



Analyses of posts written in online eating disorder and depression/anxiety moderated communities: Emotional and informational communication before and during the COVID-19 outbreak

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ABSTRACT

Introduction: Moderated online health communities (OHCs) are digital platforms that provide a means for patients with similar medical conditions to communicate with each other under the supervision of healthcare professionals.

Aims: To examine the impact of the COVID-19 outbreak on content and type of posts published in two moderated OHCs – eating disorders and depression/anxiety – by comparing categorizations of posts written before vs. after the lockdown, and about vs. not about the pandemic.

Methods: Posts were retrieved from *Camoni*, the first Israeli medical social network (January–June 2017, March–May 2020). A total of 1475 posts were analyzed. Of them, 802 posts were written before and 680 were written during the first lockdown. Posts were divided into two main categories: informational and emotional, and into fourteen subcategories.

Results: Before the pandemic, the eating disorders OHC was characterized as primarily emotional (emotional: 66.7%, informational: 45.4%) and the depression/anxiety OHC as primarily informational (emotional: 49.8%, informational: 65.8%) ($\chi^2 = 31.6$, $p < 0.001$). During the lockdown, there was a transition in the eating disorders community, from primarily emotional to primarily informational communication (emotional: 46.1%, informational: 71.7%) ($\chi^2 = 30.3$, $p < 0.001$). In both OHCs, only about one in six posts written during the lockdown was related to the pandemic. There were only minimal differences in subcategorization of posts written before vs. after the outbreak (e.g., searching for medical information was more common during the pandemic: $\chi^2 = 40.9$, $p < 0.001$), as well as about vs. not about the pandemic (e.g., sharing negative emotions was more common when writing about the pandemic: $\chi^2 = 4.1$, $p = 0.43$).

Conclusion: During the first lockdown, people with eating disorders have increased their use of OHCs as sources of informational (as opposed to emotional) support, but the overall impact of the pandemic on the content of posts written in the examined OHCs was minimal, suggesting that OHCs have not changed their function as a valuable means of providing emotional and informational support for people with mental difficulties.

1. Introduction

Online health communities (OHCs) are digital platforms that provide a means for patients with similar medical conditions to learn about illnesses, seek and offer social support, and connect with others in similar circumstances (Chen et al., 2020; Willis and Royne, 2017; Yan and Tan, 2014; Yan et al., 2016). It is clear by now that the impact of the COVID-19 pandemic on people's mental health is severe (Pfefferbaum and North, 2020), but studies examining the impact of the pandemic on online communication among people with mental health difficulties are

still scarce (Massaad and Cherfan, 2020). In this study, we therefore wished to analyze posts written in two OHCs, one dedicated to eating disorders and one dedicated to depression/anxiety, before and during the coronavirus outbreak, in order to explore the impact of the outbreak on online communication among people with these mental health conditions.

The World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak an international public health emergency on January 30, 2020, and a pandemic on March 11, 2020 (World Health Organization, 2020). In an effort to contain the outbreak, the first

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lockdown was announced by the Israeli government on March 19, 2020 (Elran-Barak and Mozeikov, 2020). There is growing evidence suggesting that the pandemic has contributed to widespread emotional distress and increased risk for psychiatric illness among the general population and among populations at risk (Pfefferbaum and North, 2020), such as people with psychiatric conditions (Pfefferbaum and North, 2020). People with psychiatric conditions may be likely to experience severe mental health consequences during this period for several reasons. First, many people with mental health conditions are dealing with various pre-pandemic difficulties (Molarius et al., 2009), such as poor economic status, lack of permanent employment, or loneliness, which are likely both to intensify during challenging times (such as a global health crisis) as well as impair their ability to deal with them. Second, people with a psychiatric condition may have fewer psychological resources, including fewer coping strategies (Wigman et al., 2014), sense of control (Fryers and Brugha, 2013), and self-efficacy (Vauth et al., 2006), qualities that are likely necessary to contend with a global catastrophe (Prentice et al., 2020). Last but not least, the pandemic has ushered in an abrupt change in the delivery of mental health services, and some people with mental health difficulties went without psychological and psychiatric treatment (Gautam et al., 2020), especially during the first few months of the pandemic when lockdown measures were issued (Weissman et al., 2020). Hence, in the current study we wanted to examine the impact of the pandemic on people with mental health conditions by exploring their online communication before and during the outbreak.

An OHC is an online platform that focuses exclusively on a health-related topic so as to allow people with similar health circumstances to connect with each other, learn about their common illness, and seek/offer online support (Wu, 2018; Yan and Tan, 2014; Yan et al., 2016). A moderated OHC (Griffiths et al., 2017; Lindsay et al., 2009) is a specific kind of OHC that allows users to communicate with each other under the supervision of healthcare professionals (e.g., psychologists, social workers, dieticians), who can answer questions, moderate the discussion (e.g., by making sure that all inquiries are answered and that communications are respectful), and provide users with a safer online environment. The literature about OHCs distinguishes between posts seeking emotional support and posts seeking informational support (Bambina, 2007; Deetjen and Powell, 2016). Previous studies have consistently found that informational and emotional support make up the largest share of posts in OHCs (Braithwaite et al., 1999; Deetjen and Powell, 2016; Eichhorn, 2008; Finn, 1999; Ridings and Gefen, 2006), although there are differences in share of posts depending on the topic and type of OHC. Specifically, OHCs dedicated to physical illness may have a larger share of informational posts and a smaller share of emotional posts, relative to OHCs dedicated to mental health conditions (Deetjen and Powell, 2016). It is important to study emotional vs. informational communication on OHCs as this distinction does not only apply to online settings; research has identified that patients often have a combination of informational and emotional needs in relation to their health (Beeney et al., 1996; Deetjen and Powell, 2016; Hallstrom and Elander, 2001; Wesson, 1997). Mapping patterns of emotional and informational support among OHC members can thus inform the development of accessible and available services that provide both kinds of support for patients (Biyani et al., 2014). Despite the accumulating literature about emotional and informational communications in OHCs, studies looking at the impact of the COVID-19 pandemic on these kinds of communication are scarce.

This study focuses on two mental health OHCs, eating disorders and depression/anxiety, because of several reasons. We looked at a depression/anxiety OHC, as according to the American Psychiatric Association, mood and anxiety disorders are the most common type of psychiatric disorders (Parekh, 2017), and studies suggest that the prevalence of these conditions has increased during the pandemic (Salari et al., 2020). We focused on an eating disorders OHC, as the COVID-19 pandemic has been predicted to result in an increase in eating disorder risks and symptoms due to disruptions in food access and food routines,

restrictions on movement and exercise, greater stress and anxiety, lower levels of support and, in some cases, greater potential for violence (Clark Bryan et al., 2020; Cooper et al., 2020; Fernández-Aranda et al., 2020; Rodgers et al., 2020; Schlegl et al., 2020). Furthermore, it is particularly important to study moderated eating disorders OHCs, as most of the research conducted into eating disorder virtual communities has concentrated on pro-eating disorder internet websites, including pro-ana and pro-mia (Custers and Van den Bulck, 2009; Gavin et al., 2008; Tierney, 2008), and has represented voices of untreated individuals. There have been many fewer reports from websites moderated by certified professionals (Leung et al., 2013; McCormack, 2010; Stommel and Meijman, 2011). These moderated pro-recovery virtual communities represent a variety of voices and learning from such communities may help professionals better understand clients at different stages of their recovery journeys (Ramjan et al., 2018).

Based on the literature review, we sought to conduct a mixed methods (qualitative and quantitative) (Tashakkori and Creswell, 2007) study by comparing two timepoints and analyzing posts written before and during the COVID-19 outbreak in two moderated OHCs (eating disorders and depression/anxiety). These were the aim of the study:

Stage 1: Qualitative coding:

To describe content of emotional/informational posts written in online eating disorder and depression/anxiety moderated communities.

Stage 2: Quantitative analyses:

To find differences between eating disorders and depression/anxiety OHCs in terms of content and type of communication (emotional vs. informational)?

To find differences between posts written before and during the outbreak in terms of content and type of communication (emotional vs. informational)?

To find differences between posts dealing with the outbreak and posts not dealing with the outbreak in terms of content and type of communication (emotional vs. informational)?

Analyses of posts written in moderated OHCs can provide a glimpse into people's in-the-moment experiences, especially during times when they are facing difficulties and challenges (Seale et al., 2010). Findings from the current study will also help characterize the specific challenges that people with eating disorders and depression/anxiety shared on the internet right at the beginning of the outbreak, informing healthcare providers regarding the development of both face-to-face and digital mental health services. Considering the fact that it is difficult to provide face-to-face mental health treatments amidst social distancing requirements, it is imperative that some form of online support be available outside of treatment centers (e.g., through the use of moderated OHCs).

2. Methods

2.1. Data collection

Data were retrieved from *Camoni* (which means "like me," <http://www.camoni.co.il/>), the first Israeli medical social network. *Camoni* includes several communities for people who share similar medical conditions, such as diabetes, cancer, obesity, depression, and eating disorders. These are moderated communities, maintained by the Gertner Institute for Epidemiology and Health Policy Research (<http://www.gertnerinst.org.il/e/>), and they are free and accessible to everyone. The *Camoni* eating disorders community has more than 14,000 members, and the *Camoni* depression/anxiety OHC has more than 21,000 members. Written permission to use the messages posted there was obtained from the maintainer of *Camoni*, who created a special data file containing all communications in the *Camoni* eating disorders and depression/anxiety OHCs from January 1st, 2017 through December 30th, 2017, and from March 1st, 2020 through May 30th, 2020 (the height of social distancing reinforcement in Israel).

2.2. Ethical issues

The current study analyzed data obtained from public online group as opposed to private online group, in which only members of the group can see who's in the group or what has been posted. To ensure participants' privacy, we insisted on analyzing public OHCs that can be viewed by all people on the internet and not only by members. Essentially, we adopted the criteria suggested by Eysenbach and Till (Eysenbach and Till, 2001), and the American Sociological Association's Code of Ethics (American Sociological Association, 1999), which allows researchers to "conduct research in public places or use publicly available information about people (such as naturalistic observations in public places and analysis of public records or archival research) without obtaining consent" (regarding online communities as public, see also Salmons, 2016, p. 86) (Salmons, 2016). The ethics committee of the University of Haifa (Faculty of Welfare and Health) approved the ethical aspects of this study (approval #1683) and stated that due to the public, open, and anonymous nature of the *Camoni* internet community, this type of study was exempt from informed consent.

2.3. Sample

A total of 1475 posts were analyzed: 918 posts from the depression/anxiety OHC and 557 from the eating disorders OHC. Of them, 802 posts were written before the pandemic (between January-July 2017) and 680 posts were written during the first months of the outbreak (between March-May 2020). Of the posts, 115 (7.7%) were excluded from analysis: 95 posts from the depression and anxiety forum, and 20 from the eating disorders forum. Reasons for exclusion: 42 posts lacked sufficient information to analyze them (e.g., posts that included only an image), 30 posts included advertisements, and 43 posts were excluded for other reasons (duplicate posts, posts written by forum management, or technical announcements/inquiries).

Of the 1360 posts included in the final analysis, 493 posts were written by unique IDs, and 867 were written by repeat users. However, given the anonymous nature of *camoni* and given the option to use multiple nicknames, the exact number of repeat users cannot be determined. Moreover, the anonymous nature of *Camoni* online platform allows anyone to post by creating an account without even being diagnosed. Therefore, specific information about participants (e.g., sex, age, diagnosis) was unavailable, and it was even possible that some participants participated in both communities, as patients with eating disorders often have comorbid depression and anxiety disorders (Elran-Barak and Goldschmidt, 2021). Alternatively, it was plausible that some participants did not have any psychiatric diagnoses, and that some participants are healthy people with a tendency towards depression or eating disorders.

2.4. Analyses

This study uses team-based, systematic, mixed methods (qualitative and quantitative) approach to analyze posts written in online eating disorder and depression/anxiety moderated communities. Qualitative content analysis was used to code posts and quantitative analyses were used to compare the distribution of the coded posts between and within diagnoses.

2.5. Stage 1: qualitative coding

Content analytic approach was used to analyze the posts through the process of coding and identifying themes or patterns in data (Forman and Damschroder, 2007; Hsieh and Shannon, 2005). Hsieh and Shannon (2005) distinguishes between conventional and direct content analysis. In the current study the main support categories (emotional and informational) were defined using directed content analyses (i.e. codes are derived from prior studies and defined before the analysis), while the

subcategories were defined using conventional content analyses (i.e., codes are derived from the data and defined during the analysis). Our coding scheme was developed as follows: Two members of the research team individually read 40 posts from each OHC and suggested a coding scheme that would match the different types of requests appearing in users' posts. Afterwards, the team held a joint discussion and together chose the most appropriate code division. Next, two members of the research team individually read another 40 posts from each OHC in order to check that the code system we had developed covered all issues that were raised in the posts. Another meeting was held among all research team members to fine-tune the understanding of the various codes. After a final decision on the support subcategories, two coders worked on 50 correspondences in parallel. After reaching 95% agreement, the coding was done separately. We continued to hold weekly consultations to discuss unclear posts. The research team included the author of this paper and three research assistants – a registered dietician with a master's degree and two Social Work students. The same codes were used before and after the outbreak, but the code "COVID-19" was added to posts that were written during the outbreak and that dealt with the outbreak.

2.6. Stage 2: quantitative analyses

Chi-square tests were used to examine differences in rates of informational/emotional categories and subcategories before and during the lockdown. Chi-square tests were also used to compare posts written during the lockdown and dealing with the outbreak (vs. not dealing with the outbreak) in terms of rates of informational/emotional categories and subcategories.

3. Results

3.1. Stage 1: qualitative coding

Qualitative coding was used to define informational and emotional post subcategorizations (Table 1). Informational subcategories included the following: Medication and nutrition, bureaucracy and referrals, disease management, searching for other people's personal experiences, family member inquiring (on behalf of self or of family member), diagnosis, and searching for medical information/reaching out to a professional. Emotional subcategories included the following: Asking a general question, asking a concrete/specific question, sharing positive emotions, sharing negative emotions, a desire to get well, a desire to remain sick, and searching for social connections.

3.2. Stage 2: quantitative analyses

Differences in post categories between the eating disorders and depression/anxiety OHCs before and during the first few months of the outbreak, as well as the differences within each OHC, are listed in Fig. 1. In the depression/anxiety OHC, about half of the posts were categorized as informational (i.e., either solely informational or emotional and informational) and about two thirds were categorized as emotional (i.e., either solely emotional or emotional and informational), with no significant differences before (informational: 65.8%, emotional: 49.8%) or during (informational: 60.5%, emotional: 51.9%) the outbreak ($\chi^2 = 3.3$, $p = 0.196$). That said, analyses (not shown in a table) suggest that posts in the depression/anxiety OHC were shorter during (83.8 words, $SD = 132.5$) relative to before the outbreak (126.6 words, $SD = 150.7$, $F = 18.8$, $p < 0.001$), and there were fewer responses to each post during ($n = 4.1$ responses, $SD = 4.7$) relative to before the outbreak (6.3 responses, $SD = 6.4$, $F = 31.3$, $p < 0.001$). In the eating disorders OHC, there were more informational (i.e., either solely informational or emotional and informational) posts during (71.7%) relative to before (45.4%) the outbreak, and fewer emotional (i.e., either solely emotional or emotional and informational) posts during (46.1%) relative to before

Table 1
Examples of posts in each sub-category within two online health communities (OHC).

Category	Sub-category	Sub-category description	Example post-depression/anxiety OHC	Example post-eating disorders OHC
Informational support	Medication and nutrition	Questions regarding medication/ medical devices or nutrition and health-related behaviors.	“Nerven” [Hawthorn Leaf and Flower Native Extract] (title) Does anyone here have experience with the natural pill “Nerven” and can they say if it helps? I suffer from anxiety and constant anxiety attacks, and if there is something natural, I would totally prefer it personally. Thanks.	Gym (title) Hi. Do you recommend going to the gym or is it harmful? Stomach problems (title) Due to pain, I take Oxycodone syrup and one of the side effects is severe constipation. Some days I don’t defecate at all so I have nausea and vomiting and lack of appetite. What can I take to have normal bowel movements?
	Bureaucracy and referrals	Questions regarding medical bureaucracy (waiting lists, access to medications, paperwork, etc.) or looking for an institute / clinic / doctor, usually in a specific area, asking for a referral from the OHC members.	Health maintenance organization [HMO] psychiatrists (title) Does anyone know how to get a psychologist through the HMO? I saw that it was possible to get subsidized treatment. Do I just call and ask?	Question (title) Hi Does anyone know if a referral to a dietitian from November is only good up to a certain month? Or does it not matter?
	Disease management	Questions regarding ways to manage the disease/ medical condition relevant to the specific forum.	Ongoing and chronic anxiety (title) I am 24 years old, an engineering student at the Technion [University] and working as a private tutor. [In the] last period (3 months), I’ve been feeling strange things that have never before happened to me in my life. For example: intense intolerance to cold, an extreme anxiety attack, a different body part hurts every day. I immediately asked my family doctor to give me a blood test. Thank God everything went well and he recommended I take vitamin B12 anyway. Since that day of intolerance to cold, I’ve been spending a lot of time reading articles online about all things health-related and it is hard for me to get back into a routine. I found this site and thought that maybe if I shared, someone might be familiar with the phenomenon and could help with the matter. With thanks and appreciation.	How to cope? (title) After a long time of debating with myself, it so happens, I started nutritional treatment again with another dietitian [...] So, in short, she gave me a meal plan. I have to eat 6 meals a day, and I try, and it’s awfully hard, because I’m used to eating only 2 or 3 meals a day, and the morning is the hardest for me because I’m not used to eating in the morning and it is very difficult to suddenly change. I wanted to know how I should deal with all this food?
	Searching for other people’s personal experiences	Requesting “personal experience” stories/information from people who have experienced something similar.	Emotional numbness (title) Feeling emotionally numb recently, not feeling either happiness nor sadness, as if I were not alive, this has happened because of the corona situation (no anxieties). Did anyone ever feel this way and how did it go away? I’d like advice.	Night Eating Disorder (title) Hello. How do you overcome Night Eating Disorder? I would like to hear from people who have been able to successfully deal with this issue.
	Family member inquiring	When the person writing the post asks a question on behalf of/regarding another person (usually a family member, sometimes an acquaintance) with or without the person’s knowledge.	No effect (title) My partner has been in treatment for about 3 weeks. Miro [Mirtazapine] + Serenada [Sertraline]. So far, no improvement. For times of emergency, he would take Lorivan [Lorazepam], and that was the only pill that would calm him down. The problem is that Lorivan no longer works for him! My husband suffers from headaches, chills, depression, anxiety, and extreme mood swings. In the first days, Lorivan did help, but in recent days, not at all. What to do? Any advice?	Therapeutic mentoring for eating disorders (title) Hello to you, My 14-year-old son suffers from eating disorders, I would like to hear about options for a therapeutic mentor who can help with coping at home. Thanks.
	Diagnosis	Questions regarding the diagnosis process (tests, symptoms, misdiagnosis)	Heart stabbing, what is causing this? (title) I have a strong feeling of heart stabbing again. Probably severe anxiety. I took Valerian to calm me down. What is causing this to happen to me?? Feeling palpitations in the abdomen, strong pains in the heart... Palpitations. Treatment time (title) To the team of experts: (Treatment of depression and anxiety) First question, how do you know as psychologists that your patient does not need more treatment? Second question, if a patient asks you, “When	Is this considered an eating disorder? (title) If you try to starve yourself a few times but end up giving up, soon after starting, is it considered a disorder or is this common? I would love for you to answer, this is important:)
	Searching for medical information/ reaching out to a professional	Questions regarding research/ medical or scientific information on a certain topic, or questions directed to medical professionals. This category does not include posts regarding medication or nutrition, as these are covered in a separate category.		Question (title) How common is it to switch from one disorder to another? And does it make sense that someone who was anorexic became a binge eater? (i.e., binges without subsequent purging...)

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Table 1 (continued)

Category	Sub-category	Sub-category description	Example post-depression/anxiety OHC	Example post-eating disorders OHC
Emotional support	Asking a general question	General emotion-related questions, often rhetorical.	<p>will I know that I do not need more treatment?" what would you answer?</p> <p>Third question, when a patient asks, "How long will it take to recover," and the psychologist says, "A long time," what is the meaning of this? A year, two years, ten years? After all, it depends on how well the patient manages to make progress and improve his condition.</p> <p>These questions stem from the fact that a patient suffering from depression needs psychological treatment to boost morale and strengthen personal confidence, that the patient should be able to count on the psychologist being there forever ("until the age of 120!" as they say), but on the other hand the patient should at some point know how to deal with the issues alone and not be dependent.</p> <p>Thank you and good night.</p>	
	Asking a specific question	Specific emotion-related questions which may be clearly understood and answered by other readers.	<p>Despair (title)</p> <p>HELP!! What to do?!</p> <p>I keep waiting for the hour to end, the day to end, school to end, but what I really want is for life to end. The list of beautiful things in the world is starting to get significantly shorter. I'm starting to run out of reasons to get up in the morning and it stresses me out and gives me a feeling that I can't breathe, and worst of all I feel despair because I do not know how to fix it. There is no magic cure, there is no right and clear answer and I am tired of searches and attempts that will not be solved, that will only make it easier.</p> <p>Please, something make it easier. I will not survive much longer.</p>	<p>Bad (title)</p> <p>Can't stand this body. Dying to cut something. Dying to lose weight. I do not have any more energy. How much longer?</p>
	Sharing positive emotions	Sharing positive/ inspiring/ uplifting feelings and experiences regarding the main medical condition.	<p>Work (title)</p> <p>I really want to get a job but I get stressed and insanely anxious just thinking about it. I'm also not really good at things. How does onehandle this??</p>	<p>Bulimia is always with me (title)</p> <p>So, I went back to my college routine ... but not really. Admittedly it's already been a week and a half without vomiting and binges. But I have a little voice in my head that tells me to stop eating. You will get fat. Stop bingeing.</p> <p>Stop putting too much food in your mouth. How do you get rid of this voice?</p>
	Sharing negative emotions	Sharing negative feelings and experiences regarding the main medical condition.	<p>I'm happy: This is the third day I'm on 7.5 mg of Ritalin [Methylphenidate] (title)</p> <p>And I really felt fine and handled myself well, and worked efficiently non-stop for more than twelve hours. And my mood was good most of the day too.</p> <p>I'm very tired right now but it's natural. I also slept really well.</p> <p>In the middle of the night I got up to pee and when I got back into bed, I started singing. What I need to watch out for is perfectionism. I was not a perfectionist today, which was a big relief.</p> <p>Good night.</p>	<p>Calm (title)</p> <p>So, after a meeting with the dietitian, feeling much calmer.</p> <p>I've almost gone a week without bingeing and vomiting.</p> <p>And I'm using all my might to continue.</p>
	Desire to get well	Statements implying the wish to get well.	<p>I wish there was a button I could use to turn myself off ... forever. (title)</p> <p>Or at least ... until it's all over.</p>	<p>I want to die (title)</p> <p>I don't have the strength to cope anymore. Don't want to eat.</p> <p>Can't stand being inside this body. There is no way out.</p> <p>Want to live (title)</p> <p>I want to live. I want to go out to eat with friends and have fun. I want to stop calculating, stop measuring. I really want to, wholeheartedly, I promise. But still, I'm divided into two parts. One - that wants to live and fulfill, the other - wants to get thinner and thinner and thinner. And I know inside that there is really no point, I feel that at some point - I will be satisfied. But I already know that this is a lie that the disorder tells me, and that it will not end</p>

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Table 1 (continued)

Category	Sub-category	Sub-category description	Example post-depression/anxiety OHC	Example post-eating disorders OHC
			want to make room for fear, I want to go out into the world	there. I'm getting worse and losing people who are dear to me, I do not want to continue like this, I really don't. Every day is a new battle and every day I lose. I know I need to go back to Tel Hashomer [hospital], but I can't make that decision. I wish that as soon as possible I would just do it.
	Desire to stay sick	Statements indicating a wish not to recover from the disease.	Don't want to live and don't want to die. (title) I don't. And that's the only thing for me that can be followed by a period. Because I have nothing in me but nothing. And I don't want to die or live, not to be disconnected, and not to experience. Not to wander and not to settle down. Not to be normal but also not to go crazy. Not lonely and not intimate. Maybe just not to be. And maybe as ashes I'd experience less	Who's right? The one who knows you or the one who doesn't? (title) That moment when you get proof from people who don't really know you that you are not actually thin... After everyone who knows about my having the disease says I am... I no longer know who to believe, the people who really speak from the heart, or those who try to protect me and not hurt my feelings... Probably I really need to lose more weight... But I really don't know if I can trust the people who say I am thin... Probably everyone has lied to me ... The fact is that someone told me that I need to lose another (certain number of, and relatively high number of) kilograms ... And I want to lose weight again (which I am already convinced I have gained in the last two weeks)
	Searching for social connections	Asking for people to talk to and make social connections with people suffering from similar symptoms.	Is there anyone here I can talk to in private? (title) Hi, I think I have been suffering from a variety of diseases for a long time and would love to discuss this with someone.	Looking for an eating partner (title) I feel like I'm about to get depressed and I usually deteriorate very quickly into stopping eating without noticing. If you're from the Petach Tikvah area it would really help me to sit down for lunch/dinner, it doesn't have to be the same woman every day. I apologize to the men; I just wouldn't feel comfortable. Regarding relationships and such, I'm available but a little stressed right now, I just want to sit down to a meal that feels normal.

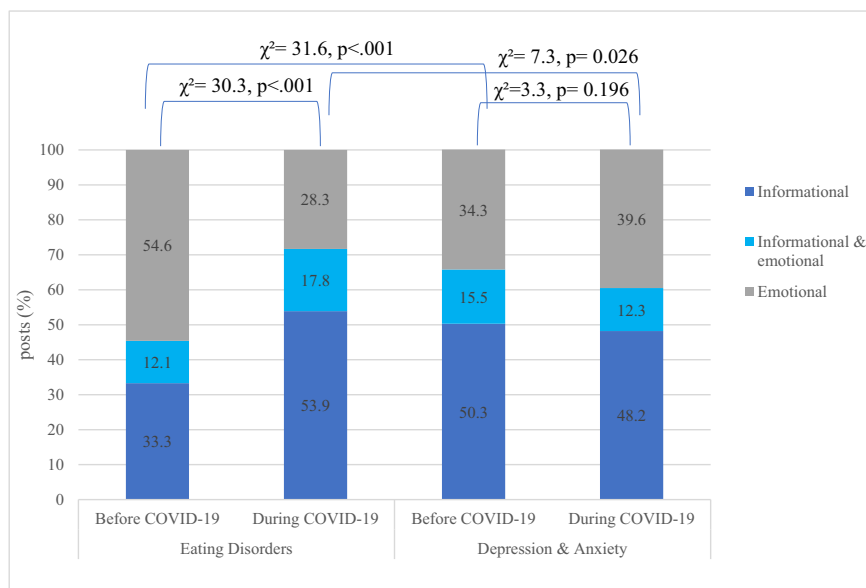


Fig. 1. Differences between two online health communities (OHC) in post categories before and during the first COVID-19 lockdown.

(66.7%) the outbreak ($\chi^2 = 30.3, p < 0.001$), yet no differences were found in post length (106.4 vs. 110.4; $\chi^2 = 0.1, p = 0.709$) or number of responses (3.6 vs. 3.5; $\chi^2 = 0.0, p = 0.843$). The two OHCs differed significantly in post categorization both pre-pandemic ($\chi^2 = 31.6, p < 0.001$) and post-pandemic ($\chi^2 = 7.3, p = 0.026$), although the post-pandemic difference was minimal.

Differences in rates of informational subcategories before and during the first few months of the COVID-19 outbreak are listed in Table 2. Differences are presented across the two OHCs and within each OHC. Across OHCs: Before COVID-19, the depression/anxiety OHC had more posts regarding medication/nutrition ($\chi^2 = 59.5, p < 0.001$), and fewer posts regarding bureaucracy/referrals ($\chi^2 = 21.7, p < 0.001$) and searches for medical information ($\chi^2 = 6.8, p = 0.009$), relative to the eating disorders OHC. During the lockdown, the depression/anxiety OHC had more posts regarding medication/nutrition ($\chi^2 = 52.5, p < 0.001$), and fewer posts regarding bureaucracy/referrals ($\chi^2 = 4.4, p = 0.036$) and disease management ($\chi^2 = 12.8, p < 0.001$), relative to the eating disorders OHC. Within the depression/anxiety OHC, fewer posts included inquiries by a family member ($\chi^2 = 4.7, p = 0.040$) and more posts regarding searches for medical information/reaching out to a professional ($\chi^2 = 40.9, p < 0.001$) were found during the lockdown compared to pre-lockdown.

Differences in rates of emotional subcategories before and during the first lockdown are listed in Table 3. Differences are presented across the two OHCs and within each OHC. Across OHCs: Before the pandemic outbreak, the depression/anxiety OHC had more posts searching for social connections ($\chi^2 = 6.0, p = 0.014$), and fewer posts including a general question ($\chi^2 = 16.3, p < 0.001$), a desire to get well ($\chi^2 = 41.8, p < 0.001$), and a desire to remain sick ($\chi^2 = 128.5, p < 0.001$), relative to the eating disorders OHC. During the lockdown, the depression/anxiety OHC had fewer posts that included a concrete/specific question ($\chi^2 = 6.6, p = 0.010$), sharing positive emotions ($\chi^2 = 3.9, p = 0.048$), a desire to get well ($\chi^2 = 48.9, p < 0.001$), or a desire to remain sick ($\chi^2 = 90.0, p < 0.001$), relative to the eating disorders OHC. Within the depression/anxiety OHC, fewer posts with a concrete/specific question were found during the lockdown compared to pre-lockdown ($\chi^2 = 4.5, p = 0.050$). Within the eating disorders OHC, more posts regarding sharing positive emotions were found during the lockdown compared to pre-lockdown

($\chi^2 = 12.9, p = 0.001$).

Analyses of posts written during the first lockdown suggest that only about one in six posts (eating disorders: 17.4%, depression/anxiety: 15.1%) written during the lockdown were directly related to the COVID-19 outbreak (Table 4). Within the depression/anxiety OHC, about two thirds (69.1%) of posts dealing with the outbreak were categorized as emotional, compared to only a third (33.3%) of posts not dealing with the outbreak. Only 16% of posts dealing with the outbreak were categorized as informational, compared with over half (54.9%) of posts not dealing with the outbreak. Similar differences were found in the eating disorders OHC: over half (56.5%) of posts dealing with the outbreak were categorized as emotional, compared to fewer than a quarter (23.3%) of posts not dealing with the outbreak. About a third (34.8%) of posts dealing with the outbreak were categorized as informational, compared with over half (57.4%) of posts not dealing with the outbreak. Posts dealing with the outbreak were longer ($F = 3.9, p = 0.049$) and had a similar number of responses ($F = 3.1, p = 0.081$) compared to posts not dealing with the outbreak.

Examination of rates of informational subcategories in posts dealing with the outbreak, compared to posts not dealing with the outbreak, in each OHC (Table 5) suggests that in the depression/anxiety OHC, fewer posts regarding disease management were found within posts dealing with the outbreak ($\chi^2 = 5.8, p = 0.015$). In the eating disorders OHC, more posts regarding searches for other people's personal experiences ($\chi^2 = 4.0, p = 0.044$) and fewer posts regarding searches for medical information/reaching out to a professional ($\chi^2 = 6.5, p = 0.011$) were found within posts dealing with the outbreak. Examination of rates of emotional subcategories in posts dealing with the outbreak, compared to posts not dealing with the outbreak, in each OHC.

(Table 6) suggests that in the depression/anxiety OHC, more posts regarding sharing negative emotions ($\chi^2 = 4.1, p = 0.043$) and fewer posts regarding searching for personal connections ($\chi^2 = 6.0, p = 0.015$) were found within posts dealing with the outbreak. No differences in emotional subcategorization were found between posts dealing with the outbreak and posts not dealing with the outbreak within the eating disorders OHC.

Table 2

Differences in rates of informational sub-categories, before and during the first COVID-19 lockdown, within two online health communities (OHC).

Forum	Depression/Anxiety OHC				Eating Disorders OHC				Differences between Depression/Anxiety & Eating disorders OHC			
	Informational posts (n = 444)		Differences-	Test statistics	Informational posts (n = 217)		Differences-	Test statistics	Before COVID-19		During COVID-19	
Emotional	Before COVID-19	During COVID-19			Before COVID-19	During COVID-19			Before COVID-19	During COVID-19	Chi ²	p-value
Sub-category, N (%)	n = 182	n = 224	Chi ²	p-value	n = 381	n = 152	Chi ²	p-value	Chi ²	p-value	Chi ²	p-value
Medication and nutrition	105 (57.7)	144 (64.3)	1.8	0.184	20 (15.7)	18 (22.0)	1.3	0.275	59.5	<0.001	52.5	<0.001
Bureaucracy and referrals	30 (16.5)	25 (11.2)	2.4	0.145	48 (37.8)	21 (25.6)	3.3	0.073	21.7	<0.001	4.4	0.036
Disease management	37 (20.3)	44 (19.6)	0.3	0.901	29 (22.8)	27 (32.9)	2.6	0.113	1	0.322	12.8	<0.001
Searching for other people's personal experiences	76 (41.8)	115 (51.3)	3.7	0.058	60 (47.2)	46 (56.1)	1.6	0.257	0.1	0.704	1.5	0.227
Family member inquiring	17 (9.3)	9 (4.0)	4.7	0.04	19 (15.0)	6 (7.3)	2.8	0.127	0.3	0.605	0.1	0.726
Diagnosis	21 (11.5)	23 (10.3)	0.2	0.749	13 (10.2)	8 (9.8)	0	1	0.1	0.739	0.0	0.894
Searching for medical information or reaching out to a professional	19 (10.4)	86 (38.4)	40.9	<0.001	27 (21.3)	26 (31.7)	2.8	0.104	6.8	0.009	2.1	0.145

Table 3
Differences in rates of emotional sub-categories, before and during the first COVID-19 lockdown, within two online health communities (OHC).

Forum	Depression/Anxiety OHC				Eating Disorders OHC				Differences between Depression/Anxiety & Eating disorders OHC			
	Emotional posts (n=444)		Differences-		Emotional posts (n=217)		Differences-		Before COVID-19		During COVID-19	
Emotional Sub-category, N (%)	Before COVID-19	During COVID-19	Test statistics	p-value	Before COVID-19	During COVID-19	Test statistics	p-value	Chi ²	p-value	Chi ²	p-value
Asking a general question	28 (22.6)	43 (23.4)	0	0.872	80 (38.5)	12 (27.9)	1.7	0.191	16.3	<0.001	0	0.979
Asking a specific question	25 (20.2)	21 (11.4)	4.5	0.05	44 (21.2)	10 (23.3)	0.1	0.839	2.7	0.098	6.6	0.01
Sharing positive emotions	12 (9.7)	17 (9.2)	0	1	15 (7.2)	11 (25.6)	12.9	0.001	1.6	0.212	3.9	0.048
Sharing negative emotions	108 (87.1)	157 (85.3)	0.2	0.739	181 (87.0)	34 (79.1)	1.8	0.229	0.8	0.375	0.8	0.368
Desire to get well	12 (9.7)	18 (9.8)	0	1	84 (40.4)	20 (46.5)	0.5	0.498	41.8	<0.001	48.9	<0.001
Desire to stay sick	0 (0.0)	2 (1.1)	1.4	0.517	81 (38.9)	21 (48.8)	1.4	0.238	128.5	<0.001	90	<0.001
Searching for social connections	13 (10.5)	35 (19.0)	4.1	0.054	15 (7.2)	4 (9.3)	0.2	0.75	6	0.014	3.4	0.067

4. Discussion

The current study describes posts written in two OHCs (eating disorders and depression/anxiety) before and during the first three months of the COVID-19 outbreak (March-May 2020). Four main findings emerged. First, in the eating disorders OHC, posts written during the outbreak tended to be more informational and less emotional than posts written before the outbreak. Second, only about one in six posts written during the lockdown were directly related to the COVID-19 outbreak. Third, posts dealing with the outbreak tended to be more emotional and less informational relative to posts not dealing with the outbreak. Fourth, we found only minimal differences in content of emotional and informational posts when comparing post subcategorization before and during the outbreak.

Data revealed differences between the two examined OHCs in terms of rates of emotional and informational posts. As demonstrated in Fig. 1, before the outbreak, the eating disorder OHC can be characterized as primarily emotional while the depression/anxiety OHC as primarily informational. One explanation for this difference could be related to the fact that epidemiological studies suggest that the majority of individuals (>75%) with eating disorders never receive professional care (Ali et al., 2017; Coffino et al., 2019; Hart et al., 2011), in comparison to only about half of individuals with depression/anxiety (Castonguay et al., 2016; Wang et al., 2005). Therefore, it could be that many untreated individuals with eating disorders use the internet in order to receive the emotional support that they lack due to the fact that they are not in psychological treatment (Kendal et al., 2017).

To the best of our knowledge, our study is one of the first to compare depression/anxiety OHCs with eating disorders OHCs. One prior study comparing four mental health-related forums, including eating disorders and anxiety/depression, relied on self-report questionnaires but did not examine post content (Kummervold et al., 2002). Moessner et al. (2018), who examined an eating disorders forum on Reddit, showed that the most prominent topic (about 25% of posts) was giving and receiving social support and expressing one's feelings, and the second most common topic (about 15% of posts) was centered on weight, weight loss, or gain (Moessner et al., 2018). Feldhege et al. (2020), who used a methodology similar to that used by Moessner et al. (2018) to examine a

depression forum on Reddit, showed that the most prominent topics were feelings (7.5% of posts), motivation (6.3% of posts), and the Reddit community (7.5%, 6.3%, and 5.9% of posts respectively) (Feldhege et al., 2020). Although it is difficult to draw direct conclusions from these two aforementioned studies, it may be indeed that the Reddit eating disorder forum (Moessner et al., 2018) is characterized by higher rates of emotional posts (i.e., posts that deal with feelings) relative to the Reddit depression forum (Feldhege et al., 2020). A finding that is consistent with our results.

Interestingly, during the lockdown, there was an increase in the rate of informational posts in the eating disorders OHC – an increase that might be explained by the confusing circumstances and uncertainty surrounding the pandemic and the lockdown (Dubey et al., 2020; Tang, 2020). Users most likely had the feeling that they needed urgent answers to a variety of informational questions such as how to get access to treatment during the lockdown, and as a result - the eating disorder OHC, was transformed, from a mainly emotional to a mainly informational support community. In the depression/anxiety OHC, however, we did not find a major change in rates of informational and emotional posts during the outbreak. It could be that as the depression/anxiety OHC has always been used primarily for informational support, there was no change in its function. Of note is that when looking at post subcategorization during the lockdown, in the depression/anxiety OHC there were more informational posts searching for medical information; in other words, during the lockdown, the general trend of information seeking remained the same but there was a slight change in the specific information sought out by users with depression/anxiety.

Interestingly, during the lockdown, only about one in six posts was directly related to the outbreak, and the posts dealing with the outbreak tended to be less informational and more emotional relative to the posts not dealing with the outbreak. It is reasonable to suggest that users felt it was better to ask specific questions about the pandemic in designated online forums (i.e., forums dedicated to the COVID-19 outbreak) and not in the eating disorders or depression/anxiety OHCs which are designated for asking specific questions about mental health. This notion may explain why the posts that were written about the pandemic tended to be more emotional; that is, users seemed to feel more comfortable using these two OHCs to receive emotional support related to the pandemic

Table 4

Analyses of posts written during the first lockdown: Comparison of posts dealing with the outbreak (vs. not dealing with the outbreak): Rates of informational/emotional posts within posts and examples of posts.

	Depression/Anxiety OHC				Eating Disorders OHC			
	Dealing with the outbreak?		Statistics	Example of posts dealing with the outbreak	Dealing with the outbreak?		Statistics	Example of posts dealing with the outbreak
	Yes n = 81 (17.4%)	No n = 384 (82.6%)			Yes n = 23 (15.1%)	No n = 129 (84.9%)		
Informational n (%)	13 (16.0)	211 (54.9)	Chi ² = 46.0, p < 0.001	Weaning off of Clonex [Clonazepam] (title) Hello, I have been taking 1 mg of Clonex for a long time, prior to corona times I would take it once or no more than twice a week. For the last three weeks I have been taking it almost every day and I would like to stop, and consult with someone about how to wean off of it wisely and effectively.	8 (34.8)	74 (57.4)	Chi ² = 9.8, p = 0.007	Eating disorders: Eating disorder hospitalizations at Tel Hashomer [Hospital] (title) Does anyone know how the Department of Eating Disorders at Tel Hashomer works these days, with the whole corona situation? Are they accepting new patients? In what capacity are they working? Are there individual treatments? Group treatments? What is the daily schedule there?
Emotional n (%)	56 (69.1)	128 (33.3)		I'm glad I'm studying but it's not enough for me, the loneliness is in first place (title) Does anyone know how the Department of Eating Disorders at Tel Hashomer works these days, with the whole corona situation? Are they accepting new patients? In what capacity are they working? Are there individual treatments? Group treatments? What is the daily schedule there? The loneliness is very difficult for me. I've been spending the corona period just with notebooks and textbooks. This is, of course, nice and helpful. But I still feel lonely and lacking a relationship, love. Feeling alone in the world.	13 (56.5)	30 (23.3)		Fear of being alone with the eating disorder (title) The city is closed down and I am currently the only person in the office. I am supposed to take all the necessary work equipment with me and work from home in the coming weeks. I also live with a landlady so as not to live alone. The truth is, the landlady went abroad a few weeks ago and now cannot return. And in reality I know that if I am left alone with the eating disorder my condition will deteriorate. So I'm confused. I hope they do not really impose a curfew on the city so I can continue to come to the office and not be at home. This situation scares me, less so from getting sick and more so from falling off the wagon.
Informational & emotional n (%)	12 (14.8)	45 (11.7)		Home isolation and Panic Disorder (Title) Hi friends, due to contact with a verified [COVID-19] patient at my workplace, I have to quarantine at home. Expecting to undergo testing in the coming days. Physically feeling well and without symptoms. Mentally – it's been very difficult for me! I live alone in a very small, one-and-a-half-room house, feeling suffocated. Very scared that a seizure will come and I will not be able to leave the house as I usually do to relax sometimes. I'm not afraid of the virus, I'm afraid of an attack that I will not be able to control. I use medication and I also have Clonex [Clonazepam] that I do not want to use. I would love tips on how to get by in this unbearable time?? And does anyone know if there are any earlier food deliveries for those in isolation? Because I realized that it takes weeks through the supermarket ...	2 (8.7)	25 (19.4)		Should I be hospitalized with everything that is going on now? (title) The condition of my eating disorder has deteriorated quite a bit and I am supposed to go for an intake for hospitalization in a few days, and probably to be hospitalized. On the one hand, I feel that I am not succeeding alone; on the other hand, the situation in the country is crazy now with the coronavirus and maybe they will cancel my intake altogether, and maybe no new patients will be hospitalized, and if they do indeed hospitalize me then I will not be allowed visits and I will not see my children and nobody knows how long this madness is going to continue ... And in terms of treatment in the ward they may only be dealing with emergency matters, limited staff, no groups, individual treatments ... In short, I am very anxious and confused and do not know what to do. Thank you all.
Length of post (words)	80.3 (124.4)	100.2 (165.6)	F = 1.5, p = 0.220		103.7 (95.7)	147.6 (110.1)	F = 3.9, p = 0.049	
Number of responses	4.1 (4.8)	4.3 (4.2)	F = 0.2, p = 0.665		3.3 (3.1)	4.6 (3.4)	F = 3.1, p = 0.081	

and informational support related to their mental illness.

Findings indicated that when looking at emotional posts written in the eating disorders OHC, rates of posts sharing positive emotions increased during the lockdown (Table 3). It could be that the sharing of positive emotions during the lockdown was related to participants

feeling that despite the awful circumstances, they were able to contend with their mental health situation better than they had previously thought they could. Relatedly, the sharing of positive emotions has been shown to be a popular theme in both eating disorders and depression/anxiety communities in previous research (McCormack, 2010; Park

Table 5

Analyses of post written during the first lockdown within two online health communities (OHC): Rates of informational subcategories in posts dealing (vs. not dealing) with the outbreak.

Forum	Depression/Anxiety OHC				Eating Disorders OHC			
	Dealing with the outbreak?		Chi ²	p-value	Dealing with the outbreak?		Chi ²	p-value
	Yes n=13	No n=211			Yes n=8	No n=74		
Informational Sub-category, n (%)								
Medication and nutrition	6 (46.2)	138 (65.4)	1.9	0.17	1 (12.5)	17 (23.0)	0.5	0.471
Bureaucracy and referrals	3 (23.1)	22 (10.4)	1.6	0.207	3 (37.5)	18 (24.3)	0.6	0.434
Disease management	0 (0.0)	44 (20.9)	5.8	0.015	3 (37.5)	24 (32.4)	0	0.774
Searching for other people's personal experiences	7 (53.8)	108 (51.2)	0	0.852	7 (87.5)	39 (52.7)	4	0.044
Family member inquiring	0 (0.0)	9 (4.3)	1.1	0.294	0 (0.0)	6 (8.1)	1.3	0.258
Diagnosis	1 (7.7)	22 (10.4)	0.1	0.743	0 (0.0)	8 (10.8)	1.7	0.188
Searching for medical information/ reaching out to a professional	5 (38.5)	81 (38.4)	0	0.996	0 (0.0)	26 (35.1)	6.5	0.011

Table 6

Analyses of post written during the first lockdown within two online health communities (OHC): Rates of emotional subcategories in posts dealing (vs. not dealing) with the outbreak.

Forum	Depression/Anxiety OHC				Eating Disorders OHC			
	Dealing with the outbreak?		Chi ²	p-value	Dealing with the outbreak?		Chi ²	p-value
	Yes n = 56	No n = 128			Yes n = 13	No n = 30		
Emotional sub-categories, n (%)								
Asking a general question	13 (23.1)	30 (23.4)	0	0.974	3 (23.1)	9 (30.0)	0.2	0.638
Asking a specific question	5 (8.9)	16 (12.5)	0.5	0.474	3 (23.1)	7 (23.3)	0	0.985
Sharing positive emotions	3 (5.4)	14 (10.9)	1.6	0.208	3 (23.1)	8 (26.7)	0.1	0.803
Sharing negative emotions	52 (92.9)	105 (82.0)	4.1	0.043	11 (84.6)	23 (76.7)	0.4	0.547
Desire to get well	5 (8.9)	13 (10.2)	0.1	0.795	8 (61.5)	12 (40.0)	1.7	0.193
Desire to stay sick	0 (0.0)	2 (1.6)	1.5	0.227	6 (46.2)	15 (50.0)	0.1	0.817
Searching for social connections	5 (8.9)	30 (23.4)	6	0.015	1 (7.7)	3 (10.0)	0.6	0.808

et al., 2018). In McCormack's (2010) work regarding an eating disorders online support group, emotional expression appeared in more than a third of the messages, with positive emotions, such as feeling "hopeful," "happy," "great," and "determined," being expressed on many occasions (McCormack, 2010). In a study that compared discussion topics in on-line mental health communities, positive emotion-related posts made up 5.25% of total post content in the Reddit anxiety community and 2.84% in the depression community, and was one of the three themes shared by these communities (Park et al., 2018). These findings demonstrate how OHCs also act as a source of encouragement that can provide users with optimism and with proactive ideas about how to improve their situation. Indeed, McCormack (2010) showed that common types of messages in an eating disorder online support group were messages of encouragement and esteem support (McCormack, 2010). In contrast, in the depression/anxiety OHC, emotional posts dealing with the outbreak were more likely to share negative emotions relative to posts not dealing with the outbreak (Table 6). These findings suggest that although some users shared positive emotions, the COVID-19 pandemic raised many fears and concerns such as fears that symptoms would be exacerbated (Chatterjee et al., 2020).

Analyses of post subcategorizations revealed many similarities and only a few differences in the content of emotional and informational posts written "before" vs. "during" the pandemic, as well as "about" vs. "not about" it. These analyses may suggest that the overall impact of the pandemic on the content of the examined emotional and informational requests for support may be minimal. Of note is that prior studies examining OHC post subcategorization have not always identified similar categorization topics. For example, Feldhege et al. (2020) used topic modelling methods to categorize posts on a depression online support group. They identified codes such as cognitive strategies and everyday life, which were not included in our analysis, as well as topics such as "treatment" (including medication and therapy), "feelings and connections," and "relationships" (Feldhege et al., 2020), which are more similar to our codes (Feldhege et al., 2020). McCormack (2010),

who studied an eating disorders support group, reported that members provided factual or technical information regarding specialists, medical tests, diagnosis criteria, and symptoms (McCormack, 2010). Flynn and Stana (2012) also identified post categories in an eating disorder forum, of which the main categorization was similar to that in the current study (providing and requesting informational and emotional support; providing and seeking advice), yet some of the subcategories were slightly different (providing and requesting personal disclosure, displaying gratitude, and board maintenance) (Flynn and Stana, 2012). Future studies are warranted to develop a uniform coding scheme and to validate our finding that the pandemic had minimal impact on subcategorizations of emotional and informational posts.

Several limitations should be noted. First, the dataset included posts written in two communities from the Camoni platform. Although Camoni is a widely used platform in Israel, results may not be generalizable to other online platforms. Second, this study examined eating disorders and depression/anxiety OHC. The extent to which these results are representative of online support groups aimed at patients with other illnesses or conditions is not known. Third, post content was categorized by our research team members, as opposed to studies using machine learning (Feldhege et al., 2020). It could be that the specified subcategories that we have developed are not the only possible categories. Last, it could have been better if we had analyzed data from January 2019 through December 2019, as opposed to January 2017 through December 2017. Future studies should additionally include more objective, quantitative methods, such as topic modelling (Airoldi and Bischof, 2016), but still allow for qualitative methods that involve human subjectivity (Rains et al., 2015). In addition, future studies should aim to collect data on user characteristics, for example by sending short questionnaires to users, and use posts published right before the pandemic.

To conclude, although social isolation may be effective in preventing the spread of the novel coronavirus, it has also led to reduced access to support from family and friends, as well as from mental health providers

(Weissman et al., 2020), Online health communities has become an immense source of medical information and emotional support (Mas-saad and Cherfan, 2020). Analyses suggested that although the eating disorders OHC has turned during the pandemic from primarily emotional to primarily informational OHC, the overall impact of the pandemic on the content of posts written in the examined moderated OHCs was minimal. Findings imply how during the first three months of the pandemic, OHCs have not changed their function as a valuable means of providing emotional and informational support for people with mental difficulties.

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Dr. Roni Elarn-Barak has participated in (a) conception, design, analysis and interpretation of the data; (b) drafting the article and revising it critically for important intellectual content; and (c) approval of the final version.

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