

Research Article

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A Tumblr thematic analysis of perinatal health: Where users go to seek support

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Abstract: With the research sex gap impacting available data on women's health and the growing popularity of social media, it is not rare that individuals will seek health-related information on such platforms. Understanding how women use social media for perinatal-specific issues is crucial to gain knowledge on specific needs and gaps. The Tumblr platform is an excellent candidate to further understand the representation and discourse regarding perinatal health on social media. The objective was to identify specific themes to assess the present discourse pertaining to perinatal health. Posts were collected using Tumblr's official API client over a 4-day period, from August 18 to 21, 2023, inclusively. A sentiment analysis was performed using the Valence Aware Dictionary and sEntiment Reasoner sentiment analysis toolkit and a deductive thematic analysis. In total, 235 posts were analyzed, and 11 individual categories were identified and divided into two main concepts; Women's Health (Endometriosis; Postpartum Depression, Menopause, Miscarriage, Other Health Problems, Political Discourse) and Pregnancy/Childbirth (Maternal Mortality, Personal Stories, Pregnancy Symptoms, and Fitness/diet/weight). The last category was classified as Misinformation/Advertisement. Findings revealed that users used the Tumblr platform to share personal experiences regarding pregnancy, seek support from others, raise awareness, and educate on women's health topics. Misinformation represented only 3% of the total sample. The present study

demonstrates the feasibility of using in-depth data from Tumblr posts to inform us regarding current issues and topics specific to perinatal and women's health. More research studies are needed to better understand the impact of social support and misinformation on perinatal health.

Keywords: women's health, perinatal, social media, social support, misinformation

1 Introduction

While women's health has been a topic of interest for many years, there is a sex gap present in research still impacting today's literature, whether it is regarding women's mental health [1] or physical health (e.g., cardiovascular health [2], chronic diseases [3,4]). Women's health is a broad domain of the study but is often referred to as the study of the whole female body, including biological characteristics, how the female body is affected by diseases and environmental factors, reproduction and fertility, and all cultural, socioeconomic, and political factors impacting one's health [5].

The development of social media, especially in the last decade, changed how individuals interact and share with others [6]. These platforms are easily accessible resources for women who seek support [7] and for sharing similar experiences regarding their health [8]. Social media has been recognized as having the possibility of providing a peer support network for a diverse population and issues [9]. As such, social media platforms can be used as a tool to assess general conversations and opinions on topics impacting a specific population, and offered support [10].

Among women, perinatal health is a popular theme seen in social media [11]. The perinatal period refers to the timeline before conception, during gestation, and after giving birth. The timeline is not well defined with some studies declaring the period to be up to 1 year before conception and up to 2 years after giving birth, while others consider it the time of conception to 1 year after giving birth [12,13]. From perinatal mental health [14], including postpartum depression (PPD) [15], to pregnancy support [11], women can find supportive communities on social

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media no matter where they are. For example, Baker and Yang [11] surveyed 117 mothers from the United States using social media. Among them, 84% reported using social media as a form of support, and 89% reported seeking pregnancy and parental answers to their questions on these platforms [11].

While seeking support on social media has been observed, the use of such services has also been associated with negative outcomes. Indeed, Baker and Yang [11] also highlighted the risk of unreliable information present in these forums. Similarly, Chee *et al.* [16] assessed 17 articles investigating social media “influencers” sharing their pregnancy and parenting journey. Findings revealed that although these influencers provided a platform fostering support, the authors also found a risk for the transmission of misinformation [16]. Misinformation refers to information that is false and is being shared by an individual who thinks it is true, whereas disinformation refers to someone knowingly sharing false information [17,18]. An increase in misinformation on social media platforms was seen during the COVID-19 pandemic [18], where misinformation was massively shared on the nature of the virus [19], disease prevention [20], and the safety of vaccines [21]. Regarding perinatal health, misinformation on the safety of vaccines for pregnant women was significant during this period [22,23]. Other misinformation regarding women’s health includes eating and physical habits during pregnancy [24], breastfeeding [25], contraceptives [26], endometriosis [27], and menopause [28].

A netnographic approach to understand information found on social media, specifically self-disclosed statements from users, can help gain new knowledge about the public perception regarding different issues [6,29]. The digital platform Tumblr [30] was created in 2007 by David Karp [31]. Most often defined as a “blogging network” rather than a social media platform, Tumblr allows users to personalize their page (*i.e.*, blog) and share images and texts with other users [31]. In 2019, Tumblr was purchased by the wireless carrier company Verizon [32]. Quickly, Tumblr defined itself as a platform for individuals from underrepresented groups to seek support, including LGBTQI2SA+, people of color, feminists, people with physical disabilities, mental health disorders, and so on [31]. Consequently, Tumblr also became a platform for researchers to gather and seek better understanding of challenges, opinions, and support among these communities. A single post can be of a maximum of 4,096 characters, larger than other social media platforms such as Twitter’s maximum of 280 characters per tweet [29,33]. With such a relatively high character limit, it can translate to an increase of sentiment, ideas, opinions, and thoughts shared online, thus making Tumblr an ideal candidate for understanding different aspects related to

perinatal health. Previous studies have analyzed the sentiment on Tumblr to understand the overall sentiment of users on different issues, from weight loss movements to transgender transition sentiment [34,35]. The studies used a tag-driven gathering script and a lexicon-based analysis to understand the sentiment and themes present within the posts. For example, researchers have explored the Queer community [36], the transgender community [37], and mental health (*e.g.*, eating disorders [38], depression, and anxiety [39]). Results revealed that in general, people find Tumblr to be a safe and supportive space [36,37,39].

To date, no studies have investigated the general discussion regarding perinatal health on Tumblr, as well as the status of misinformation on this platform. As such, this study aims to conduct a thematic analysis about perinatal health on the Tumblr platform to (1) identify specific themes regarding perinatal health on Tumblr, (2) assess the general discourse on perinatal health (*e.g.*, positive or negative), and (3) assess the status of misinformation on perinatal health. This research lays the foundation for studies pertaining to perinatal health representation and opinion on Tumblr by offering a glimpse of the conversation present on the platform. Information gathered in the present study demonstrates the feasibility of using in-depth data from Tumblr posts and blogs to inform us of current issues and topics within this field of research and beyond.

2 Methodology

2.1 Search strategy

The search was conducted using Tumblr’s official API client through the python library PyTumblr [40] using predefined search words, totaling 15 words (Table 1).

Using the predefined words, associated keywords often used with the predefined list were gathered. A manual cleanup of the keywords was performed to keep only relevant words. A keyword was considered relevant if it was related to women’s health during the perinatal period.

Keywords were chosen based on an initial search of popular tags used in connection with a preliminary keyword list. Using the Tumblr API, all associated tags related to the preliminary keywords were collected. There were 515 tags collected and then parsed, through peer review, for relevancy related to women’s health. The total count after the parsing process was 43 keywords (Table 2). All posts were gathered on a 4-day period, from August 18 to 21, 2023 inclusively. The 4-day period was chosen to

Table 1: Preliminary list of search terms

List of preliminary keywords
Baby
Birth
Labor and delivery
Maternity
Miscarriage
Obstetrics
Peripartum
Postpartum support
Postnatal
Postpartum
Postpartum health
Pregnancy
Pregnant
Prenatal
Prepartum

represent a “snapshot” of Tumblr while obtaining enough posts for analysis. During this timeframe, no awareness or remembrance day/month related to women’s health was ongoing, limiting therefore the potential impact of said event on the collected data. There were 676 posts collected that used at least one of the searched keywords.

2.2 Data cleanup

For a complete summary of data cleanup, see Figure 1. To prepare data for analysis, the following steps were performed:

1. Removal of links, photos, videos, answers, audio: When data are gathered from Tumblr, it is labeled using one of the following descriptions based on the type of posts the user made: links, photos, videos, answers, and audio. In the context of the study, only text posts were analyzed,

while the rest of the posts were removed from the dataset. From the initial dataset containing 676 posts, 244 posts were not labeled as text and as such were removed.

2. Deduplication: During the deduplication process, any single post and posts that had matching metadata (i.e., authorship, date time) were removed from the data except the first original one based on the posting date of the text. The earliest post is considered the original one in the context of the study. During this process, 80 posts were removed resulting in a dataset of 352 posts.
3. Approximate string matching: An approximate string method was used to remove similar posts that were overall similar but differed in terms of a few words or characters (typically described as “spam” [41]). The approximate string matching was performed using Python’s TextDistance library using the Jaro-Winkler algorithm [42]. The sensitivity value of the algorithms was set at 85% similarity, meaning if two posts were more than 85% similar, the newer one is considered a semi-copy and thus is removed from the dataset ($n = 15$). Using this strategy-reduced copies, semi-copies and spam posts thus making the analyses representative of the original posts on the platform.
4. Non-English posts were removed manually from the dataset ($n = 9$).
5. Finally, irrelevant posts were removed using a peer-review method where both co-first authors independently reviewed the dataset and listed all irrelevant posts ($n = 93$). Afterward, both lists were compared, and any disagreements between included/excluded posts were resolved through consensus between the co-authors. A post was considered nonrelevant when it did not mention explicitly any keywords or concept related to the search terms. Irrelevant posts were mostly fiction stories ($n = 57$), artwork ($n = 17$), and irrelevant discourse (e.g., discussion on movies, books; $n = 19$).

Table 2: List of final keywords

Final list of keywords			
Abortion	Gynecology	Peripartum	Preggie
Babieblue	Gynecologist	Postpartum support	Pregnancy
Birth	Labor and delivery	Postnatal	Pregnancy hormones
Bodily autonomy	Maternal mortality	Postnatal depression	Pregnancy journey
Death by childbirth	Maternity	Postpartum	Pregnancy after miscarriage
Endometriosis	Menopause	Postpartum health	Pregnant
Female gynecologist	Miscarriage	Preeclampsia	Prenatal
Fertility awareness	Obstetrician	Preg	Prepartum
First trimester	Obstetrics and gynecology	Pregblr	Second trimester
Giving birth	Obstetrics services	Preggers	Third trimester

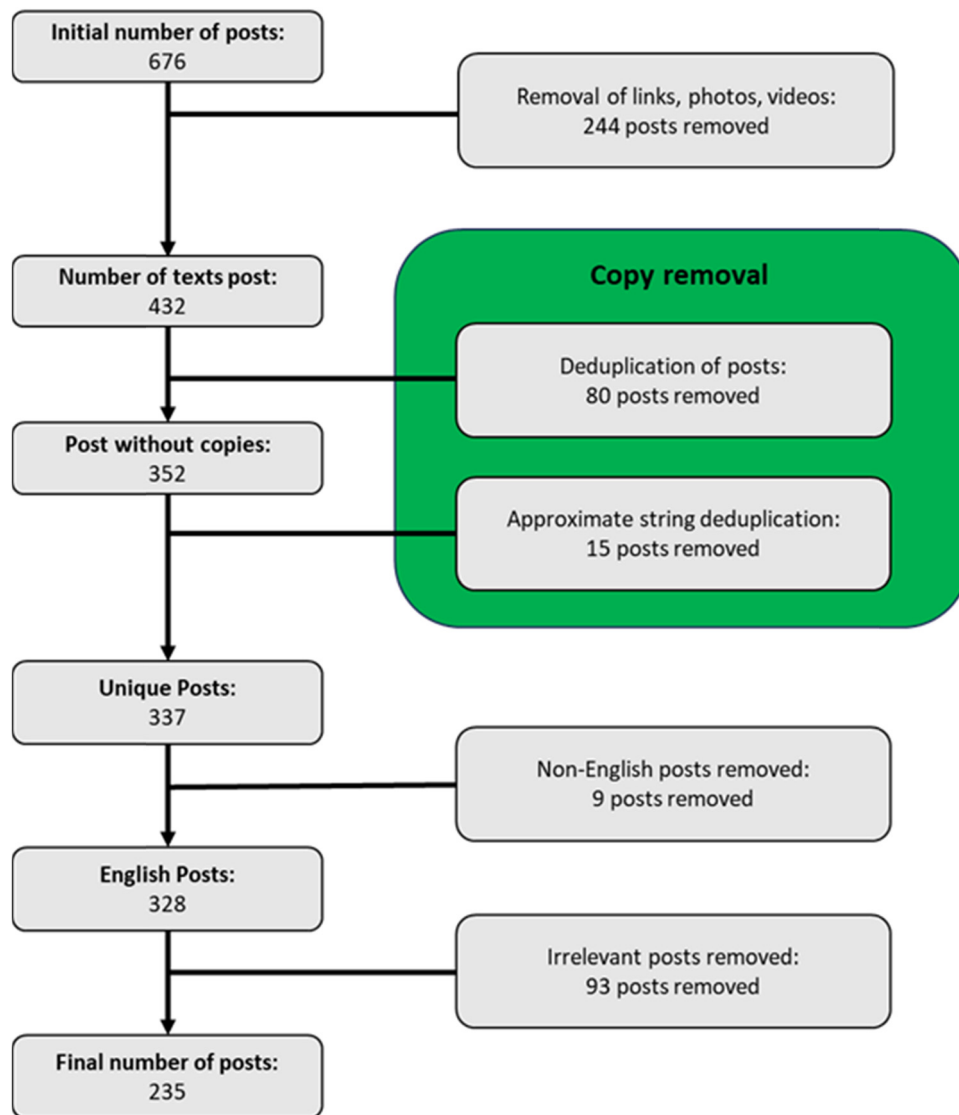


Figure 1: Data collection: Tumblr flowchart. Tumblr posts selection process flowchart starting at the size of the initial process (top) with the cleaning steps (right side), the number of posts remaining after each step (left side), and the final number of posts (bottom).

2.3 Data analysis

Data analysis was performed in two stages: sentiment analysis and thematic analysis. The sentiment analysis was performed using the Valence Aware Dictionary and sEntiment Reasoner (VADER) sentiment analysis toolkit [43]. This toolkit is a lexicon-based sentiment analysis tool that has a high reported accuracy. The sentiment analysis provides polarity scores, negative, neutral, or positive tone for each text block analyzed. The toolkit provides a compounded score for each post, which represents the overall sentiment of the text (negative [score from -1 to -0.05], neutral [score from -0.049 to 0.049], and positive [score from 0.05 to 1]).

The approach used for the thematic analysis is inductive in nature, meaning no prior knowledge or expectations of themes within the dataset were used. This allows for a more unbiased approach in finding themes that are representative of the dataset as the data itself lead to the discovery of new themes [44]. Steps described by Campbell et al. were followed in the thematic analysis: data familiarization, initial code generation, generating initial themes, theme review, and theme defining and naming [44]. Following data familiarization (1), the initial code generation (2) for the thematic analysis was performed using the computational thematic analysis toolkit [45]. The type of analysis used for the topic model sampling was the Latent Dirichlet allocation as it is the most suitable algorithm for the format

of posts analyzed, being long blog-styled posts [46]. This toolkit allows the agency of researchers by helping identify possible themes, but the final decision lies in a manual analysis. The third step is the generation of themes (3) based on the initial code generation based on the Computational Thematic Analysis Toolkit, and the co-authors (J.T. and V.C.) independently analyzed each labeled category to identify common themes among them [45]. Once themes were identified, the theme review process (4) described by Campbell et al. was performed by comparison of identified themes, and disagreements between the theme list were resolved through consensus between both coauthors [44]. Finally, the theme defining and naming (5) step was performed as a second review of the dataset and independently checked by both coauthors to confirm the accuracy of the themes, and then, any remaining disagreements were resolved.

3 Results

3.1 Thematic analysis

The search was concentrated around perinatal health topics and keywords although themes specific to women's health also transpired. In total, 11 themes were found among the 235 posts (Figure 2). Posts were centered on endometriosis ($n = 11$ posts), PPD ($n = 22$), menopause ($n = 8$), miscarriage ($n = 17$), other health problems ($n = 7$), political discourse ($n = 38$), and pregnancy/childbirth ($n = 102$). Another category

entitled “misinformation and advertisement” found a total of 30 posts. Regarding the political discourse, posts mostly discussed matters of abortion rights ($n = 21$), access to contraceptives ($n = 2$), bodily autonomy ($n = 12$), and gender-affirming care ($n = 3$). Regarding other health problems, posts concerned specific health problem such as lipedema ($n = 1$), anemia ($n = 1$), protein S deficiency ($n = 1$), fibrosis ($n = 1$), round ligament pain ($n = 1$), vaginal dryness ($n = 1$), and pain/discomfort during sexual relations ($n = 1$).

Since the pregnancy/childbirth category was the most prominent, a closer look at the topics discussed within this broader theme revealed four subcategories: maternal mortality ($n = 12$); personal stories of pregnancies ($n = 65$); fitness, diet, and weight during/after pregnancy ($n = 10$); and symptoms during/after pregnancy ($n = 15$).

4 Global sentiment analysis

Throughout the 4 days of sampling, the average global sentiment score of all included posts ($n = 235$) was 0.172 with a median global score of 0.283, both representing a positive sentiment (Figure 3). For detailed sentiment scores for each category, see Table 3.

4.1 Endometriosis

Discussion on endometriosis was mostly negative (global sentiment score = -0.228). General discussion among the

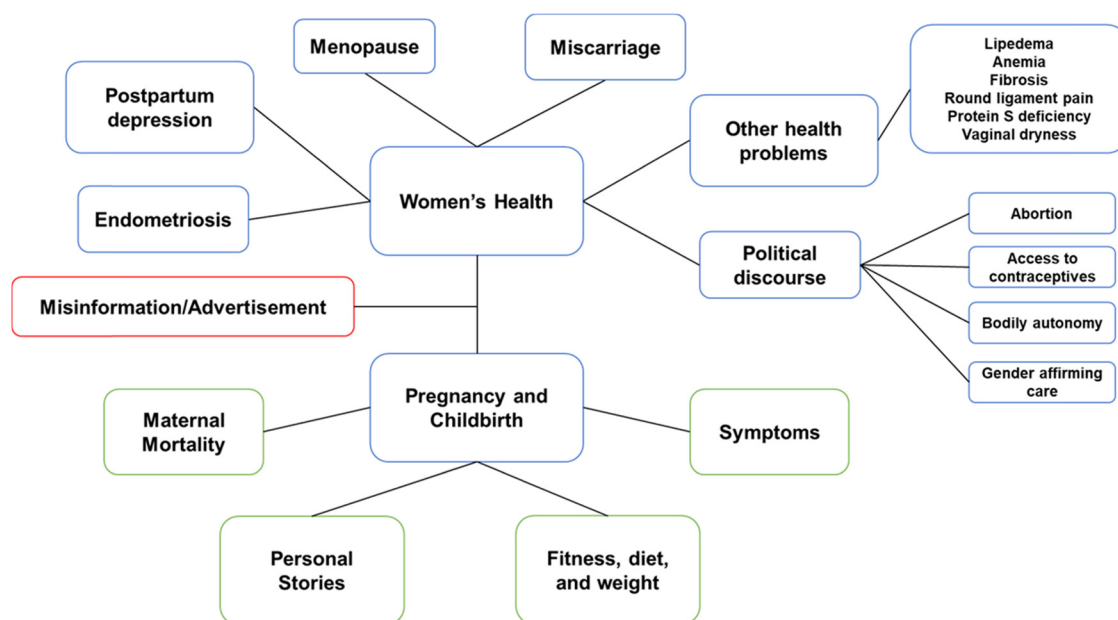


Figure 2: Thematic analysis of all 235 posts.

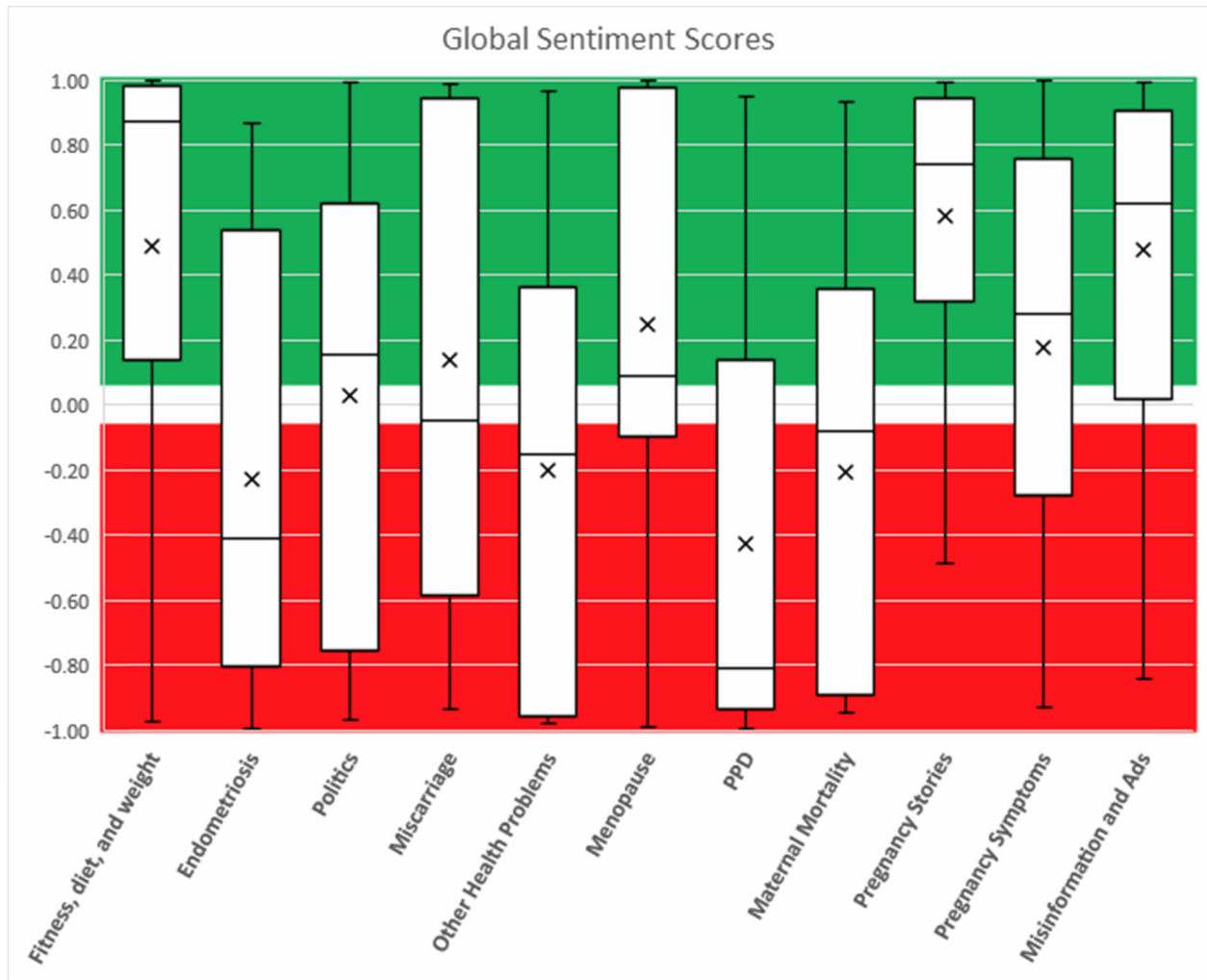


Figure 3: Global sentiment analysis. The VADER sentiment scores of the 11 identified categories. Scores between -1.0 and -0.05 represent a negative sentiment. Scores between -0.49 and 0.49 are neutral, while scores between 0.05 and 1 are labeled as positive. The “x” represents the mean, while the horizontal line in each bar represents the median.

Table 3: Detailed sentiment score for each category

Category	Compounded mean	Compounded median	Number of posts
Fitness, diet, and weight	0.487	0.874	10
Endometriosis	-0.228	-0.409	11
Politics	0.014	0	38
Miscarriage	0.136	-0.0474	17
Other health problems	-0.203	-0.153	7
Menopause	0.251	0.089	8
PPD	-0.425	-0.807	22
Maternal mortality	-0.208	-0.082	12
Pregnancy stories	0.455	0.676	65
Pregnancy symptoms	0.178	0.283	15
Misinformation and ads	0.477	0.621	30

Note. Table describing the mean and median for the global sentiment score for each category and the number of posts per category.

posts ($n = 10$) centered mostly on pain caused by the disease: *“I am so exhausted from being in pain all the time. My pain medication is done, and it feels like I am going to pass out.”* Other posts centered around the debilitating effects of endometriosis on daily life: *“I had to get a leave from work due to the pain. I feel like I can only live a few weeks at a time in between flare ups.”* Others mentioned the exhaustion caused by the disease: *“I am so drained from this pain. I hope it passes soon because I have so many things to do.”* Finally, one post highlighted the need for support and awareness: *“I want to share my journey with endometriosis to raise awareness and make sure others know they are not alone.”*

4.1.1 PPD

Global sentiment score for PPD was mostly negative (-0.425). Of the 22 posts, 7 mentioned the lack of support: *“I feel so lonely in this PPD. I am a single mom and I wish I had more support. I am so tired of this.”* Other posts ($n = 7$) aimed at raising awareness: *“It is so important to talk about PPD, I went through it, and it was the most difficult time of my life. If you know anyone who has recently given birth, make sure they know you are there for them.”* Other posts ($n = 4$) were from individuals sharing their journey with PPD and related symptoms: *“I feel so sad all the time. People around me don’t understand but I just can’t stop crying. Doing simple things is becoming harder everyday.”* Finally, four posts were about individuals sharing their difficulty with experiencing guilt due to their PPD: *“I simply can’t do everything. Everyone expects so much of me, and I feel so guilty for being tired of being a mother.”*

4.1.2 Menopause

Global sentiment score for menopause was mostly positive (0.251). Of the eight posts, half were from individuals raising awareness/education on the topic of menopause: *“Menopause is when a woman’s reproductive system no longer produces eggs, meaning cessation of ovarian function. It happens between the ages of 45 and 55 and comes with many symptoms.”* The other half ($n = 4$) concerned individuals sharing their symptoms and personal experiences with menopause: *“I did not expect hot flashes to be this intense, I feel like I am going to combust at any time. And don’t get me started on insomnia and fatigue. I wish people around me would talk more about menopause to normalize it.”*

4.1.3 Miscarriage

Global sentiment score for miscarriage posts was mostly positive (0.136). Of the 17 posts on miscarriage, 15 were about individuals sharing their personal stories with miscarriage: *“Forever grateful for my rainbow baby. I will never forget the ones before you, the pain will always remain but there is light at the end of the journey.”* The remaining two posts were centered around raising awareness and support: *“The main advice I have received from women who went through pregnancy loss and miscarriage is that you are not alone and that there is light on the other side of this journey.”*

4.1.4 Other health problems

Posts regarding other health problems were mostly negative (-0.203). Four posts concerned individuals sharing personal stories with a specific health problem, such as lipedema, anemia, protein S deficiency, and round ligament pain. The remaining three posts were centered around education and awareness for specific health problems, such as fibrosis, vaginal dryness, and pain or discomfort during sexual relations.

4.1.5 Politics

Global sentiment score from the 38 posts regarding politics was mostly neutral (0.014). A total of 21 posts concerned abortion rights, all of them leaning toward the pro-choice movement: *“I can’t believe what is happening in the United States with laws against abortion. This is a joke. This is not ok.”* Twelve posts conveyed around the concept of body autonomy: *“The education system is clearly lacking. I learned nothing regarding body autonomy in health classes. This is not acceptable.”* Two posts concerned access to contraceptives: *“Insurances should cover the costs of contraceptives. There is nothing wrong if you like using a fertility app, but this is not accessible to everyone.”* Finally, three posts concerned gender-affirming care: *“Everyone should have access to gender affirming surgeries or treatments.”*

4.1.6 Misinformation/advertisement

Posts regarding advertisement and misinformation were mostly positive (0.477). Of the 30 posts, 7 were flagged as “misinformation” due to the content of the post. For example, posts

suggested nonevidence-based treatment and natural remedies to get pregnant: “Get easily pregnant in less than 3 months! Look at the video below,” to relieve migraine during pregnancy: “Subscribe to receive information on how to naturally relieve migraine during pregnancy,” to relieve pain in the case of endometriosis or labor: “Essential oils can ease labor and delivery. Check out this new trend and try it for yourself, click on the link below,” to slow down hair loss during pregnancy, or natural remedies for menopausal symptoms: “Check out this article about naturally curing your menopausal symptoms without hormones, click on the link below for a free try of our product.” Seven posts concerned advertisements for podcasts, books, and documentaries regarding women’s health. The remaining 16 posts were advertisements for gynecologist and obstetric doctors in specific regions.

4.1.7 Pregnancy/Childbirth

4.1.7.1 Pregnancy stories

Global sentiment score for this category was mostly positive (0.455). All 65 posts centered around women sharing their personal pregnancy stories or stories from their entourage: “I am beyond excited to announce that I am officially starting my second trimester today! It goes by so fast I can’t believe it! I am still waiting for lab results so I will keep everyone updated but everything looks good so far. I am open to any baby must have recommendations!”

4.1.7.2 Pregnancy symptoms

Global sentiment score for this category was positive (0.178). All 15 posts were from individuals sharing their pregnancy symptoms with others on the platform: “While I was exhausted during my first trimester, I am happy to report a boost of energy as I enter the second one. Although the nausea is still there, I am so happy to know the baby is growing well and this is really all that matters.”

4.1.7.3 Fitness, diet, and weight

Posts regarding fitness, diet, and weight were mostly positive (0.487). In total, three posts concerned diet and nutrition during pregnancy: “I got a book on nutrition during pregnancy. I highly recommend it, recipes are delicious so far,” three posts were about exercise and fitness during and after pregnancy: “I finally got the OK from my doctor to exercise again. Postpartum fitness journey, here we go.” Finally, four posts discussed weight management issues during and after pregnancy: “I feel so uncomfortable in this postpartum body. Everything feels tight on me. While

pregnant, I was so skinny! I’m so triggered by comments and conversation around weight lately.”

4.1.7.4 Maternal mortality

Posts on maternal mortality were mostly negative (−0.208). All 12 posts aimed at raising awareness and sharing international news about maternal mortality: “Maternal mortality is on the raise. This is not an issue that used to happen only centuries ago, maternal mortality still happens today with modern medicine.”

5 Discussion

In total, 235 posts regarding perinatal health over the course of 4 days were analyzed on the Tumblr platform. Seven categories were found: endometriosis, PPD, menopause, miscarriage, other health problems, political discourse, and pregnancy/childbirth. The latter revealed four subsections: maternal mortality, personal stories, fitness/diet/weight, and pregnancy symptoms. General findings revealed that Tumblr was mostly used by individuals to share and seek support and raise awareness regarding perinatal health and other specific themes related to women’s health. Misinformation, although present on the platform, accounted for only 3% of the total sample of posts (7/235).

5.1 Sharing and seeking support during the perinatal period

Findings revealed that Tumblr is heavily used by women to share their personal pregnancy stories, as shown by the highest number of mostly positive posts in this category. This aligns with previous research suggesting that social media are often used by pregnant women to share and seek support [11,47]. Research in other groups has found that individuals on social media can obtain emotional support, community building, and seek advice from others [48]. Previous research examined social media platforms including Twitter [49], Facebook [50], and Reddit [51], but none had investigated this topic on Tumblr. As such, findings from this study adds Tumblr as being a platform used by pregnant women to seek support and share their personal stories.

Individuals also used Tumblr as a platform to share their symptoms, whether regarding pregnancies or health conditions such as PPD and endometriosis. PPD is found in

the *Statistical Manual of Mental Disorders*, fifth edition [52], as a major depressive episode with symptoms occurring during pregnancy and/or 4 weeks after [52]. Symptoms of PPD include depressed mood, lack of interest, increase or decrease in appetite, insomnia or hypersomnia, fatigue, loss of energy, concentration difficulties, feelings of worthlessness, psychomotor retardation or agitation, and suicidal ideations [52]. Research has shown that a lack of social support is a risk factor for PPD [53–56]. Studies investigating online support revealed that women participating in PPD online communities found social and emotional support, as well as a safe platform to share their experiences [57–59]. Our results revealed that individuals on Tumblr used the platform primarily to share and seek support for PPD, corroborating findings from previous studies.

Interestingly, results revealed that women also used the Tumblr platform to seek support for other health concerns not necessarily related to the perinatal period including endometriosis. Endometriosis is a chronic disease characterized by the growth of endometrial tissue outside of the uterus [60]. Symptoms of endometriosis can include pain, chronic fatigue, nausea, and dysmenorrhea [61]. Endometriosis is undiagnosed in a large proportion of women: it is estimated that 6 out of 10 endometriosis cases are undiagnosed [62]. A study by Shoebbotham and Coulson [63] investigated the benefits of online support groups for women with endometriosis. Results revealed that the most useful factors for participants in these groups were the ability to seek support and connect with individuals also suffering from endometriosis and the possibility for them to share their experiences and learn from others [63]. As such, online communities sharing and seeking support regarding endometriosis can be beneficial for sufferers and provide social support.

5.2 Raising Awareness and Education

Another main finding stems from the abundance of posts aiming at raising awareness regarding perinatal health but also different women's health issues. In total, posts on awareness and education represented 14% of the total sample ($n = 33/235$). Awareness and education were found in the following categories: Maternal Mortality, Menopause, Endometriosis, PPD, Other Health Problems, and Miscarriage. Social media are often used as platforms to share and disseminate health-care information [64,65]. The advantages of raising awareness and educating on online platforms include reaching a greater number of individuals, lower resources needed and thus cost-

efficient, and easier knowledge dissemination [65,66]. Past research found that women use social media as a source of health information [67,68]. Results from this study corroborate previous findings and support Tumblr to be a platform promoting awareness and education on perinatal and women's health.

5.3 Political discourse and current climate

Among the 38 posts regarding politics, 21 were about abortion rights and 12 concerned bodily autonomy. Tumblr does not require users to indicate their location, making it impossible for researchers to use this information [69]. Consequently, the geolocation of the political posts collected is unknown. However, abortion-related posts can still be related to worldwide events, such as the current situation in the United States. Indeed, the United States supreme court overturned *Roe v. Wade* on June 24, 2022, meaning that States could independently decide abortion regulations and legalities [70]. Since then, abortion has been a topic of interest on social media platforms, regardless of the geolocation of the users [71]. This study is no exception, with the majority of posts in this category pertaining to abortion. Interestingly, all posts were leaning toward the pro-choice movement, which is consistent with previous studies stating that Tumblr is an overall supportive platform for left leaning political statements [72]. Links made between collected posts and current political events demonstrate the viability of using the Tumblr platform to analyze in real-time current world events and discourse on social media.

5.4 Misinformation on women's health

Misinformation on social media has been a popular topic as it was highlighted as having an important negative impact on physical (i.e., COVID-19 misinformation) and mental health [48]. The number of misinformation posts observed in the final dataset was small ($n = 7$); however, it is nonetheless concerning as the repercussions of such a statement can negatively affect the overall health of users [73]. Posts pertained to women's health in general, from pregnancy to menopause. Some posts promoted the use of herbs and medications (e.g., essential oils, natural vitamins, herbs to relieve menopause or pregnancy symptoms) without sufficient scientific evidence supporting their use. Furthermore, some of these products such as

herbs have been shown to have a potential negative impact on health [74].

Misinformation on social platforms increased in the past few years, especially since the COVID-19 pandemic [18,75]. While many studies highlighted the risks of misinformation on platforms such as Twitter, Facebook [76], and Reddit [77] research on Tumblr has remained sparse and limited. However, even if the number of identified misinformation posts was low ($n = 7$), it has been reported in the past that organized misinformation/disinformation campaigns presented on the Tumblr platform were responsible for the polarization of politics and general topics [78]. Such campaigns have been reported over other major platforms such as Reddit, Twitter, and Facebook [79–81]. Tumblr is not immunized to such campaigns and future studies should expect to observe, to a certain extent, active efforts of spreading false information or concerted efforts to modulate public perception on certain topics [78]. The importance of the credibility of information present on such platforms is paramount as users tend to adopt health behavior regardless of perceived information credibility [82]. As such, more research is needed to better characterize misinformation – and its impact – on the Tumblr platform.

5.5 Limitations and future directions

In this study, a sample of posts over 4 days was made to lay the foundation of perinatal health representation on Tumblr. To further understand the aspect of community, interactions, and overall discourse associated with these issues, it would be ideal to explore the replies to the original posts. Understanding how users interact, communicate, and share with each other will allow the creation of a community map within the Tumblr platform. As such, this information can guide future researchers on more precise health issues pertaining to perinatal health representation and target specific communities and discourse on the platform. Furthermore, including a higher number of posts and more keywords associated with women's health specifically will allow a better representation of each category and the possibility of finding new themes.

A limitation of this study is the size of the dataset. While some posts are extremely in depth, spanning over 4,000 characters, the number of total posts limits the amount of data that can be analyzed and the overall representativity. Furthermore, the timeline in which the data were collected limits the representation on the Tumblr platform. Future studies should increase the timeline of collection and as such should also increase the total amount of

posts collected. Increasing the number of posts should increase the validity of the findings by supporting the categories and themes found within the study.

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Conflict of interest: The authors state no conflict of interest.

Informed consent: All data collected were publicly available posts, and no data stemmed from private messages or groups. Consequently, no identifiable information nor direct quotes of any posts permitting the identification of users were used in the manuscript. Throughout the article, representative posts were created to demonstrate the themes and sentiments present in analyzed posts while keeping anonymity of users.

Ethical approval: Tumblr is a publicly accessible social media platform where users can expect others, including strangers without an account, to view and follow their posts; thus, it is not considered necessary to obtain ethics approval for collection and analysis of said posts.

Data availability statement: The dataset is not included in the article as to protect the anonymity of the users. Protecting their identity, their username, and their posts is necessary to prevent risks of online harassment and negative outcomes to the users.

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