

Anxiety-Related Content on Instagram and Twitter: A Mixed Methods Analysis of Mental Health Communication and Information Sharing

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ABSTRACT

Approximately four percent of the world's population suffers from anxiety disorders. This makes anxiety disorders one of the most common mental illnesses and a significant global health concern. As social media is a primary source of health information and communication, this study aims at investigating how the hashtag #anxiety is used on Twitter and Instagram. The hashtag #anxiety was chosen because it is commonly used by the social media community to post or tweet about anxiety disorders, such as social anxiety, thus providing broad access to the data. We followed a quantitative approach and gathered open data from December 24th, 2019 to January 1st, 2020. Furthermore, we used a qualitative content analysis to detect topics and patterns within the data. Coding focused on identifying goals, motivations, and feelings concerning anxiety (disorders) and information sharing. Findings show that content and appearance of posts are strongly shaped by characteristics of the platforms. Additionally, the results unveil that both platforms serve as media for sharing information regarding mental health matters, such as personal experiences, challenges, and coping strategies, thereby cultivating a sense of community and support among users dealing with comparable issues. Twitter predominantly functions for real-time updates, in-situ interactions, and emergency communication, while Instagram's visual nature appears to offer a venue for creative expression through images and captions, illuminating the emotional and personal narratives of mental health journeys.

INTRODUCTION

The world is currently facing multiple health challenges. These include psychological and physical diseases, as well as combinations of both, as evidenced during the COVID-19 pandemic. With approximately four percent of the world's population suffering from anxiety (Ritchie and Roser 2018), anxiety disorders represent one of the most common mental illnesses today and a global health concern of significant impact. Anxiety often prevents people from fully participating in social life. Mental health issues are still stigmatized within societies, and stigmatization often prevents affected people from seeking help (Lachmar et al., 2017). The symptoms associated with anxiety disorder hinder face-to-face interactions and can create uncomfortable situations for those affected by anxiety. Social media allows anxious people to enter social interactions from a position of relative safety in terms of facilitating communication with others without the need to leave one's home and/or reveal one's identity (Russo 2020). Social media may therefore function as a space in which people suffering from anxiety can work (together) on their issues. Prizant-Passal et al. (2016) have found evidence that people affected by social anxiety feel more comfortable online than in the offline world. In addition, Narlund et al. (2020) have noted that people struggling with mental health problems tend to turn to social media to connect with peers and seek emotional support.

As social media provides a primary source of health information sharing and exchange (Berry et al. 2017; Narslund et al. 2016), the present study aims at investigating how the hashtag #anxiety is used in both text and image-oriented social networks, focusing on Twitter and Instagram. We decided to capture communicative artifacts employing the hashtag #anxiety as it is broadly used as an umbrella term for communicating experiences of disorders, issues, and problems relating to anxiety. Searching this hashtag yielded a huge variety of social-anxiety-related content. During the research process, we investigated the content people are sharing on Twitter and Instagram in two ways: First, a quantitative hashtag analysis was carried out to determine which hashtags are used most frequently with or in connection to the hashtag #anxiety. We did this in order to identify anxiety-related topics and to contrast the ways in which people use the two platforms. In addition, a qualitative approach was applied to learn more about people's goals, motivations, and feelings in mental health information sharing with regard to the common usage patterns of the two networks. The approach was designed to detect topics and patterns related to feelings of anxiety spread publicly, to support a better understanding of how anxiety disorders are seen by the ones affected by it, and to recognize meaningful patterns created via users' interactions with images and texts.

LITERATURE REVIEW

Anxiety Disorder

Anxiety is an important and normal reaction. Anxiety helps the human organism cope with dangerous situations. Still, unusual behavioral reactions to everyday life situations and stimuli can trigger persistent anxiety. These emotional reactions are known as anxiety or fear-related disorders. They appear in a variety of forms, including panic, social anxiety disorder, phobias, or generalized anxiety disorder (Bandelow et al. 2017; Beck et al. 2005). The symptoms these disorders have in common are outlined in the WHO's International Classification of Diseases (ICD-11), and they include "excessive fear and anxiety and related behavioral disturbances, with symptoms that are severe enough to result in significant distress or significant impairment in personal, family, social, educational, occupational, or other important areas of functioning" (WHO 2018). Anxiety can have multiple causes, including past experiences, exhaustion/burnout, loneliness, and abuse. Furthermore, anxiety can massively impact a person's everyday life. It can lead to social communication problems, avoidance of social contact, panic, distress, insomnia, and an overall reduction in a person's quality of life. Anxiety disorders are usually chronic conditions that may occur in combination with other mental illnesses such as depression, autism, eating disorders, and schizophrenia. Anxiety disorders are commonly treated with cognitive behavioral therapy (CBT), but many people affected also seek help via peer-to-peer and moderated self-help groups, as well as interventions that are offered both online and offline (American Psychiatric Association 2017; Furmark et al. 2009).

Anxiety Disorder and Social Media

Previous research shows that social media is a commonly used tool for people to seek and to share information on mental health issues and wanting a way to connect with persons who feel the same or are suffering from similar health conditions. Furthermore, anxiety sufferers can use social media to do these things without revealing their individual identities (Coppersmith et al. 2015; Naslund et al. 2020). Many people share personal experiences, opinions, thoughts, and other random information relating to their mental health on social media platforms. Oftentimes, sharing such information in the real world can lead to stigmatization (Luo and Hancock, 2020). Narslund et al. (2016) have found that people experience benefits from interacting online because they feel socially connected. They feel they belong to a group by sharing personal stories and strategies for coping with mental illness. They seek advice, learn from each other, and support each other throughout the recovery process. Though

research into eating disorders has demonstrated that social media can be used to foster toxic behavior (Eichenberg et al. 2011), social media offers a place where people can feel safe and empowered to communicate sensitive information about stigmatized illnesses. Sharing such information brings relief through goodwill, recognition, and appreciation from the community (Narslund et al. 2020).

There is a vast amount of studies from a variety of different fields that investigate social media usage in the context of anxiety disorders. Many of these studies specifically focus on the effects of social media upon people's (psychological) wellbeing (e.g. Coyne et al. 2020; Keles et al. 2019; Shensa et al. 2018; Alikis et al. 2017; Primack et al. 2017; Vannucci et al. 2017). These studies show how wellbeing can be influenced by the excessive use of technologies like smartphones and social media. Studies have demonstrated the negative effects that social media have on anxiety. They have even shown how social media can trigger symptoms of anxiety to the point of initiating mental disorders (Coyne et al. 2020). On the other hand, researchers have found evidence that using social media to communicate about mental health issues can have positive effects on patients (Russo 2020; Berry et al. 2017; Lachmar et al. 2017; Narslund et al. 2016). This study does not focus on the psychological effects upon wellbeing of consuming and sharing mental health content on social media. However, the results of this study cannot be seen independently from the broader discussion about the potential risks and benefits of using social media to discuss mental health issues. Indeed, social media's relation to mental health must be considered in regard to the individuality of each disease and the people suffering from it.

Several studies, including those by Berry et al. (2017), Lachmar et al. (2017) and Reavley and Pilkington (2014), have been carried out to investigate and analyze tweets marked with hashtags relating to mental health. These hashtags range from specific types of tags such as #WhyWeTweetMH and #MyDepressionLooksLike to more general hashtags like #depression and #schizophrenia. A recent study by Russo (2020) highlights social media content related to anxiety disorders that has been marked with the specific hashtag #ThisIsWhatAnxietyFeelsLike. Regardless of what specific disorders these studies focus on, what they have in common is that their results indicate that social media is being used by people to share content about mental health issues, to express thoughts and feelings, and to create a sense of community within social media platforms. Berry et al. (2017) point out that social media offers an infrastructure and an environment in which it is normal to express opinions about issues that would usually be quite difficult to negotiate and express in the outside world. Moreover, when people use social media, they feel connected and empowered. They raise their voices in order to raise awareness and combat stigmas related to mental health issues (Lu and Hampton 2017).

Lachmar et al. (2017) investigated the hashtag #MyDepressionLooksLike to gain insights into how users speak about their depression on Twitter. They analyzed 1,978 tweets containing this specific hashtag. Coding yielded several depression-related topics, including "dysfunctional thoughts, lifestyle challenges, social struggles, apathy and sadness, suicidal thoughts and behaviors, and relief seeking" (p. 1). In addition, Lachmar et al.'s data shows that people share and seek guidance in order to self-manage their mental health. Findings also show that, besides finding relief from symptoms through self-disclosure, users tend to share and seek information about experimental recovery treatments, such as consuming psychedelic mushrooms. Interestingly, Lachmar et al.'s results show that more support is requested through tweets than users are actually willing to give. This suggests that the use of social media functions as a remedy on its own, regardless of what communications actually occur. Indeed, Lachmar et al. (2017) state that neither their study nor any other study in the literature has evaluated whether the emotional support offered by online communities actually

positively influences the health status of patients or whether involvement in these communities leads to an improvement in wellbeing and symptoms. Nevertheless, the researchers consider it possible that users benefit from sharing mental health content on Twitter because exchanging experiences and communicating with others can lead to the temporary improvement of a moment or a situation.

In the case of Instagram, a study by Andalibi et al. (2017) focusing on self-disclosures, responses, and social support in the context of #Depression found that people can benefit by disclosing negative emotions or stigmatized facets of their psychological wellbeing. The results of the study indicate that image sharing is an effective way of expressing difficult emotions. Furthermore, the results show that people use Instagram to engage in social exchanges and tell stories about difficult experiences. Indeed, the evidence shows that sharing focuses primarily on social support and building a sense of community. There are few instances of aggression or support for harmful and/or pro-disease behaviors in these online communities. Mental health content often receives social support in the form of comments, and the content itself often contains personal stories and experiences in reference to the users illness and tend to self-appearance.

While most of the studies in the literature that focus on creating a better understanding of mental health discourse linked to depression (Berry et al. 2017, Lachmar et al. 2017, Andalibi et al. 2017), Russo (2020) explicitly focused on anxiety-related posts on Twitter that have a specific focus on relationships. Furthermore, there is a dearth of studies that examine posts on Twitter and Instagram in order to contrast these platforms and identify people's practices in self-help and peer-to-peer communication.

Russo (2020) evaluated 1,318 tweets with the hashtag #ThisIsWhatAnxietyFeelsLike to provide more information about the specific stories people post concerning everyday experiences of anxiety. Russo's results show how anxiety sufferers view themselves in relation to others. The underlying topics found in the tweets include worrying about and avoiding behaviors that can lead to social interactions and relationships. Russo's data indicates that people suffering from anxiety have difficulty spending time or communicating with partners and family members. This can be exacerbated when triggers are present (e.g. 'social triggers'). The tweets also show that people with anxiety feel stressed and exhausted when others put high expectations on them that they fear they may not meet. These stressful expectations cause negative emotional reactions that result in feelings of misunderstanding, loneliness, and failure. The assumptions of others and the anxiety of the sufferer make it very difficult to feel fulfilled and safe in relationships. While the study was carried out, many people reported situations in which others made insensitive and unsupportive comments. Such comments are very stigmatizing. They delegitimize the severity of anxiety disorders, and delegitimization is not helpful when one wants to connect with others. On the other hand, people also often tweet that receiving social support from others is useful for coping with anxiety, and research on perceived social support confirms it as central to changing dysfunctional symptoms over time (Luo and Hancock 2019).

RESEARCH DESIGN

Research Questions

Starting from the theoretical considerations, and the given body of research, this study aims to examine how people use the hashtag '#anxiety' for mental health information sharing. To accomplish this, the study addresses four questions:

- **RQ1:** Which hashtags are used in combination with #anxiety to specify anxiety-related social media content?
- **RQ2:** What patterns and differences can be identified in #anxiety related posts on Twitter (tweets) and Instagram (images and captions)?
- **RQ3:** How do the functionalities of the platforms shape or influence mental health content?
- **RQ4:** What kind of information sharing practices can be derived from the #anxiety postings?

By answering these questions, this study gains deeper insights into people's peer-to-peer communication in the context of anxiety-related mental health information sharing via social media.

METHODS

Social media platforms such as Twitter and Instagram generally provide the opportunity and the ability to examine social data on a variety of topics, on a massive scale, and over short periods of time. Studying these platforms can provide a better understanding of the social relationships and behaviors of users and even specific social groups. Furthermore, social media platforms are helpful for documenting opinions, changing moods, sentiments, and emotions at the aggregate level. This can lead to a better understanding of current discourses, and it may help to forecast the (future) behavior of some social groups. Still, one must keep in mind that social media scraping may generate selection bias, as a given selection may only represent a small group of a larger population, potentially sharing characteristics making it actually a subset of the broader population. In the context of social media, data collection and analysis usually cannot implement a strategic approach to sampling, but allows the identification of trends and discourses, both of which are important to this study.

Several studies have shown how aggregating and analyzing social media entries can generate broad and valuable insights into both the variety and distribution of mental health information, as well as patient communications (Yazdavar et al. 2020; Gupta and Ariefdjohan 2020). The data collection and curation process used in our study was already validated in previous studies. The procedures and results were modeled on the example set by several previous studies (e.g. Narlund et al. 2016; Lachmar et al. 2017).

By comparing data sets from two different social networks, this study considers the platforms' influence on recurring communicative artifacts. The predominant distinctive features between Twitter and Instagram during the time of the analysis supposedly relevant to the analysis were their different aesthetic foci (text oriented vs. image oriented), their diverging restrictions in terms of text length (280 characters for Twitter vs. 2,200 characters for Instagram), number of hashtags allowed (30 hashtags for Instagram), link inserts (possible with tweets but not with Instagram-postings), and the different curations of a person's profile page which can lead to a longer visibility for Instagram-posts (three in a row) than for tweets (one in a row).

PROCEDURE

Instagram posts containing the hashtag #anxiety were scraped by using an apify actor based on Node.js. In addition, we collected Twitter data with the hashtag #anxiety by crawling Twitter's Rest-API. The resulting data was stored in a structured form on an Excel data set. The hashtag #anxiety was chosen for the scraping as it allowed us to cover a variety of anxiety-related phenomena ranging from initial signs or symptoms to pathological issues without restricting our research to a specific anxiety disorder. This procedure allowed us to create a broad data set that allowed us to map a discourse of anxiety-related information sharing and communication. Between the 24th of December 2019 and the 1st of January 2020, 30,358 public Instagram posts containing captions and images and 15,986 public tweets were collected. Although the posts are from public accounts, we decided not to

publish account names and hashtags along with the content of posts in order to protect this vulnerable group. Even if individuals might be protecting themselves by not using their real names as account names when sharing sensitive personal information, their privacy must still be protected.

DATA CLEANSING AND ANALYZING

As we wanted to examine people's practices with regard to their health-related communication and information sharing, we focused on analyzing the communicative artifacts of private individuals. We therefore eliminated items such as public service announcements, advertisements, spam, or duplications. This was done in the first data cleansing process. Posts containing languages other than English and German were also filtered out. Furthermore, we excluded all retweets, all comments and answers to postings, and all posts containing only pictures without text. As the data set is supposed to represent the community, all postings or tweets from personal accounts were kept in the data set, regardless of the number of followers, likes given to a post/tweet, or whether someone gave any information about the pathological diagnosis of their anxiety. Furthermore, all posts from allies, friends, and family were kept in the final data set, as those people are part of the community. Using qualitative methods, we identified 901 postings from individual accounts on Twitter and 796 postings on Instagram. The various tweets and posts were clustered into two different data sets and analyzed in terms of three areas of interest: captions, pictures, and hashtags.

Tweets and Instagram postings were coded inductively in Excel. Content analysis was then used to analyze the data qualitatively, as this is an established technique for examining information and content in text-based materials (Neuman 1997). Anderson and Kanuka (2003) have described content analysis as a suitable method for conducting e-research because it is based on the analysis of text documents. It also helps to analyze online materials through coding and category development. Coding proceeded iteratively with reflective discussions until main- and subcategories were created. Following Anderson and Kanuka (2003), connecting-codes within and across the categories were identified. The analysis also included the quantitative evaluation of the use of other hashtags that had been assigned in combination with the hashtag #anxiety. This helped to identify related hashtags and topics on both social media platforms. The analysis of Instagram postings also implied the identification of image content that had been shared in combination with the hashtag #anxiety to get an impression of the types of images that occur most frequently in conjunction with the hashtag #anxiety.

FINDINGS

Hashtag Frequency Twitter and Instagram

In total, we found 3,846 hashtags spread over 901 tweets, and 12,747 hashtags spread over 796 Instagram postings. As a first step, we conducted a quantitative frequency analysis of the hashtags used in combination with #anxiety in order to locate any thematic clusters existing within the shared contents. We also tested to see if these thematic clusters differed between the two social media platforms. The following tables present the 20 most commonly used hashtags in combination with #anxiety:

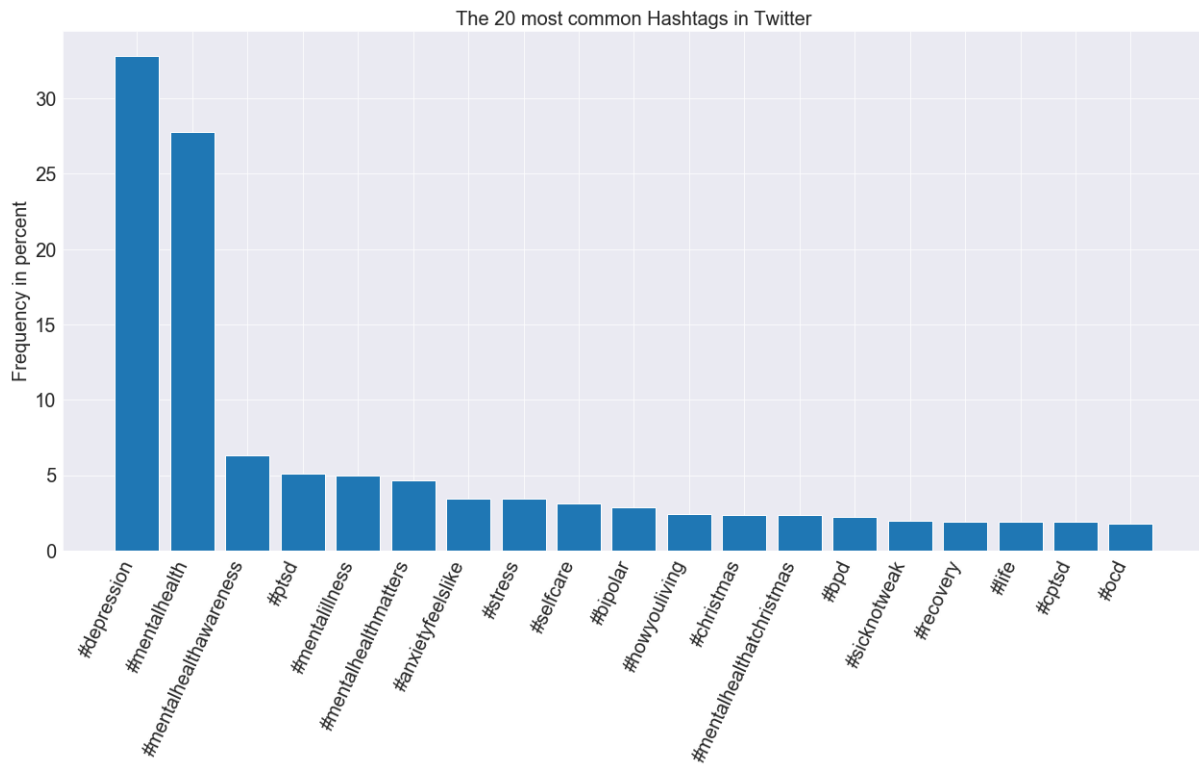


Figure 1: Top 20 hashtags on Twitter, measured by percentage. $n=3846$.

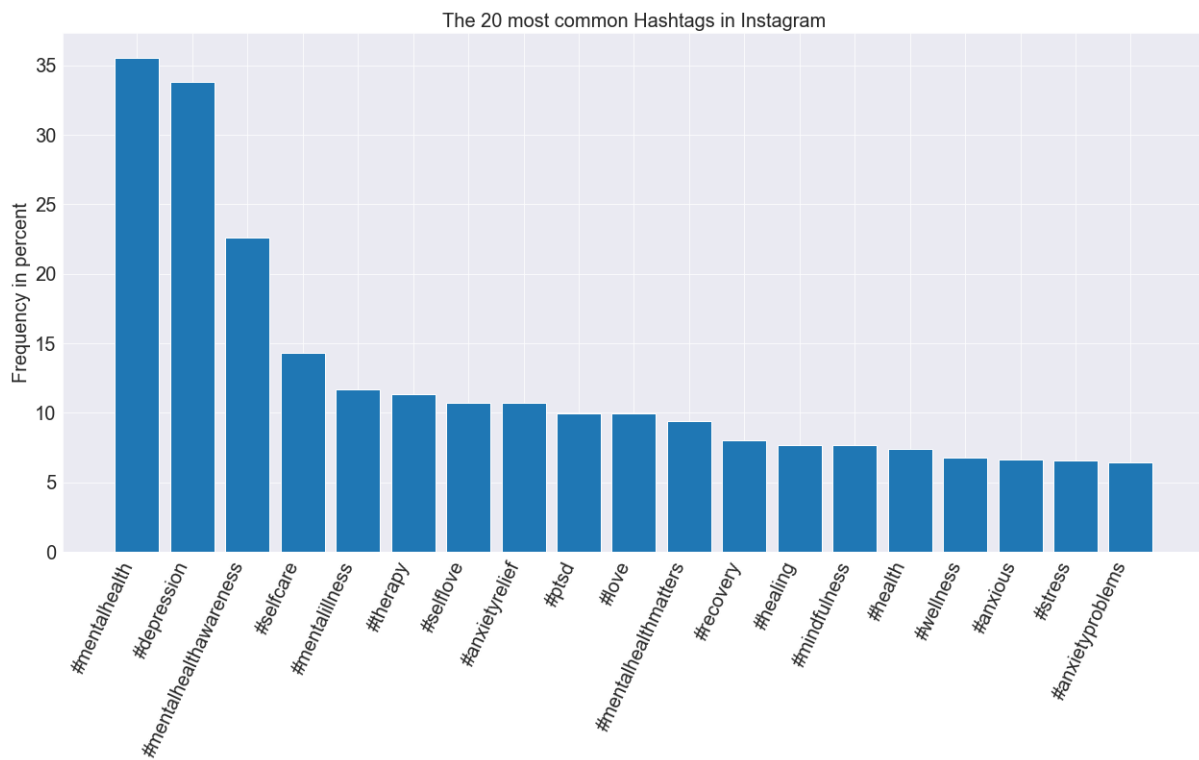


Figure 2: Top 20 hashtags on Instagram, measured by percentage. $n=12747$.

The visualization shows that, when comparing the two networks, the hashtags used seem to be not too different from each other. However, the frequency of their application varies greatly. In Twitter (see Fig. 1) we only found two hashtags (#depression and #mentalhealth) with a two-digit percentage range. In contrast, on Instagram (see Fig. 2), we discovered ten hashtags in that range. Furthermore, even the remaining hashtags have a higher frequency on Instagram than they do on Twitter. For both platforms, #depression and #mentalhealth are the most common hashtags. Among the other top 20 hashtags (see Fig. 2 and 3), there are several overlapping terms. These include terms like #mentalhealthmatters, #mentalillness, #stress, #ptsd or #recovery. We also detected different foci. In the case of Twitter, we found a high usage of concrete diagnosis information (for example, #ptsd, #cptds, #ocd, #bipolar, and #bpd are present in the top 20 Twitter hashtags). On the other hand, when studying the Instagram data, we found lots of hashtags that could be identified as motivational or supportive in a general sense (#selfcare, #selflove, #love, #wellness, #mindfulness), as well as hashtags pointing towards cure and relief (#healing, #therapy, #health, #anxietyrelief). A hashtag-based connection to the holiday season in the top 20 hashtags only occurred in the Twitter data (#mentalhealthchristmas).

By analyzing the most frequent combinations of two to three hashtags, the notion of different foci became even more apparent. We found a combination featuring concrete diagnosis (#anxiety, #depression, #ptsd) in the top seven combinations on Twitter (see Fig. 3). Instagram hashtags, were rather recovery-oriented, motivational or supportive (#selfcare, #selflove, #love, #wellness, #mindfulness), as well as pointing towards cure and relief (#healing, #therapy, #health, #anxietyrelief).

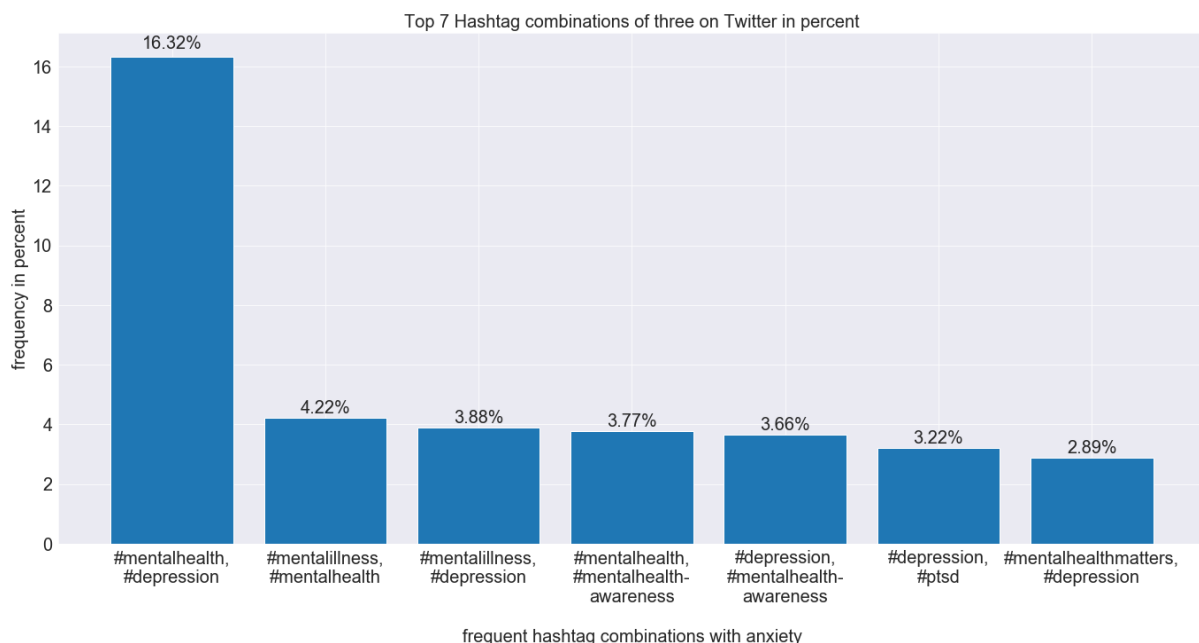


Figure 3: Top seven hashtag combinations of three on Twitter (in percent, $n = 901$).

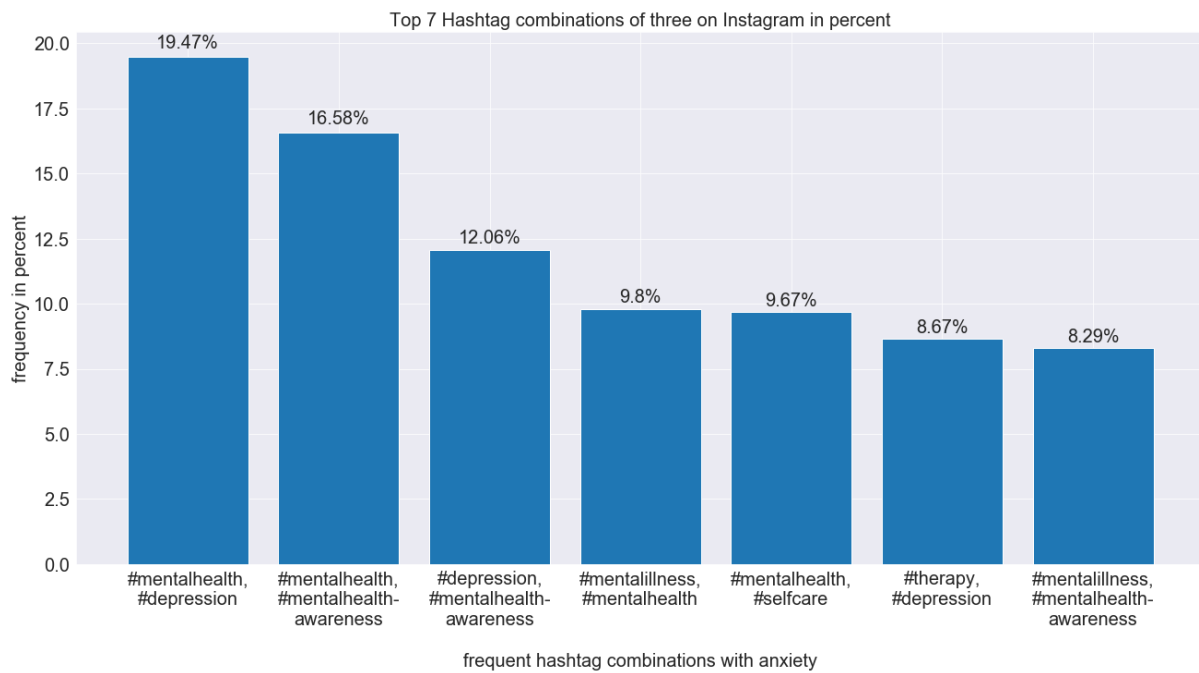


Figure 4: Top seven hashtag combinations of three on Instagram (in percent, $n = 796$).

Content Analysis Twitter

During the content analysis, four major categories emerged by which Twitter users share their experiences of anxiety: (T1) Diary entries, (T2) Community–Inside (T3) Community–Outside, and (T4) Mood Management. In total, we assigned 818 out of 901 tweets to these main categories.

In the following section, these categories are described further. They are also illustrated with example tweets that show the different manifestations that can be detected.

Table 1. Twitter analysis of #anxiety themes and descriptions

Category	Description	Tweet example	Tweets in total
Diary entries	Tweets that show a certain temporal routine, e.g. updating through reviewing the week, day, month, or year in the context of anxiety-causing situations and experiences.	<i>“Faced anxiety head on today and while my pulse is still around the Usain Bolt level, I’m feeling pretty darn proud of myself. Couldn’t have done today a month ago. Realising that some fears can be defused when you run right towards them [...]”</i>	281
Community-Inside	Tweets focus on established communities in a person’s inner circle, and that deal f.ex. with experiences relating to family, friends, or colleagues.	<i>“My family have always been amazing in regards to my mental health, but anyone who doesnt suffer can never truly understand. [...]”</i>	162

Community-Outside	Tweets mainly dealing with building up (new) communities and that thereby follow different approaches containing motivation, protection, help, and support.	<i>“Twitter folks: Tell me all that I need to know about weighted blankets. Have they worked wonders for you? Helped with #anxiety #PTSD #insomnia ? Which are the best brands. What is the ideal weight? Thanks for your help. [...]”</i>	232
Mood Management	Tweets consisting of citations, wisdom, motivational phrases, and spiritual messages that are not inseparably connected to the individual posting.	<i>“It is very hard to explain to people who have never known serious #depression or #anxiety the sheer continuous intensity of it. There is no off switch.’ - Matt Haig”</i>	143

Category T1: Diary entries

The tweets that make up the diary entries category mainly focus on the communicators themselves. They consist of utterances dealing with one’s own (anxious) personality and feelings (subcategory 1a), as well as one’s concrete behavior in anxiety-related situations (subcategory 1b). Diary entries are characterized by a high frequency of the words “I,” “me,” and “my.” They tend to not be addressed to a concrete other person. This impression is supported by the fact that diary entry tweets usually do not contain questions or have a demanding character.

“Faced anxiety head on today and while my pulse is still around the Usain Bolt level, I’m feeling pretty darn proud of myself. Couldn’t have done today a month ago. Realising that some fears can be defused when you run right towards them. #anxiety #fear #goals #movingon”

T1a. Anxious personality and feelings

Entries in this subsection include moments of outing and self-disclosure, as well as instances of dealing with anxiety disorders in general, as the following example illustrates:

“I see no reason to hide that I suffer from #depression and #anxiety. I’m not ashamed of it, and NO ONE ever should be. I am always going to BE ME! #mentalhealth”

They also contain descriptions of what it feels like to have an anxiety disorder:

“This is exactly what my anxiety attacks are like, it’s like i visit another dimension while being in the present at the same time #anxiety”

“It’s really difficult for me when I screw up a project at work. I had been told for 8 years that I was a fucking worthless human being with no value. #Anxiety and #Depression are in overdrive when I make mistakes. These feelings are very real. We can’t just “get over it”.”

T1b. Describing situations and anxiety experiences

As the following examples illustrate, tweets in subcategory 1b are bound to concrete experiences and situations:

"Today has been one of them days where I wake up full of intense anxiety and depression. I cried for no reason, been tempermental, irritable and I just want to hide in a dark corner. (The Town of Light) #MentalHealthAwareness #Bipolar #Mood #Depressed #Anxiety"

"I called to make a doctor's appointment yesterday but panicked when they answered so I hung up, did the dishes, ate a sandwich, and fixed the bathroom sink before I worked up enough courage to call again #anxiety"

"I had really intense anxiety this morning, and I had to go on the bus. But you know what? I did it. [...]"

As the scraped tweets originate from the time between Christmas and New Year, it is not surprising that dealing with the holidays takes on an important place in the diary entry tweets. These tweets include stories and moments of success as well as ones of failure:

"Well I got through Christmas and family gatherings without having a panic attack. I love #Christmas but #anxiety sucks. I'm glad it's over. Now for the #NewYear!"

"Who knew hiding in the bathroom for a bit during dinner with the family would actually reset my mood #anxiety #MentalHealthAtChristmas #bipolaridorder"

"Quick trip to #Rhody to visit family didn't go well as in I couldn't see them #anxiety won that battle...anywho great to be home with my #furbuds #theygetme 🐾💕"

Category T2: Community–Inside

The tweets in this category focus on maintaining and describing already established communities in a person's inner circle. They mostly concentrate on utterances dealing with experiences in regard to family, friends, or colleagues. This category includes tweets made by anxiety sufferers as they communicate with those around them, and it also includes tweets from individuals who are in contact with people suffering from anxiety.

"#anxiety this is so true because I have a good friend with anxiety. I always think of his feelings when going to a public space and when he needs that time alone. People with anxiety need understanding and not judgement."

As mentioned above, the data set was collected between Christmas and New Year. Therefore, it is not surprising that there are many Christmas related tweets in this category, as this holiday is deeply connected to the family.

"Only went and did it! Christmas family meal in a public restaurant accomplished. Yes it was terrifying. Yes, I nearly had a panic attack. Yes, my boyfriend had to pick out my salad for me at the salad bar because my hands were shaking...but I did it. #anxiety #bipolar"

"My family have always been amazing in regards to my mental health, but anyone who doesnt suffer can never truly understand. Today I cried happy tears as I opened a gift from my daddy.. 💕 #MentalHealthAwareness #Anxiety #PTSD #PTSDchat"

Category T3: Community–Outside

The tweets in the Community–Outside category mainly deal with building up (new) communities. Their approaches can be clustered into three subcategories: (3a) motivation, (3b) protection, and (3c) help and support. The tweets belonging to those categories often consist of questions or calls to action. Many of them do not have a concrete addressee but feature community-oriented wording. An example highlighting the characteristic features of this category can be found in the following tweet, which includes a combination of questions, a direct address to an audience, and information about the author that lets readers understand that the author belongs to the group of affected people:

"Twitter folks: Tell me all that I need to know about weighted blankets. Have they worked wonders for you? Helped with #anxiety #PTSD #insomnia ? Which are the best brands. What is the ideal weight? Thanks for your help. [...]"

As the following example demonstrates, these tweets also tend to contain educational content informing others about the specific nature of anxiety:

"It's so hard for people with no #anxiety to tell u "there's no reason for u to be #anxious" they don't know how painful, suffocating and heart-shaking it is to do something that might trigger ur #anxiousness. It's easy said then done [...]"

T3a. Motivation

The tweets in this category aim to motivate others to fight their illness and to stay strong. As the following tweet demonstrates, these motivational utterances are characterized by inclusive wording emphasizing the fact that the originator of the tweet belongs to the community:

"My fellow demon fighters and warriors / Hugs / We got this / We can survive this #Depression #anxiety #SuicideAwareness #MentalHealthMatters"

T3b. Protection

The tweets of subcategory 3b spend less time portraying their author as part of the community of affected people than the tweets of 3a. As the tweet below demonstrates, they concentrate instead on giving concrete hints and advice:

"You know when you're #anxious, and you start thinking all the bad stuff, then you think that you're annoying and shouldn't be close to people, and that you should eat all the junk and maybe cry? DO NOT GO ON THAT PATH! #AnxietyFeelsLike #anxiety #MentalHealthAwareness"

T3c. Help and support

This category contains tweets in which people seek help and support as well as those in which they offer the same. Tweets that seek support often contain detailed information about the author and/or the situation in question:

"Suffering with anxiety disorder and panic attacks from last 1 month. Consulted many doctors, tried some pills but still anxiety is not leaving me it made me insomniac and it's effecting my daily life. Any suggestions? [...]"

"I am on antidepressants (sertraline) it takes the edge of but its still unbearable I just wanted advice on is there anything else I can do I've tried literally everything and nothing works. #anxiety [...]"

In addition to dealing with recommendations for actions and medications, 3c tweets also focus on concrete artifacts that can be used to achieve relief from suffering. For example, consider this Tweet regarding weighted blankets:

"Advice for anyone with anxiety: get a weighted blanket. I tried one on a whim and it's been the best thing ever 🤗 [...]"

"Using this tonight!! I can't wait! I've heard all good about them for anxiety-depression and autism!!! I have anxiety-I will keep you posted if it works!! [...]"

Category T4: Mood Management

The Mood Management Category consists of citations, wise sayings, motivational phrases, and spiritual messages that are not inseparably connected to the individual that is posting them, but rather function on a more general level, as the following examples illustrate:

"#Anxiety is the hand maiden of #creativity.' - T. S. Eliot"

"Acceptance of our past, present, future, ourselves and what others do is a key to contentment and happiness and very helpful to combat #anxiety and #depression"

"Life happens in the process. Don't let goals cloud the beauty of this moment' ❤️🙏"

"It is very hard to explain to people who have never known serious #depression or #anxiety the sheer continuous intensity of it. There is no off switch.' - Matt Haig"

The mood management category also contains tweets relating to the holiday season:

"Holidays make my anxiety worse. Just know that I do care but sometimes I need a quiet place to try to reign in my anxiety." — Shannon Trevino [...]"

Within the mood management category, the community shows solidarity with those who suffer by showing commitment in a distanced way in sharing quotes or wisdom in context of mental health topics.

Content Analysis Instagram

Overall, it was striking to discover that the Instagram postings studied were quite text-based, even though the platform is primarily image-oriented. Instead of using the caption to describe a picture, most of the captions are used as diary entries. These postings mainly summarize a person's experiences of anxiety during a given day. Therefore, many of the images in these posts seem to be rather secondary to the users, as the focus of the users who authored these posts is directed towards the caption text. In fact, there are only 52 out of 796 captions that refer in any way to the image within the post. All the remaining posts did not refer to the image. Through image analysis selfies and portraits were identified to be the most used image accompanying the content of an Instagram posting (see Tab. 2)

Table 2. Top 10 Instagram image categories (n=796).

Image Category	Count
Selfies and portraits	135
Picture containing poetry / life wisdom / motivational slogans	118
Drawings and art	55
Infographics and educational texts	40
Videos	36
Christmas pictures	31
Pictures of nature and plants	28
Memes	25
Pictures of animals	24
Food pictures	19

By analyzing the captions of Instagram posts, we inductively derived four categories from the data set: (1) diary entries, (2) gaining relief through self-disclosure, (3) fighting anxiety with motivational phrases; and (4) anxiety treatment. Table 1 shows an overview of the categories. It includes descriptions and examples, as well as the total number of assigned Instagram posts for each category:

Table 3. Instagram analysis of #anxiety themes and descriptions

Category	Description	Examples	Number of total posts assigned to the category
Diary entries	Posts that show a certain temporal routine, e.g. updating or reviewing the week, day, month, or year in terms of anxiety-associated situations and experiences.	“Today is just one of those days where I feel like I can’t do anything right. I haven’t been keeping up with my meal plan. I’ve been breaking my own rules. [...]”	235
Self-disclosure, confessions, and outings	Posts that contain a kind of outing in which the communicator consciously reveals himself and talks about his anxiety.	“Yes! I am the same girl who had an anxiety attack last night, yet, here I am ♀ As someone with neuromuscular disorder, certain things really disturbs me. [...]”	125

Fighting anxiety motivational phrases	Posts that take a motivational approach to fighting anxiety. Either the recipient's address themselves, their anxiety, or the community.	"Thats right!! Anxiety can just shut up!! I know what anxiety can do to you and how it feels like. But you have be strong and fight it!! [...]"	123
Anxiety treatment	Posts about anxiety treatment in general, experiences with and demands for medications and therapy, recommendations for alternative treatments, and tips for reducing anxiety in certain situations.	<i>"on what it feels like to take anxiety medication that's supposed to help you but does the opposite just gotta try a few more until i find the right one. [...]"</i>	152

Category I1: Diary entries

In the Instagram posts assigned to the major category *diary entries*, the communicator often gives an update or review of a day, week, month, or past year(s). Posts often contain or start with a concretization of the time in question ("Today", "This week," or "Last year") and describe feelings, situations, and experiences of anxiety. This category consists of generally positive and negative entries as well as event-specific posts, including posts about anxious experiences before, during, and after family gatherings held on Christmas and New Year's Eve. They also contain holiday-related content such as reviews of the past year or New Year's resolutions. *Diary entries* on Instagram often contain the words "I", "me" and "my". They are very specifically linked to one's own very personal experiences, and they reflect on one's own behavior, as can be seen in the following example:

"Today is just one of those days where I feel like I can't do anything right. I haven't been keeping up with my meal plan. I've been breaking my own rules. I am transitioning jobs and feeling like a failure for not just tolerating stuff that was happening at the other. I lost my new glasses. I just feel like decision after decision is wrong. And on top of that, my body image is and my anxiety is [...]"

The postings in this category tend to present the author's own feelings in combination with certain concrete situations. They allow for further elaboration and concretization. They include clusters of uncomfortable situations as well as a person's reactions to such situations. These postings can be divided into two subcategories: (1a) general feelings and situations connected to anxiety and (1b) concrete feelings and situations connected to anxiety.

I1a: General feelings and situations connected to anxiety

The postings in this section present prototypical situations that elicit anxious reactions from sufferers. They also present coping and/or reaction strategies. They communicate one's point of view on the disease of anxiety as a whole, and they comment on societal awareness and individual affectedness. These posts describe how users perceive their anxiety. They discuss what anxiety feels like and what the consequences of having it are, as the following excerpt demonstrates:

"[...] if i'm late to something, there's a 90% chance i'll just not go at all; the thought of entering a space where others are already settled into really makes me anxious. the thought of "making an entrance" is terrifying to me. if i get ill and have to call sick to work i get anxious, because i'm scared they'll think i'm lying, for whatever reason. [...]"

In the above quotation, the user describes in detail what situations make them feel anxious and how negative thoughts keep them away from social interactions. The assumed judgment of the outside world makes the user feel unaccepted, unwelcome, and invisible. The postings in this section are detailed and personal, as can be seen in the following example:

"I will start by making myself the topic of the day. #ANXIETY is one of the types of mental health ill-health that I face. It ruins my social life, I have limited friends, in a room full of people I feel like the awkward and odd one out in the room. Most people interpret my being anxious as unsociable and as not being friendly or approachable. [...] My anxiety affects my work life, when I have to give presentations or attend meetings and speak in the midst of people, my voice shaken, my hands become moist all of a sudden and my heart starts to race very fast. My anxiety affects a lot of my decisions in life and I feel that if I was not so anxious and I was more confident in myself I would have accomplished more in my life. [...]"

This post describes in detail what it means to suffer from anxiety disorders. For anxiety sufferers, social interactions are accompanied by fear. This hinders the development of social relationships and actions such as making friends, mastering work situations, and perceiving oneself as a valuable part of society. The pressure of suffering is described as particularly high, and the desire to be freed from anxiety is discussed:


"I will start by making myself the topic of the day. #ANXIETY is one of the types of mental health ill-health that I face. It ruins my social life, I have limited friends, in a room full of people I feel like the awkward and odd one out in the room. Most people interpret my being anxious as unsociable and as not being friendly or approachable. [...] My anxiety affects my work life, when I have to give presentations or attend meetings and speak in the midst of people, my voice shaken, my hands become moist all of a sudden and my heart starts to race very fast. My anxiety affects a lot of my decisions in life and I feel that if I was not so anxious and I was more confident in myself I would have accomplished more in my life. [...]"

The post above describes how the symptoms of anxiety prevent people from participating in society or social life. They also thwart career plans and important life opportunities. The person who authored this post feels that their mental illness has prevented them from having a successful life.

I1b: Concrete feelings and situations connected to anxiety

Most postings in this section refer to the holiday season (Christmas and New Year) and describe how anxiety symptoms are aggravated by social situations at family gatherings. Some posts share that panic and anxiety attacks have occurred during the author's holidays. Not only do people feel anxiety in a social situation itself, they can also feel anxiety when thinking of certain situations before, during, and after they occur.

Many of the posts in this category indicate that anxiety levels are at a peak over Christmas. As many users note in their posts, this event triggers anxious thoughts. However, it also motivates many people to share their experiences:

"I know it's Christmas but anxiety is HUGE. Scroll  When mine is out of control I have tremors.. headaches.. more weakness etc...and sometimes it can get worse at busy times like Christmas. [...]"

"Christmas Eve Today is a tough one...there's a lot of pressure and my anxiety is getting higher. I hate the build up to Christmas and then the feeling that it wasn't as good as it was supposed to be. [...]"

Users also posted about specific Christmas-related situations that had frightened them, as well as circumstances that had made them feel pressured or that had triggered them. In the following posts, perfectionism, loneliness, and sadness are described as triggers for anxiety.

The following post describes what kinds of coping strategies may help one to get through this difficult season without avoiding social events. It also describes ways to gain back confidence and control over situations that might be frightening at first glance:

"[---] I have always loved Christmas, but it can also feel like quite a lot of pressure - gifts, large groups, food choices, memories etc. I used to bring a couple of extra gifts wrapped up without labels in case I'd forgotten anyone! I thought I was getting better at managing my anxiety by doing things to avoid situations in which I might feel anxious... But surrendering to lack of control & rebuilding the confidence to just let these moments pass feels a lot more like recovery to me now. If you feel anxious over the next couple of days remember you are only human and perfection is just trying your best. [...]"

Social interactions at Christmas are described as painful by those affected by anxiety. Nevertheless, the posts show that positive experiences in social interactions are perceived as a form of success. In fact, such positive experiences increase the wellbeing of anxiety sufferers. In the next post, accepting one's own anxiety is posited as a strategy for dealing with overwhelming situations:

"I'm thankful for the subtle smell of the Christmas tree that brings me back to presence. 🌲🌲🌲 I'm thankful for my anxiety because it reminds me that I am alive and that I can feel. [...]"

"Fitting in and being a part of larger groups of people has always filled me with anxiety. Maybe you can relate? I know meeting new groups of people can take a lot of energy. [...]. This Christmas I'm spending with my German girlfriend's family and it's been so lovely to share moments of play with everyone. Despite the language barrier and feeling like a bit of a newcomer. It's been so much fun and I'm glad they welcomed me in, in such a nurturing way. [...]"

Postings dealing with the New Year differ from those connected to Christmas. New Year's oriented posts deal especially with reviewing the past year(s) and making New Year's resolutions connected to mental illness. These posts include discussion of negative experiences like mental breakdowns, social isolation, relationship breakups, and the ups and downs brought about both by diagnosis and experiences with medications:

"2019 was... a year. My anxiety kicked in full force and I fucked up with someone who is probably the love of my life (I can say this without dying of embarrassment because she's not on Insta) I really want to have the courage to try to fix it, but talking to someone you know you've hurt is terrifying. Probably making a fool of myself, but I'm feeling kinda brave and maybe reading this will make someone feel better about not having their shit together either [...]"

"[...] the last few months- was the scariest, most tumultuous time of my life. I've grown and fought for myself and clawed through the pain, but not without a lot of sobbing, constant mistakes, and steady increases in medication & therapy. 🌱🌱 was so relieved when my dr diagnosed me with BPD, and I specifically remembering being warned (by a peer) that the first few months after my diagnosis could be a downward spiral. [...] If your head is spinning from that last paragraph, welcome to my 2019 experience. It's been hell, but damnit if I don't feel good about 2020."

Positive experiences are also mentioned in these posts. For example, progress in the recovery process or thankfulness for the good things that have happened in the past are often discussed. As the next example suggests, making new friends and having a supportive and understanding family are often noted as positive aspects of a user's life:

"The year's nearly over, and I haven't been able to stop thinking about how grateful I am for this life. This year. This family. To be frank, this year was probably my worst yet. Started out great, and it's ending great. [...] I'm ending the year with my boys again, and feeling more loved than ever. I'm going into another year with the same best friends by my side [...], and I've created so many friendships through the year. I've broken out of my comfort zone, and I'm on my longest stretch of medication yet-progress and stability I have so much anxiety and some sadness and guilt still, but on days like today, the relief, the hope, and love take over. merry Christmas, and happy new year! [...]"

"2019: the year, I beat my anxiety and stopped having panic attacks. The year, I graduated from University with a writing degree. The year, I became confident on film sets and specialized in costumes, props, and set design. The year, I did stand up comedy. The year of making the best friends I have ever met. The year, I started my fitness journey. 2020 will be my leap of faith year. I am very excited for it. [...]"

Category I2: Self-disclosures, confessions, and outings

This section contains posts revealing central details about one's anxiety and or mental illness. These posts should not be considered as regular postings that one might expect from a typical user. Indeed, these posts include an exceptional amount of information about the user, as the following example demonstrates:

"Hello, a quick intro : my name is Kristin and I live in Seattle with my young family. I am a designer by trade and an aspiring artist. I live with chronic anxiety and have been working on it through therapy and medication for three years now. [...]"

Instagram users use the platform to come out as anxiety sufferers and to stand alongside their mental illness in front of their community. Some of the postings appear to contain information given for the first time, and they are similar to the procedure of coming out that is associated with the LGBTQI+ community. With these posts, users prove their strength to themselves and others, particularly when overcoming a time of personal crisis:

"[...] I chose to withdraw from society with the expectation that I would rejoin the world when I lost weight. Unfortunately, this plan backfired, fueling my anxiety, and ultimately keeping me a prisoner in my condo. I want my life back, and I deserve it. This is what I look like right now, and while painful to look at, it's me. Effective immediately, I quit hiding from the world. Many of you are likely going to react with disgust, that's your problem, not mine. My name is Joey, and I'm back [...]"

"Yes! I am the same girl who had an anxiety attack last night, yet, here I am ? [...]"

Instagram users, in their self-disclosures, tend to provide very detailed information about their anxiety. Their posts often contain descriptions of how anxiety and anxiety attacks feel like. In the example below, the user mentions various symptoms that occur during an anxiety attack. The user explains in detail how their inner fear rises and how they become physically anxious. The user experiences increased heartbeat, sweating, and cold feet. In addition, the user reports about insomnia and irrational fears that interrupt their logical and constructive thought streams. The physical and mental symptoms of anxiety go hand in hand and trigger each other, and this user describes this as a circle of anxiety made of endless loops that cannot be broken by rationality:

"[...] I could feel the anxiety slithering in slowly with each passing hour. Then comes the night, which is dark and full of terrors, I laid down on my bed, my chest thumping loud, my palms getting sweaty and legs cold despite wearing warm socks. I knew it right then that the moment has come where my irrational fears will piss on my logical reasoning. The more anxious i was, the more weird sensations I could feel in my body and the more weird sensations, the more anxious I was. It turned into a neverending loop. I knew I was having an anxiety attack but I couldn't do anything about it anymore. I was having trouble falling asleep. So I laid there, let my fears feast on me, while I cried myself to sleep [...]"

This user also describes the strong combination of physical and psychological suffering that can be experienced during anxiety attacks:

"[...] I could feel my brain start to revert back into its overthinking ways, back into its over analyzing every physical feeling my body would give me. I started crying "No, I can't go back into this place, I don't want to feel this feeling again." My anxiety has been so manageable lately, that last night scared me so much. It's still here. I was hoping maybe it wouldn't show its ugly face around here again. . I do know that recovery is a journey. [...]"

Self-disclosures are often accompanied by statements that conceptualize mental illness as something that should not make anyone feel ashamed. Such statements encourage other users to come out on Instagram as anxiety sufferers:

"Long post alert!!! So I've been thinking a lot about #mentalhealth the last few days. Most people who know me know that I am not shy about my anxiety problems and am always willing to talk about it as I don't consider it something to be ashamed of. [...]"

Category I3: Fighting anxiety & motivational phrases

This category brings together all the posts that use a motivational approach for dealing with one's self and one's anxiety. The posts in this category seek to motivate users to fight their illness together as a community:

"My brain just wants to give up but I don't even know what that looks like for me. I'm not a quitter. I have standards and I hold my boundaries - but I don't quit. Just gonna keep fighting the good fight. What is something you do to cope on days like this? [...]"

"Still feeling calm, but my anxiety is whispering to me, "I can change that..." Nope, not tonight, anxiety! [...]"

*"Thats right!! Anxiety can just shut up!! I know what anxiety can do to you and how it feels like. But you have be strong and fight it!! It took me 10 years to beat mine. I didn't want my anxiety to get the best of me or to stand in my way to how I want to live MY LIFE! Stay strong loves! And Remember YOU ARE F**king AWESOME!!! [...]"*

There are also entries that are part of dedicated Instagram profiles of individuals who are struggling with an anxiety disorder and who have decided to create and share anxiety-based experiences with and for the community. These posts help transform the social media landscape into a place of communication where users can face challenges and come together to support each other:

"It's easy to feel alone when dealing with a mental illness. This page was created to raise awareness about social anxiety and to provide a safe place for us to connect with each other as a community. We're in this together! [...]"

"Long winding roads, steep mountains, and moments where it isn't always so easy. Having a bad day or days does not make you broken, it makes you human. We just need to take hold in the fact that the reward on the other side is so much greater than we can understand, that it's ok to have days where you stumble, days where you cry, days where you feel lost, and alone. . If this is you today, just know you are not alone. We will get through this, one step, and day at a time ♡ [...]"

In the fighting anxiety section, we identified a high number of postings reporting positive experiences relating to anxiety. Such posts function as positive reinforcement for others. They include reports about friends and allies who have helped sufferers to confront situations of anxiety rather than avoid them. These kinds of positive experiences are generally considered to be important steps in the healing and recovery process:

"[...] If it weren't for him I would have never gone in the store because my social anxiety kicked in and I didn't want to talk to the sales person. He said "Nope, you're going in, come on!" Spoke to the salesman so I didn't have to and could browse, and change my mind a million different times in peace. To some it's just a necklace, but to me it's a reminder that I can do whatever I put my mind to and a reminder of the amazing man supporting me! I will cherish this piece forever! ♡ [...]"

"Safety behavior: Avoidance We tend to avoid things that make us anxious but avoidance is often counterintuitive in dealing with anxiety. The less you expose yourself to anxiety triggers the more likely you are to feel anxious in the same way for the same situation (this is particularly true for social anxiety). The anxiety is reinforced because your brain has not learned to manage the anxiety triggers. Facing your fears is what "exposure" is about. By exposing yourself to whatever triggers the fear response in your brain, you can teach your brain to be less afraid over time. [...]"

We also discovered that persons who have healed from anxiety disorders may share their personal recovery stories and positive outlooks. Posts of this nature describe a life in which one is no longer controlled by anxiety:

"[...] I'm extremely proud of myself now that I have come so far from when I was at my worst in the summer of 2016, and am happy that I have much to be thankful for with my Fiancee, our beautiful baby daughter and our two puppies. I am not stupid enough to consider myself to be cured as I don't believe that is possible but I am certainly in a period where I can say I am not suffering and this period has thankfully been a long one! I will share more about my anxiety in the future in this blog as its such an important topic and if I can even help one of my friends who may be going through a difficult time it would be amazing [...]"

Posts in this category describe in detail the suffering endured during the depths of mental illness, as well as the struggle one must go through to overcome an anxiety disorder. In these posts, positive moments of healing are described as empowering triumphs over one's own demons:

"[...] My anxiety was at an all time high, I could hardly focus on a thing, surviving on crazy amounts of caffeine via Diet Coke + meds. I didn't want to take responsibility for it, or admit I had a problem I could take care of, so I blamed it on just age, and hated every second of getting older. - Two years later I'm proud to be off meds, without a caffeine addiction, and instead a habit of daily exercise to maintain a healthy mental state. - I am glad to be where I'm at, with goals for the new year to make this 32nd year my best yet! [...]"

"[...] The sun rose, and as it is said, a new day brings new strength and new thoughts; so, here I am, ready to slay my demons. [...]"

"I was actually experiencing very little anxiety symptoms, and I have a strong sense of self-compassion for myself. Yes there are still bad days every once in a while and life is going to cause anxious moments (being anxiety is actually normal) but overall my anxiety no longer controls me - I'm free! Aahh so much relief and freedom. Don't get me wrong this 3 year journey was not easy and there where so many moments of pain, confusion, and anger. And I know this journey is not over! But I have now seen the power of the things I teach clients as a counsellor - I have worked through them myself and I know they work! I want to share what I learned with you."

"There is a lot of shame and guilt with anxiety. Many times I didn't feel good enough and questioned my self worth. I was hard on myself for not being perfect and felt less than. What I discovered is that once I began to love and accept myself as is, anxiety and all, my anxiety started to subside. When we are not aligned with self-love, our souls scream out which turns into anxiety. Perfection is an illusion and impossible for anyone to attain. [...]"

Category I4: Anxiety treatment

Posts assigned to this category show that many users exchange information about anxiety treatment. Peer-to-peer interaction is particularly prominent in this category. As many questions are asked and answered by the community, the experiences of others are clearly some of the community's most valuable assets.

Posts about certain anxiety medications, alternative medicines, or treatment methods that can alleviate anxiety are often shared. Such sharing is gratefully accepted by the community. Furthermore, people share not only their positive personal experiences, but also their miserable experiences with anxiety treatment:

“on what it feels like to take anxiety medication that’s supposed to help you but does the opposite just gotta try a few more until i find the right one-”

“[...] In January I started taking clean, plant based supplements that address gut health, blood sugar regulation, and reducing inflammation in hopes of healing an autoimmune disease I have that has some gnarly side effects. I’m not historically great at taking care of my health and it was catching up to not only me, but everyone around me, especially my anxiety. (Did you know at least 70% of your serotonin is produced in your gut-woah!) [...]”

Posts often contain questions about specific foods such as coffee, sugar, and other items that may increase anxiety. Posts also describe the effects that dietary changes have upon users’ minds:

“Well I ate sugar for the first time in a month last night. Holy shit. I had the worst anxiety ever after. Now I’m wondering has sugar always made my anxiety worse?! Anyone? Thoughts?”

“Chicken, potatoes and vegetables! I hate how rubbish my body is feeling so time to get some goodness in. Loads of water and peppermint tea and plenty of self care today as my anxiety is sky high ♡🌸 [...]”

In one particular post, the user notes that playing sports and having a supportive family has helped them to combat their anxiety. Another user describes feelings of relief brought about by spending time with their dog:

“It took 24 Years but I’m finally AWAKE. I found my true purpose in life. My Anxiety is no longer holding me back. I can’t describe how much fitness has changed my life and how important it is. Thank you so much for the support from family & friends ♡ [...]”

“[...] Work has been incredibly demanding lately. The anxiety is causing me panic attacks. And at times I am not sure how to calm myself or slow my breath - then my dog walks over and I remember, this is how you calm down - through them. It is one thing that truly melts my negative emotions away, just petting and hugging my dogs. Far better than any anxiety medication [...]”

Below, a user explains how traveling and taking photos gives them more focus and helps them to combat anxiety. The user also notes that sharing pictures on Instagram and receiving positive feedback makes them feel good:

“For as long as I can remember, I have coped with my anxiety and depression in unhealthy, self-abusive ways; living and nearly drowning in a sea of negative thoughts about past, present, and future. Photography (and travel for that matter) gives me something to focus on, a small reason to stay in this very moment and capture it to the best of my abilities through the lens of a camera. It is most definitely a blessing that so many of my friends, family, and strangers have said such kind words about my photos and for that I am truly grateful. But personally, I am just glad I have stumbled upon a hobby that has the ability to pull me away from my own detrimental thoughts, if even just for a moment. [...]”

Many posts from people affected by anxiety ask for concrete recommendations or reviews. These may range from questions about experiences with weighted blankets to requests for general tips that can help when anxiety attacks occur. By posting such questions, users often receive direct and immediate answers from their community and their peers:

"Has anyone used a weighted blanket? I'm really looking at investing in one in the hope it eases my anxiety at night! [...]"

"Question from Anxiety Attacks: I get very anxious at every new phase of life. How can I manage my anxiety especially when it comes to dealing with the unknown?"

"If anyone has any tips to deal with panic attacks it would be appreciated if you could drop a comment [...]"

In addition, there are several posts that recommend CBD, which is available in various forms such as oils and gummies, as an alternative method for seeking relief from anxiety-related symptoms. A lot of people suffering from anxiety promise that CBD will have positive effects on those who take it:

"[...] I literally had a therapist ask me what I like to do to relax and if I ever do anything fun. My answer was I work and the more anxious I feel the harder I work, and to be honest having fun makes me anxious. . . . Headed into 2020 I'm embracing tools to help tackle the constant worrying and anxiety I've dealt with for as long as I can remember. One of the best things for stopping in the moment worry has been CBD oil, I carry it in my purse, making it easy to take a few drops under my tongue. [...]"

"I'm a little "high" maintenance. 🧐 And even though my anxiety during the holidays has been extra AF, I am well-supported in love and in hemp. CBD Livity has been keeping me sane and my anxiety disorder at bay while I stress out over WTF a turtle dove even is. [...]"

It is popular to share alternative healing methods. Since many users report that conventional treatments have failed to relieve their symptoms, the fact that there is a certain level of disillusionment in the community regarding conventional treatment becomes visible:

"Unfortunately, the medical system's solution to anxiety falls short for many people. If you struggle with chronic stress or anxiety, you may be considering supplementing your treatment with CBD gummies. Several clinical trials with humans are currently underway, but there is already good evidence of CBD's usefulness for: - Generalized anxiety disorder - Panic disorder - Social anxiety disorder - Obsessive-compulsive disorder (OCD) - Post-traumatic stress disorder (PTSD). [...]"

"The healing process may not require a lot of medicines or other treatments... Sometimes the solution could be simply taking a break and refrain from the usual routine. This solution could also help those with anxiety challenges. Instead of the regular routine, build yourself from the inside out by reading the Bible and other inspirations. [...]"

Anxiety treatment posts are directly addressed to users' peers and the community. In the following example, the user gives concrete tips based on their own experience. The user also offers valuable information, including the fact that anxiety attacks can often be caused by shortness of breath:

"So you suffer from anxiety? Me, too! 🧐 [...] I wanted to share some tips on how to alleviate anxiety if you too are struggling! 1. Deep breathing exercises-so simple, yet so underused. Often anxiety is caused simply because we are not breathing correctly."

Some posts contain recommendations for apps that can be used to train one's breathing technique, and others link to specific YouTube or Spotify resources or podcasts that offer meditations designed to bring down anxiety levels:

"[...] Free apps such as "headspace" or "calm" are amazing at helping guide you to slow your breathing. I also love searching "meditation for anxiety" on YouTube or Spotify-so many great free resources! [...]"

Hint-based posts also contain thoughts and advice regarding self-care, self-love, and self-awareness. For example, taking time for oneself, relaxing, and writing down feelings are all offered as ways that sufferers can reconnect with themselves and reduce their anxiety:

"[...] Have some "me" time-when things get too hectic, I like to take myself to a quiet place and relax and just watch Netflix or if that's too much noise, just write in my journal about how I'm feeling or read. [...]"

Another user advises that those suffering from anxiety have an informed person who can be contacted in the case of a crisis. This person can lend support and reassure a user who has encountered a fearful situation:

"[...] Have an "emergency person"-if things are getting too much, it helps to have someone you can trust who understands what you're going through. Occasionally I will suffer from panic attacks and every time I call my mum, because she can calmly talk me out of it. A professional such as a councillor is amazing, too. [...]"

Other voices recommend that those suffering from anxiety contact a therapist to get the benefits of professional treatment and to check whether there is a serious, underlying mental illness at hand:

"[...] Please seek professional help if you are really struggling but also know that it is perfectly okay if you have it, too. My anxiety is part of what makes me my effervescent, hyper self but it doesn't need to control me! Deep breaths, we got this okay?" [...]"

"[...] I then decided to talk to a therapist and she guided me through out. Today I spoke to my therapist and we were discussing about how much and what all new things we have done since then and what progress has been made. She mentioned how probably she would have rated my anxiety 9/10 then and today I'm a 5/10. It made me soo happy. [...]"

DISCUSSION

Using a mixed-method approach, the data was examined quantitatively via an analysis of hashtag frequency, as well as qualitatively via content analysis of tweets and captions and images of Instagram posts. The number of hashtags assigned to posts and tweets is numerically distinct: 3,846 hashtags spread over 901 tweets, and 12,747 hashtags spread over 796 Instagram posts. Certainly, the assignment of hashtags is influenced by the distinct character restrictions of the platforms. Nevertheless, the frequent use of hashtags in Instagram posts (an average of 16 per post) indicates a desire to expand audience reach for the content. Whereas Twitter users only assign meta hashtags to make their content retrievable, Instagram users apply a broad variety of hashtags. The hashtag frequency analysis shows that for both data sets the combination of the hashtag #anxiety with the hashtags #depression and #mentalhealth were the most popular (see figures 1 to 4). A deeper look into the co-occurrences reveals that the Twitter hashtags specifically focused on comorbid mental illnesses, e.g. #ptsd, #bipolar, and #bpd, while the Instagram hashtags, were rather recovery-oriented, motivational or supportive (#selfcare, #selflove, #love, #wellness, #mindfulness), as well as pointing towards cure and relief (#healing, #therapy, #health, #anxietyrelief).

Through analyzing the material via content analysis, we inductively identified eight main categories within the two data sets. For both platforms, the category *diary entries* is found to be the most prominent content type (281 tweets, 235 Instagram postings). As several studies (Luo and Hancock, 2020; Berry et al. 2017; Narslund et al. 2016, 2020) already pointed out, social media provide a safe space to communicate very personal and sensitive information on mental health issues without feeling

stigmatized. People with anxiety disorders are hindered in feeling self-efficacious as they are often struggling with cognitively dissonant feelings, which can have negative impacts on their self image. One way to experience self-efficacy is to communicate inner feelings (Prizant-Passal et al. 2016; Russo, 2020), which is intensively done on both platforms. The routine of writing diary entries and documenting anxiety-related feelings and situations, has the effect of sustaining and supporting social interaction with others and creating a sense of belonging to a group.

The diary entries found in both data sets can be divided into postings focusing on feelings and postings describing actions. Twitter's 280-character limit at the time of the analysis makes tweets more likely to describe one concrete situation or feeling, while diary entries on Instagram are more precise and often describe a set of situations, feelings, or actions by generating a narration around – sometimes even extending the 2,200 characters available by continuing the post in the first comment. This variance shows how the platforms lead to different ways of sharing anxiety-related content. For instance, the velocity and brevity of Twitter allows users to perfectly employ the platform for (affective) in situ and/or emergency communication. On the other hand, the better and longer visibility of Instagram postings calls for well-considered messages that reflect upon anxiety-related situations in a more detailed way. The posts are written in retrospect and created from the user's point of view who has mastered a certain type of anxiety situation. Timeness and timeliness can therefore be seen as a factor shaping people's mental health information sharing in social media-based anxiety-related health communication: Twitter is rather used to communicate and respond to urgent needs in an immediate, short and precise way, while Instagram is employed for detailed and in-depth reflection of past situations.

This impression of variance between platforms is strengthened by the fact that a high number of *self-disclosures, confessions, and outings* (125 postings) were identified on Instagram presenting detailed descriptions of the author's anxiety disorder. The disclosure of negative emotions or stigmatized facets of mental well-being provides relief to people, as shown by the study of Andalibi et al (2017), which further describes Instagram as a tool that enables people to express difficult emotions. In addition to this result, we found the phenomenon of mental health outings as a prominent communication pattern within our study. With regard to self-efficacy, these posts emphasize empowerment, since admitting one's own mental illness can be seen as a first step towards recovery. We did not find content equivalent to these posts on Twitter. This could be partly attributed to Twitter's character limit of 280, which is insufficient for comprehensive narratives.

In addition, the image analysis showed that especially selfies and portraits are shared with anxiety-related Instagram posts. Contrary to the findings of Andalibi (2017), our results reveal that people use Instagram to tell their stories via extensive captions rather than using images to express their emotions. The high use of portraits and selfies within the Instagram posts speaks for the personality and intimacy of the shared content on the one hand, while on the other hand people seem to use random images as a filler to put the text.

We discovered that many anxiety-related Tweets address an unknown community. By comparison, we observed that tweets focusing on already established communities occur much more rarely (*community-outside* = 232 tweets, *community-inside* = 162 tweets). Patterns of interacting with the outside community found in the data were divided into acts of protection, motivation as well as help and support. In a similar way, we found numerous Instagram postings with a similar focus. For example, we identified *Fighting anxiety & motivational phrases* as the third most common category (123 postings). These posts contain a striking amount of positive experiences related to anxiety, and

potentially act as positive reinforcement. Supporting the results of the study by Luo and Hancock (2019) and Russo (2020) we found negative emotions shared in tweets describing social interactions and social triggers, especially with regard to family gatherings on holidays. Perceiving social support through sharing mental health information with others, regardless of positive or negative experiences, can support recovery and healing (Househ et al 2014; Luo and Hancock 2019).

In a similar manner, we identified many postings on Instagram dealing with *anxiety treatment* (153 postings). These posts contain information about medication, alternative treatments, therapy, and ideas that can be used immediately to manage or relieve anxiety attacks. On Twitter, users rather ask questions regarding alternative treatments and medication, but do not write detailed posts about recommendations, as happening on Instagram. On Twitter this topic is more related to community building, as Lachmar et al. (2017) also point out. A category that we discovered on the Twitter data set is *mood management* (145 tweets in total). In these posts, people share wisdom, life philosophies, and quotes that reflect upon anxiety on a more abstract level. These posts can allow users to join the community without necessarily sharing personal information. Sensible quotes are also present on Instagram. These types of posts are largely communicated directly in the images only, while users elaborate on their personal situation or feelings in the captions. Similarities in the way that both platforms are used can be seen especially in the self-centered orientation of the tweets and Instagram posts that we studied. Although anxiety-related content is aimed at addressing the community, its main purpose may be to help the person posting in finding some relief from their suffering through a process of self-revelation that can lead to acceptance of the problem and recognition of one's own suffering by the members of a world-wide community. These posts can also help sufferers adopt the role of an expert sharing information about anxiety and supporting others.

LIMITATIONS

The data acquisition and collection method employed in this study inherently carries the risk of systematic bias. Consequently, it is imperative to consider specific limitations associated with this research. The analysis of social networks provides researchers with the opportunity to examine social interactions on a large scale within a relatively short period of time. This can facilitate researchers in acquiring fundamental insights into the relationships and behaviors of particular online social groups. Further, it allows researchers to investigate the opinions, emotions, and inner worlds of people who use social media for information sharing and communication. Sociodemographic information (e.g., age, gender, diagnosis) about the users could not be collected for this study; hence, it was not feasible to draw any conclusions regarding sample characteristics. Furthermore, it is essential to acknowledge that the character limits imposed by the platforms inherently constrain the depth of understanding one can derive from the gathered tweets and posts. Therefore, the tweets and posts in the data set may represent a biased and limited population of social media users, not representing all people suffering from anxiety symptoms and anxiety disorders. In the course of data collection, Twitter and Instagram were explicitly searched for public data, and content was stored without the knowledge of the users. As we know little about the users themselves, we have to expect that some of the content is from underage users. In order to respect data protection, no images or elements of individual users were included in the study, nor were captions published in connection with usernames, places, and the times and/or dates in which posts were uploaded. After the analysis of the empirical material, only the data necessary to enable the reproducibility of the study was securely stored on an encrypted hard disk. The procedure for scraping open data can be seen as a limitation of this study, since the subjects are not actively involved in the research process and have not approved of it. This procedure should, therefore, never be carried out without first reflecting upon ethical research practices.

CONCLUSION

This study sought to examine the following research questions: **RQ1:** Which hashtags are used in combination with #anxiety to specify anxiety-related social media content? **RQ2:** What patterns and differences can be identified in #anxiety related posts on Twitter (tweets) and Instagram (images and captions)? **RQ3:** How do the functionalities of the platforms shape or influence mental health content? **RQ4:** What kind of information sharing practices can be derived from the #anxiety postings?

Health information sharing practices and mental health communication are shaped by giving and seeking support via social media and finding new pathways to promote wellbeing through self-help, community building, and peer-to-peer communication. As addressed in the first research question (RQ1), the hashtag frequency analysis revealed that Twitter hashtags used besides #anxiety were more focused on comorbid mental illnesses, while Instagram hashtags leaned more towards recovery, motivation, and support. This can be due to Twitter's character limit leading to concise descriptions of specific situations and feelings.

The analysis of the content of the two platforms, revealed patterns and differences (RQ2) as well as indications that the platforms can also influence the content (RQ3): Instagram posts provided intimate insights into users' experiences in the form of text and additionally mostly were combined with selfies and portraits, underlining the personal and intimate nature of content also on the visual level. Both platforms are used to build up or maintain a sense of community, either for motivation, support, empowerment or to educate others. It can be stated that the platforms' functionalities influence the ways in which users share anxiety-related content. Twitter serves for in situ and emergency communication. In contrast, Instagram encourages more thoughtful and detailed reflections on anxiety-related narratives. As shown, Twitter and Instagram both play important roles in digital mental health information and communication as both platforms facilitate self-expression, community support, and the dissemination of information about anxiety and mental health. The nature of the platforms, with their character limits and visual elements, influences the depth and style of content shared, providing users with a variety of ways to engage with the online mental health community. Understanding these dynamics can contribute to reducing stigma, fostering conversations, and promoting mental health advocacy on these platforms.

With respect to RQ4, it can be stated that mental health information sharing on Twitter and Instagram is a common practice to express thoughts, feelings, and experiences related to anxiety disorders. Further, mental health information sharing concentrates on personal disclosure, as publicly sharing and discussing sensitive information with others, as well as giving and receiving treatment information, can be seen as a psychosocial adjustment to illness and function as a coping strategy, e.g. as it provides relief. Sharing information can also be viewed as positive reinforcement related to anxiety treatment and recovery and thus could promote psychoeducation on both platforms. By sharing mental health stories and journeys, individuals aim to increase awareness and understanding of anxiety disorders and related conditions and therefore help to combat stigma related to mental health. All in all, mental health information sharing can lead to empowerment and advocacy as social media users adopt the role of experts, sharing information about anxiety and providing support to others. This empowerment allows them to advocate for mental health awareness and break down barriers to seeking help.

OUTLOOK

Future research should explore how online peer networks must be shaped to include all benefits from social media peer-to-peer support while also educating users about the potential risks that may arise from online peer-to-peer interactions. A core challenge will be to determine whether meaningful interactions and skills are actually learned from peers on social media and whether feelings of relief, recovery, and mental wellbeing persist in the offline world. In future research, we plan to determine the roles governments and healthcare authorities and institutions are currently playing in the anxiety-related social media communication. It would be interesting to further investigate if and how the community feels connected to these institutions that mainly spread accurate and reliable information. Generally, the results of such a study could be used to improve the living conditions of vulnerable groups within the community of users and also to help reduce the stigmatization of anxiety-related disorders.

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