value interpersonal interactions and the lived experiences of other women, rather than solely medicalized accounts of pregnancy loss. This aligns with feminist arguments that medicalized views on pregnancy loss are known to negatively shape survivors' experiences, because they dismiss the deep emotional dimensions of the experience [65,66]. Sharing lived experiences involves exchanging stories that represent how one experiences the world and the meaning attached to those experiences [26]. As participants expressed, hearing other people's stories provided emotional validation through achieving experiential validation; by comparing their experience with others' lived experiences, they were able to process difficult emotions such as loneliness or guilt by learning that pregnancy loss and associated feelings were not unique to them and that they were not alone in their emotional reactions.

The participants often turned to online forums and groups (e.g., Facebook groups) when searching for stories of others' lived experiences with pregnancy loss. Whether directly interacting with others or passively reading content, they viewed stories shared online as valuable sources of informational and experiential (and thus emotional) validation. The perceived informational, experiential, and emotional value of informal online support spaces highlights the importance of designing social computing platforms that integrate a diversity of loss experiences. For example, if most experiences with pregnancy loss available on a platform include only one scenario, others whose experiences do not match that scenario will not find the validation they seek, even though the experiences are meant to represent an overarching shared experience -- pregnancy loss.

5.3 Maintaining Emotional Validation Through Designing for Information Avoidance

Emotional validation included more than seeking positive information that "normalized" personal experiences for participants; maintaining a sense of perceived normalcy also involved avoiding emotional invalidation through information avoidance. Information avoidance is defined as any behavior designed to avoid the acquisition of unwanted or threatening information [93]. One common reason for avoiding information is to regulate emotions; research shows that people will actively avoid information if it challenges their beliefs or threatens their desired emotional state [93]. For the participants, information avoidance served as a self-protective function that helped them avoid information that would invalidate their experiences and result in painful emotions – thus diminishing emotional validation. For example, participants described avoiding forums where they encountered misinformation that would drive them "nuts." In this sense, while in some cases information avoidance meant that people could maintain their sense of emotional validation, it also limited opportunities to potentially achieve further experiential and/or informational (and thus emotional) validation, for example due to lack of engagement or participation in online spaces that was necessary for information avoidance.

Yet, the ability to avoid information was key to maintaining emotional validation and preventing disruptions in their journey to achieving a sense of perceived normalcy. The self-protective function of information avoidance points to the beneficial impact of designing systems that give users greater control over the content, formats, quantities, and sources of information they encounter online. Rather than privileging a greater access to any and all information as a generic principle, our findings suggest that designing systems with self-protective features may better support individuals who are coping with difficult experiences. We call this *designing for information avoidance.* For instance, multi-faceted filters that regulate information flow based on multiple factors, such as temporal and emotional conditions, may allow individuals to have more control over the information they encounter. Pregnancy journeys are characterized by differing emotional states, such as happiness, fear, anxiety, and relief; thus, a self-protective privacy-preserving filter based on one's current emotional state could help regulate the informational content one encounters when seeking information. For example, a multi-faceted filter approach could regulate content based on one's current emotional state and gestation or pregnancy loss recovery stage (or any other factors important to potential users). Designing technologies in ways that privilege self-protective functions such as information avoidance may more effectively avoid invalidating information encounters, thereby reducing negative emotions like feelings of guilt and self-blame and maintaining the emotional validation that is helpful to their unique journeys. We do not uniformly suggest that information avoidance is a beneficial approach to dealing with harmful information. We also recognize that engaging with different points of view can help expand one's own understanding of a topic. Yet, within this context where participants expressed an overwhelming loss of control, we advocate for designing systems in ways that foster agency and control in information encounters.

5.4 Maintaining Emotional Validation by Designing for Representational Belonging to Combat Design and Algorithm-Based Symbolic Annihilation

Participants discussed experiences related to how mobile apps and algorithmic encounters such as notifications or ads were often invalidating and emotionally, deeply, harmful. Participants believed that these encounters were often harmful because they did not consider pregnancy loss as a plausible outcome of pregnancy, further shaping *their perceptions* of what constitutes a "normal" pregnancy.

Symbolic annihilation is a concept originated in feminist media scholarship back in the 1970s. Gerbner and Gross wrote: "representation in the fictional world signifies social existence; absence means symbolic annihilation." [50]. Through an analysis of traditional mass media content Tuchman [95] wrote: "by largely ignoring women or portraying them in stereotypical roles of victim and/or consumer, the mass media symbolically annihilate women." This conceptualization of symbolic annihilation constitutes omission, trivialization, and condemnation, contributing to reinforcing stereotypical conceptions of the affected individuals, and maintaining social inequities [50,95]. In response to harmful effects of symbolic annihilation, Caswell, et. al. [23:75] proposed the concept of representational belonging to describe "the affective responses community members have to seeing their communities represented with complexity and nuance." Designing for representational belonging would mean supporting pregnancy loss survivors by representing pregnancy journeys in their full complexity, providing space for the sharing of nuanced narratives, and fostering a sense of belonging and inclusion.

Prior work provides a feature analysis of pregnancy-related mobile apps to examine how they account for pregnancy loss in their designs finding that most do not in any way do so, and those that do, do so poorly [9], arguing that such ignorance is a form of symbolic annihilation [50,95] facilitated through design – they call this "symbolic annihilation through design." Our findings regarding mobile apps resonate with this work [9], and further contribute insights from *lived experiences* of individuals who have used these technologies and demonstrate how harmful they can be.

Additionally, we found that algorithmic encounters such as experiences with advertisements that assumed one was either (still) pregnant or had experienced a healthy pregnancy were emotionally harmful, and invalidating; reinforcing the notion that pregnancy loss cannot be an outcome of the pregnancy that was somehow known or inferred by an algorithm. In this sense, we further argue that our findings regarding experiences with insensitive and emotionally harmful ads and algorithms similarly render pregnancy loss subject to symbolic annihilation – we therefore build on prior work that has applied the concept of symbolic annihilation to a variety of contexts such as gaming and archives (e.g., [27,59,75,95]) and introduce the concept of "algorithmic symbolic annihilation." Algorithmic symbolic annihilation refers to how algorithms perpetuate normative and stereotypical narratives about phenomena, where what they account for has power, and what they do not account for does not. We suggest that this concept provides a useful lens to interrogate other harmful algorithmic encounters that reinforce normative perceptions of phenomena (e.g., gender [62]).

As Winner discusses, technologies have political properties and help establish patterns of power and authority [97]. The aforementioned symbolic annihilation through design and algorithm are some ways in which the experiences and existence of individuals experiencing pregnancy losses are rendered invalid and marginalized (as opposed to being in a position of recognition and power) – making achieving and sustaining emotional validation challenging. We advocate that advertising and content delivery algorithms be designed with more sensitivity to the complexity of people's experiences and not cause more harm than individuals may already be encountering. We advocate that mobile apps used by pregnant individuals in relation to pregnancy should explicitly account for pregnancy loss, as not doing so will further invalidate survivors' experiences and hinder opportunities for healing, sensemaking, and coping. We argue that designing against symbolic annihilation (through design and algorithms) and instead designing for representational belonging is a key way forward for accounting for the needs, existence, and experiences of those in the margins of pregnancy and reproductive health narratives, such as those who experience pregnancy losses.

6 CONCLUSION

Emotional validation is an emotional need. One feels that they are maintaining emotional validation when they believe that their activities, emotions, beliefs, or other responses to events are relevant and meaningful given their particular circumstances, identities, and experiences. When people experience stigmatizing and disruptive life events, they also experience disruptions in their state of emotional validation, as well as their perceived sense of normalcy and control. Online spaces are fascinating in part because people may develop connections and find community with similar others, including others who also experience distress and stigma. Pregnancy loss, commonly referred to as miscarriage, is one such experience that is associated with stigma, disrupts people's sense of self and identity, shifts interpersonal relationships, and is difficult to find support for or talk about. In this paper, we focus on pregnancy loss as a case study and examine the ways in which individuals managing stigmatizing disruptive experiences use online spaces to achieve emotional validation, and how online spaces may disrupt maintaining emotional validation.

We conducted interviews with women in the United States who had recently experienced a pregnancy loss. We identified two forms of validation processes that result in emotional validation – informational and experiential. We found that the purpose of seeking emotional validation was to achieve a sense of perceived normalcy. We do not refer to normalcy as a universal concept or even an affective experience with shared meaning for everyone. We refer to normalcy as a desired quality among participants and recognize the desire to achieve a sense of *perceived* normalcy as an emotional need. We also identified harmful information, design, algorithmic, and interpersonal interactions that inhibited maintaining emotional validation in online spaces. Through this investigation, we introduce the novel concept of *algorithmic symbolic annihilation*, describing how algorithms perpetuate normative and stereotypical narratives about phenomena, where what they account for (e.g., a full-term healthy pregnancy) has power, and what they do not account for (e.g., pregnancy loss) does not – leading to emotional and representational harm. We propose this concept as a potentially useful lens to bring to light algorithmic harms in other contexts such as automatic recognition technologies. We suggest designing for information avoidance to facilitate achieving informational validation and designing for representational belonging to combat algorithm and design-based symbolic annihilation to facilitate achieving experiential validation. Designing for information and experiential validation would contribute to improving emotional validation for people experiencing distress and stigma.

ACKNOWLEDGMENTS

We are thankful to participant who allowed us to learn from their experiences and to those who helped with our recruitment efforts. We thank Wei Li for assisting in applying codes. We are also grateful to the anonymous ACs and reviewers for providing generous feedback on this paper.

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Received June 2020; revised October 2020; accepted December 2020.