

Cross-Cultural Differences in the Use of Online Mental Health Support Forums

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Online mental health forums facilitate supportive relationships between peers that transcend national and cultural boundaries. While past work in medical anthropology indicates a central role of cultural identity in how individuals frame their mental well-being and distress, little research has been done to investigate the role of culture in seeking and providing mental health support on online forums. Using data from two mental health forums, we analyze cross-cultural differences in mental health expression between people from different countries. We characterize these differences along three dimensions—identity, language use, and support behavior. Through comparing usage of the platform by individuals from three Asian countries with their counterparts from primarily Western countries, we find that individuals from these less-represented countries mention their own country more often when expressing distress, use fewer clinical language terms, and are more likely to provide support to people from the same country as them, as expected from past work on mental health in these countries. Contrary to past work, however, we find that the use of clinical mental health language is not affected over time by interacting with others in an international forum. While these findings are useful for understanding the role of culture in mental health support, they also have practical design implications for online forums. We find that the three dimensions of cultural differences we analyze are correlated with receiving effective support, and make design recommendations that can improve quality of support for the people in the minority on these forums.

CCS Concepts: • **Human-centered computing** → **Social media**.

Additional Key Words and Phrases: mental health, cultural differences, online forums

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1 INTRODUCTION

Common mental health disorders such as depression and anxiety are becoming a growing cause of the disease burden globally [96]. Across the Global North and South, however, access to mental healthcare is limited [69]. In the context of reduced access to care [70] and widely prevalent stigma against accessing mental health services [93], online mental health forums have become one avenue by which people experiencing mental distress can both express how they are feeling in a safe environment [58] and look for support online [63]. In particular, online health forums have become

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a place where people from particularly stigmatized communities, such as homeless members of the LGBT community [26, 102] or racial minorities [46] can find support from other peers who have lived experience with similar forms of distress. As Johnsen et al [49] note, online forums where people can openly discuss their mental health are uniquely safe environments for people with concealable and stigmatized identities, an environment that these individuals may not be able to find anywhere else outside of the Internet.

Being an act of courage and vulnerability, sharing stigmatized experiences online can often be difficult, particularly when an experience of distress deviates from majority norms on what symptoms of an illness should look like [40]. These deviations in illness experience are highly tied to identity. Attributes of identity such as gender [38], race [101], and class [57] can all have significant impact on how people express their mental health to others, with differences particularly seen when comparing along cultural lines [77]. For instance, when presenting to a clinician, individuals in Asian countries often express depression and other mental health disorders in terms of somatic symptoms, such as stomachaches or headaches [52, 77], different from common expressions of mental illness in Western cultures.

Due to this diverse variation in symptom presentation, it is important for support platforms to be inclusive of these culturally-influenced framings of distress to be successful [71]. Moreover, without consideration of a shared cultural understanding between supporters and people seeking help, support programs can be ineffective [90, 97]. However, even as use of online mental health forums increases globally, little has been done to examine cultural differences between how people from underrepresented countries and people from majority countries use online mental health forums. Neglecting to understand cultural differences in how people use online mental health forums and accommodate these differences could make individuals that are already members of minority groups feel further otherized on these platforms. Further, as these platforms employ data-driven technologies to classify posts and users on different attributes [17, 32], cross-cultural differences can result in systematically differential rates of utility for people from different cultures [75].

Given this gap in the literature on cultural differences in online mental health forum use, in this paper, we provide a cross-cultural analysis of international mental health support communities and study how previously reported differences in mental health expression translate to online forums. We begin with an analysis of people's use of Talklife,¹ a global support platform for mental health. Guided by past research on cultural differences in expression of mental health [35, 62, 77, 80] in India, Malaysia and Philippines, as well as their popularity on Talklife, we present a comparative analysis of people's use of the platform from these countries versus others, following past research [31, 33, 52] in assuming geographical location as a proxy for cultural identity. To test whether our findings generalize to other online support communities, we repeat our analysis on a separate platform, 7Cups.² While both are focused on mental health support, Talklife and 7Cups differ in the way their community is structured: Talklife is structured as a social platform around a user and their posts, while 7Cups is structured around subcommunities on topical themes such as depression and anxiety. These variations provide a robust testbed for testing differences in forum use due to culture.

We characterize cultural differences along three dimensions of analysis based on past research on cross-cultural differences in mental health [42, 64]: identity-based differences, linguistic differences, and behavior-based differences. These dimensions form the basis for our three research questions respectively:

¹<https://talklife.co/>

²<https://www.7cups.com/>

- (1) How does self-expression of cultural identity vary between people from different countries, and how does it evolve over time?
- (2) How does the use of clinical mental health language vary between people from different countries, and how does it evolve over time?
- (3) How do patterns of support-giving vary between people from different countries, and how does they evolve over time?

On Talklife, we find that individuals from underrepresented countries tend to talk about their country of origin more than the majority sample, use clinical language less overall when describing their mental health than people from the majority sample, as predicted by past work. However, we also find a wide variation in clinical language use across posts, and find that clinical language use stays constant over time, contrary to theories that predict an increase due to exposure to international users and terminology [52, 86]. In terms of support behavior, people are more likely to support people from the same national background, even though the Talklife platform shows all posts in reverse chronological order. Further, all of these findings replicate on 7Cups, though to differing degrees, likely due to the structural differences in the two forums.

These cultural differences also have an impact on the success of the platform in helping individuals. We find that both the amount of clinical language used as well as the amount of cultural homophily has a strong relation to whether an individual from the minority sample is able to seek help effectively. Based on these, we suggest implications of cross-cultural differences for understanding use and designing interventions on such online platforms.

2 BACKGROUND AND RELATED WORK

Culture is an fundamental part of how people participate in supportive conversations that ease mental distress, and how they frame that distress online. In this context, significant work has been done both to understand cultural differences in self-expression and self-disclosure practices, as well as in how people create and sustain their identity in online forums.

2.1 Past Work in Mental Health and HCI

There is a growing body of work in HCI and CSCW at the intersection of mental health and general online communities. Such work can be divided into two main categories—understanding and predicting the expression of mental health online (such as on social media) [10, 12, 29–31], and creating interventions that improve the well-being of those with mental health issues [67, 88]. However, as Feuston et al. [36] note, most work concerned with analyzing online data is done with the aim of algorithmic prediction, and can often ignore finer nuances of the experience of expressing mental health online. Relatedly, the issues of cultural identity have only sparsely been addressed in CSCW [31, 103], and have primarily been studied with users from Western populations. Through a deeper examination of the intersections between cultural identity and the expression of mental distress and support on online mental health forums, this work intends to fill that gap.

2.2 Cross-cultural differences in expression of mental health

The individual experience of mental health is strongly influenced by a complex interplay of diverse cultural factors, with these cultural factors having a notable impact on how mental illness is expressed, including in symptoms [77], willingness and method of self-disclosure [14], and both internalized and external stigma [11]. In the case of India [77], Malaysia [62, 80], and the Philippines [35], significant research has shown that expressions of distress among people experiencing mental illness tend to be mainly physical and somatic, and that individuals tend to use stress-related language rather than clinical language to describe their experience of mental distress. At the same

time, terms used to describe mental illness can also be appropriated and “glocalized” [81], such as in Kerala, India where the English word “depression” is used to describe a wide spectrum of illness experiences [53]. These culturally bound expressions of mental distress, often called *idioms of distress* [64], are often used as insight into the different explanatory models that people have about their illness. As detailed by Jorm et al. [50, 51], public knowledge and discourse about what mental health is (as well as awareness and education campaigns) can also have an impact on how people conceptualize their mental health, or what Jorm dubs “mental health literacy”. In many cases, this can cause individuals to see their symptoms through a medical or clinical lens. However, globally, awareness of mental health issues is not high [70], and as a result, we use clinical language (as we define it in section 3.1.2) as an approximation signifier of whether people conceptualize their distress through more clinical or medical framings.

2.3 Expression of mental health in general online communities

Additionally, in online forums, there are significant identity-based differences in the medium and method by which people choose to self-disclose and discuss mental illness. De Choudhury et al. [31] investigated how gender and culture affect discussions of mental illness online, and found cultural differences in how people from different countries discuss their mental health on Twitter, such as people from India and South Africa are less likely than people in the United States or United Kingdom to express negative emotions when discussing their mental health on Twitter. Similarly, some work has been done understanding what culturally specific mental health forums look like, such as Zhang et al.’s work analyzing online support groups for depression in China [103]. Zhang et al. find that both Chinese cultural values and stigma play a role in how individuals experiencing depression in China express distress and seek help.

The context in which online discussions about mental health happen, such as after trauma [11] or abuse [10] can also affect the method by which disclosure of mental health information happens, such as whether disclosures are direct or indirect [11]. Moreover, these practices and behaviors around self-disclosure of sensitive information can be culturally bound to the specific subcultures within an online mental health community. This has been found by Chancellor et al [21, 23] in the case of specific subcultural norms around the expression of disordered eating practices in eating disorder communities online, and Pater et al. [72] specifically among male members of eating disorder communities online. Similarly, Horne et al. [45] find the existence of certain informal norms in forums centered around suicide that dictate which posts are accepted as authentic [45] by the community. Looking more closely at design, O’Leary et al. [67] look at what factors are necessary to design an effective mental health intervention that allows for mental health expression, including an analysis of the role identity and demographic play, eventually extending that work to design an online mental health improvement tool [68].

2.4 Cultural differences in online mental health communities

The above discussion illustrates the prevalence of cultural differences in online self-expression, but how they affect help-seeking and supportive conversations on online forums specific to mental health topics is less clear. Past work on support forums has mainly been limited to language-based differences between individual groups speaking different languages, such as Ramirez-Esparza et al.’s [78] findings on differences between Spanish-speaking and English-speaking users on a bilingual depression forum. Other work, such as Loveys et al.’s [56] work examining differences in mental health expression based on race within American users of 7Cups, also focuses mainly on linguistic attributes and does not examine behavioral differences or dynamics of help-seeking and support-giving. Additionally, it only looks at cultural differences within the United States and not internationally. Similar to our work, Pruksachatkun et al. [75] find that cultural background has

an impact on the predictability of whether someone will feel better on Talklife, but do not deeply analyze the differences between users from different cultures that may be causing this difference in prediction accuracy.

3 DATA AND METHODS OF ANALYSIS

To examine whether cultural differences exist between users of online mental health support communities, we begin by doing an extensive analysis on data from use of Talklife by people from different countries. We then do a focused analysis on data from 7Cups to see if the cultural differences in expression of mental health on Talklife generalize to a different online support platform.

3.1 Method of Analysis

3.1.1 Selection Criteria and Data Scope. To understand the impact of cultural differences on how individuals use online mental health platforms, we begin our analysis by creating a dataset of users from different national communities on Talklife, a support platform with over half a million users [91].

For this analysis, due to the fact that most research in CSCW on mental health online has been done either agnostic of cultural context [12, 34] or in a Western context [60, 67, 88], we choose to focus on users from non-Western countries, following Zhang et al. [103]. As researchers located in the Global South and with lived experience interacting with the health system and diverse explanatory models [52] of mental illness, we believe that moving the focus of CSCW and CSCW-adjacent mental health research away from the West is crucial to better meet the needs of people often underserved by the medical system [70].

To create these subgroups of users, we choose the three non-Western countries with the highest user populations on Talklife, or India, Malaysia, and the Philippines. Guided by the rich amount of literature on the unique nuances to mental health expression for each country [35, 62, 77, 80], we examine the national identity, linguistic, and behavior-based differences of use between each user subgroup. In particular, this research notes that as a result of cultural norms around the sharing of distress and alternative conceptualizations of mental illness, in India, Malaysia, and the Philippines, symptoms are often expressed in somatic and religious terms, as opposed to traditionally clinical or psychiatric terms.

We choose to analyze each subgroup at the national level for both theoretical and practical reasons. On a theoretical level, in past work in the medical anthropology of mental health, national identity has commonly been used for an approximate level of analysis for cultural identity [31, 33, 52]. Additionally, on a more practical level, each user's country was determined using their IP address by Talklife and shared with us in an user-anonymized dataset. Inferring a more precise location could potentially compromise user anonymity, as discussed in past work [47], and did not seem to have any more significant value for our analysis of cultural differences than analysis at the national level.

We analyze data from 10,532 Indian users, 3370 Malaysian users, and 3370 Filipino users, as shown in Table 2. Collectively, we refer to these countries as the *minority* sample. As a comparison set, we construct a random sample of all threads on Talklife and refer to it as the *majority* sample. Due to the relative prevalence of users from Western English-speaking countries in Talklife, most of the threads in the majority sample include posts from countries such as the USA, UK and Canada. Indians are the largest non-Western minority subgroup on Talklife. Data was sampled from May 2012 to June 2018.

Following this cross-national analysis, to see if our broader results on Talklife generalize to a differently structured online mental health community, we picked the largest Western country

(the United States) and the largest non-Western country (India) represented on 7Cups, a similar support platform with more than 15,000 users actively using the platform each week [7]. Using 7Cups data, we repeat our analysis, testing for the same cultural differences we found in our Talklife sample. For this analysis, we were provided a sample of data on activity from 6055 Indian users, and 18581 American users, as shown in Table 2. Unlike our sample of Talklife users, this dataset is not a random sample. There is an upsampling of Indian users to ensure that we have data from a sufficient number of Indians in the dataset. Like on Talklife, Indians are the largest non-Western minority subgroup on 7Cups. We focus on Indian users due to a lack of sufficient data on users from Malaysia or the Philippines. Data was sampled from March 2014 - August 2018.

3.1.2 Defining Cultural Identity and Use of Clinical Language. In this work, we examine the relationship between cultural identity and use of online mental health support forums. To do so, we leverage Tomlinson's definition of cultural identity as "self and communal definitions based around specific, usually politically inflected, differentiations: gender, sexuality, class, religion, race and ethnicity, nationality" [94], particularly looking at the aspect that of modern cultural identity that runs along national lines, as delineated by Hall et al. [41]. As a diverse and amorphous form of identity, cultural identity can often intersect and interact with other forms of identity, including religious or ethnic identity. However, in the absence of direct information about religious or ethnic identity, based on the data available, we use national identity as a proxy for cultural identity. Additionally, following Schlesinger et al's [83] call for more intersectional analyses and methods within HCI, we also include analyses of adjacent and intersecting identities when relevant, including religious identity.

To analyze clinical language, we use a broader definition of clinical language than just specific medical diagnoses. Following methods used in past work to analyze antidepressant related language [30], we create a dataset of clinical mental health language, including unigrams, bigrams and trigrams from a list of mental disorders as defined by the International Classification of Diseases (ICD-10) and Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [100]. We also included all unigrams from the MacMillan Dictionary list of words used to describe illnesses and diseases, both specifically for mental illness and general illness [1-3]. As a result, we include unigrams like "night" (from night terrors) or sleep (from "sleep disorder") as these are often correlated with specific symptoms of mental illness or distress, such as sleep issues or being awake at night [30]. This included any clinically common abbreviations for mental disorders, such as OCD for "obsessive compulsive disorder" or BPD for "borderline personality disorder." Shorthand for disorders commonly used by online communities, such as "pro-ana" (as used in pro-eating disorder communities) [22] were not included due to the difficulty in finding an exhaustive list of these terms across disorders. We choose to use terms from and associated with DSM and ICD categorized disorders as a result of the common usage of these frameworks globally [99].

Throughout our analysis of these varied factors, we use μ to represent means, and σ to represent standard deviations.

3.1.3 Constraints, Limitations and Tradeoffs. Cultural identity can exist at many different and intersecting levels, including subcultures and subcommunities within the larger umbrella of a cultural identity. As a result, for the purpose of this analysis, we had to adopt some constraints in order to do a meaningful and specific analysis.

One large limiting constraint that we chose for this study is to use national identity at the state level as a proxy for cultural identity. Though a major and formative part of modern cultural identity, as argued by both Hall [41] and Tomlinson [94], each country we analyze is incredibly diverse, with many individual cultural identities that both intersect and diverge from a greater national identity [54, 64, 89]. A more rich analysis of these other forms of cultural identity is beyond the

scope of this work, but could lead to richer conclusions about the nature of cultural identity in online mental health support communities, particularly with regard to cultural differences between users with the same national identity. Additionally, to stay consistent between analyses, as a result of a lack of data on users from Malaysia and the Philippines, we only analyze users in India on 7Cups, and extend these findings to the experience of being part of a minority group on an online mental health forum. We draw validity for these exploratory findings from similar consistent patterns we observe between Indian, Malaysian, and Filipino users, but a deeper analysis with a larger dataset is likely necessary to determine when and for which minority communities these conclusions do not hold true.

Additionally, while we construct clinical language through use of the commonly used DSM and ICD, both frameworks of illness categorization have significant limitations, particularly in the countries we have selected. For example, there are both mental health disorders that are culture-bound [74], as well as mental health language that is used in different ways within the specific countries we analyze, such as depression often being an umbrella term for all mental illnesses [53]. Additionally, it is clear that online support communities often develop their own cultural norms and language around mental health [21, 72], and a deeper understanding of how this plays out on Talklife and 7Cups is neither the focus nor within the scope of this work. In this work, we intentionally use standard clinical and medical terms for mental health disorders in our analysis of clinical language. As detailed in past anthropological research [52], it is theorized that the use of medical and clinical language is representative of a medicalized explanatory model of illness, and we frame use of this language across cultures as an approximate signifier of a greater awareness of the presence of a mental disorder, as opposed to conceptualizing distress as “stress”, “tension” or “depression” [25, 53, 98].

For our analysis, we strictly analyzed posts that were in the Latin alphabet, with almost all posts on both Talklife and 7Cups being in English. However, as both Malay [8] and Tagalog [82] are most commonly written in the Latin script, and since it is common for users from India speakers to use romanized versions of Indian languages online [79], it is possible that a small minority of posts in our analysis were text in a different language. However, as confirmed by only seeing English words used in our analysis of the top n-grams among each user subgroup, it is clear that English is the predominant language on both platforms. Though beyond the immediate scope of this work, a greater analysis of non-English code-switching on these platforms could lead to a deeper understanding of the impact of interactions on expression between users with the same national identity but different language preferences.

3.2 Platform Context

3.2.1 Talklife. Talklife [5] is a global mental health support platform founded in 2012 [6] and designed as a safe space for people to find support and openly discuss their mental health when going through emotional or mental distress [61].

Defining Posts and Replies. Unlike forums based on self-diagnosis of illness (such as depression or anxiety-focused forums on Reddit), Talklife does not contain any explicit illness-based categories. Instead, a user expresses their mental health as “posts” to which others can reply with messages of empathy, questions, and support. We refer to a post and its replies collectively as a “thread,” calling the initial post an “index post”, and the user who contributes the first post in a thread as the “original poster” or simply OP. Additionally, we call posts that are responses to an original post as “support responses”, following norms of behavior on Talklife in which posters will make an initial post to seek help, and responses from the community are messages of support, both in the form of empathy and further probing questions about the user’s situation [75]. To confirm that support responses are usually posts that support the original poster, we do an analysis of the top

Indian	Malaysian	Filipino	Random
wanna talk (0.12%)	stay strong (0.21%)	i'm sorry (0.15%)	i'm sorry (0.15%)
take care (0.11%)	good luck (0.11%)	stay strong (0.10%)	stay strong (0.12%)
stay strong (0.09%)	happy birthday (0.10%)	happy birthday (0.09%)	feel like (0.11%)
happy birthday (0.07%)	feel like (0.09%)	good luck (0.09%)	want talk (0.09%)
feel like (0.07%)	i'm sorry (0.09%)	feel like (0.08%)	good luck (0.08%)
good luck (0.06%)	one day (0.08%)	someone talk (0.07%)	need talk (0.08%)
i'm sorry (0.06%)	wanna talk (0.08%)	need someone (0.07%)	get better (0.08%)
want talk (0.06%)	get better (0.07%)	get better (0.07%)	i'm sure (0.08%)
would like (0.06%)	what's wrong (0.06%)	feel better (0.06%)	wanna talk (0.06%)
feel better (0.06)	feel better (0.06%)	want talk (0.06%)	feel better (0.06%)

Table 1. In this table of language used in responses to index posts on Talklife, through an analysis of bigrams, we show that the vast majority of response posts are constituted by support language of empathy and further probing questions (e.g. "Hope you feel better" or "Do you want to talk?" or "Stay strong?"). For this reason, we call these responses posts "support responses."

10 n-grams in a representative sample of posts, finding that across populations, support language is used, as seen in Table 1. Finally, we use the term "posts" when describing any analysis we do on posts that might be an index post by an OP or be a support response to an index post.

At any time, the user can also browse a global feed of recent posts on Talklife and choose which ones to reply to. Within a user's feed, these posts are ordered strictly based on the time in which they are posted by other users. Additionally, there is a norm on Talklife of using constructed usernames and pseudonyms when making an account—users usually do not use their actual names and maintain some level of anonymity when using the website.

Posts within threads on Talklife tend to be short and conversational, with an average of 36 posts per user ($\sigma = 248$) and an average length of 14 words ($\sigma = 21$), as seen in Table 2. Figure 1a shows the distribution of usage activity by comparing number of posts per user across different countries on Talklife. All countries show a similar trend in that most users are not heavy users, and only post a few times, as the vast majority of users contribute fewer than 10 posts. Additionally, as described in past work [75], the vast majority of conversations on Talklife tend to be in English.

3.2.2 7Cups. Similar to Talklife, 7Cups [4] is another global online mental health support platform, founded in 2013 [87]. 7Cups shares the main characteristics of mental health expression and support-giving with Talklife. Typically, a user (original poster) contributes an index post and then other people can reply to it, forming a chain of posts which we refer to a thread. However, 7Cups is similar to typical web forums like Reddit where the platform is divided into sub-communities based on different mental health-related attributes, including specific diagnoses (such as an "Anxiety Support", "Depression Q&A", or "Eating Disorder Support" group). Additionally, some volunteers on 7Cups are trained by the website to be listeners who offer emotional support, and are then directed to users who may be in distress and want emotional support [15].

Unlike on Talklife, posts within threads on 7Cups tend to be longer and go into greater detail than posts on Talklife, with an average of 7 posts per user ($\sigma = 80$) and an average length of 64 words ($\sigma = 121$). These statistics can be seen in Table 2. Figure 1b shows the distribution of usage activity by comparing number of posts per user across different countries on 7Cups. We find a similar, but starker difference in heavy and light users of 7Cups: compared to Talklife, a bigger fraction of users contribute less than 10 posts. Similar to Talklife, the vast majority of posts on 7Cups are in English.

	Talklife	7Cups
Number of Users in Sample	Indian: 10,532 users Filipino: 3370 users Malay: 3370 users Majority: 14,571 users	Indian: 6055 users American: 18581 users
Mean Number of Posts per User	36 posts	7 posts
Median Number of Posts per User	5 posts	1 posts
Mean Length of Post	14 words	64 words
Median Length of Post	8 words	30 words

Table 2. Sample sizes of each online mental health support forum we analyzed. We find that Talklife posts tend to be more conversational, whereas 7Cups posts tend to be longer and more traditional forum posts.

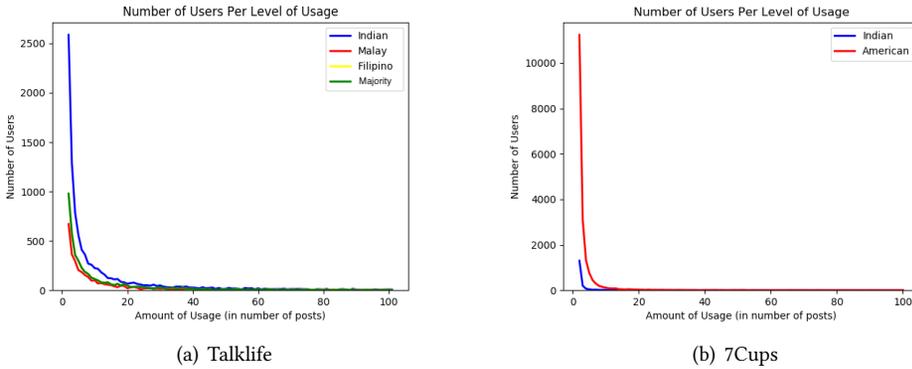


Fig. 1. Number of users who have exactly n number of posts. The vast majority of users of Talklife and 7Cups contribute less than 10 posts.

In the next two sections, we present a cross-sectional and longitudinal analysis of activity on Talklife, followed by a comparative analysis of 7Cups in Section 6.

3.3 Privacy, Ethics, and Disclosure

All data analyzed in this study was sourced (with license and consent) from the Talklife and 7Cups platforms. Additionally, to maintain user anonymity, all personally identifiable information was removed from the dataset before any findings were reported. Additionally, all work was approved by our institution’s Institutional Review Board.

4 CROSS SECTIONAL ANALYSIS

We first present a cross-sectional analysis of differences in identity-based behavior (RQ1), use of mental health language (RQ2), and patterns of support practices (RQ3) between people from minority and majority countries.

4.1 Identity-Based Expression of Mental Health

As Talklife is a quasi-anonymous forum, there is no requirement to explicitly state one’s location when beginning a new thread or post—users are as anonymous as they choose to be. With this

Indians	Malaysians	Filipinos	Majority Sample
post	us	us	i'm
happened	alone	thank	like
us	sad	alone	know
may	wish	god	people
great	nice	though	feel
like talk	dont want	thank much	feel like
[redacted]	dont worry	duly noted	i'm sorry
talk friends	dont give	wish best	stay strong
need friend	take deep	welcome talklife	want talk
would love	nice guy	lit lit	need talk
[redacted]	mhm mhm mhm	lit lit lit	need someone talk
like talk friends	happy new year	sending warm hugs	hope feel better
feel free talk	pray find peace	[redacted]	things get better
shit shit shit	what's wrong dear	[redacted]	feel free message
[redacted]	may god bless	im sorry im	cutie cutie cutie

Table 3. The top 5 unigrams, bigrams, and trigrams from all posts and support responses by Indian, Malaysian, and Filipino users of Talklife that do not overlap with the top n-grams in the majority sample. We find that people from the minority sample are more likely to talk about themselves in relation to other people, such as through the use of “us”, words involving friendship, and descriptions of feeling alone. For context in this comparison, we also report the corresponding n-grams from all posts from the majority sample.

norm of anonymity as context, we find that individuals from India and Malaysia tend to mention their country of origin in their first post (regardless of whether index post or support response) at a much higher rate than the majority of people on Talklife. While individuals in the majority sample mention their country of origin .4 percent of the time in their first post on average ($\mu = .4, \sigma = .644$), Indian and Malaysian users mention their country of origin 1.2 percent of the time in their first post ($\mu = 1.2, \sigma = .108$). The above differences are significant at a level of $p = 2.59e - 19$. Filipinos mention their country less often than the rest of Talklife ($\mu = .3, \sigma = .055$), however this difference is not significant.

Given the norm of anonymity on Talklife, the fact that people from India and Malaysia mention their country of origin in their first post at a higher rate than the majority sample suggests that cultural or national identity may potentially be one important part of how people from minority countries represent their identity to the Talklife community. This finding extends past research in medical anthropology and psychiatry to online mental health communities, showing that people’s country of origin is intimately connected to how they frame mental health to outsiders [20, 85]. Following this past work, we conjecture that the use of identifiers of country of origin may be a signal by the individual to others on the forum that they want to be supported by people from their cultural or national background. However, our finding with Filipinos also shows that this observation is not universal and needs to be understood within the context of each country.

4.2 Linguistic Differences in Mental Health Expression and Support

4.2.1 General linguistic differences. To better understand the content-based differences between posts from individuals in the minority sample, we compare the top unigrams, bigrams, and trigrams from each minority country to those from the majority sample. We filter out any words that were only one character, as well as the Natural Language Toolkit’s built in stopwords [16]. The top 5 n-grams unigrams, bigrams and trigrams can be seen in Table 3. N-grams that have been redacted are the usernames of Talklife users that were discussed in plain text by others on the website.

We can make a few observations from the relative frequency of n-grams. First, English is the most commonly used language within each community on Talklife, as words from languages native to each country were not the majority of any of the n-grams. Second, top-5 n-grams from the majority sample are not common to the top-5 n-grams in any of the minority sample, suggesting a difference in how people express mental health. Even when people are talking about the same theme, such as getting support, they tend to use different phrases: the majority sample uses “need someone to talk to”, while Indians prefer “like to talk to friends”. Third, while much of the language most often expressed by users in the majority sample is support language expressing individual distress (such as “i’m” or “feel”), we find that people from the minority sample are more likely to talk about themselves in relation to other people, as illustrated by the bolded n-grams in Table 3. For example, individuals from the minority sample use the term “us” at a higher amount than those in the majority sample. Further, individuals from India often talk about wanting or needing friends, whereas individuals from Malaysia and Filipino refer to loneliness (using the word “alone”) more often than people in the majority sample.

This use of terms related to interpersonal connections to express mental distress is seen in India [73], Malaysia [92], and the Philippines [35] when individuals experiencing distress are asked to describe how they are feeling. Our finding extends this work in the context of online mental health support communities.

Finally, references to religion (such as “god” or “pray find peace”) are more common in posts from Malaysia and the Philippines. This follows past research on the expression of mental health in both Malaysia [65] and the Philippines [55, 84] showing that religion is often used as a foundation for how people from these cultural backgrounds express mental health concerns and for how people support one another. The higher presence of references to religion among users from Malaysia and the Philippines might also suggest that index posts that discuss religion but do not specifically discuss distress might actually be one culturally-sanctioned method of signposting a state of mental distress, as seen in past research in offline contexts [24, 55].

4.2.2 Differences in Clinical Language Use. Based on past research showing that individuals from minority countries often express mental distress in non-clinical terms [52, 53, 64], we examine the use of clinical language on online mental health support communities. For this analysis of clinical language around mental distress from different countries, we use data from the top 25% of users based on number of posts on Talklife to analyze a greater number of posts.

As Table 4 shows, the amount of clinical language consistently differs between the majority sample and minority samples. We find that clinical language is used less frequently in posts from the minority sample than in the majority sample. For Indians, Malaysians and Filipinos, 14.2-17.5% of index posts have clinical language respectively, compared to 22.2% for the majority sample. We see a similar but smaller difference for support responses: 6.6-7.9% of support responses tend to have clinical language for the minority sample compared to 8.6% for the majority sample. These differences are significant with a $p < .01$ unless otherwise indicated.³ For all countries, though, we find consistently that support responses have less amounts of clinical language than index posts.

However, if we look at the frequency of clinical language within posts, the difference between the minority sample and the majority sample is small. Combined with the evidence that the fraction of posts with at least one use of clinical language is substantially lower for the minority sample, this implies that there must be higher use of clinical language terms per post for each post from the minority sample that does contain clinical language. This implication is verified by the last two rows of Table 4: when we restrict our analysis to only those posts that do contain clinical language, posts from the minority sample use more clinical mental health language in comparison

³Additionally, Percent Clinical Language in Index Post (General) for the Filipino sample has a significance level of $p = .04$

	Indians	Malaysians	Filipinos	Majority
Percentage of Index Posts With Clinical Language	14.2%	17.5%	17.1%	22.2%
Percentage of Support Responses With Clinical Language	6.6%	7.3%	7.9%	8.6%
Percent Clinical Language in Index Post (General)	1.1%	1.3%	1.2%	1.3%
Percent Clinical Language in Support Response (General)	0.58%	0.76%	0.69%*	0.66%
Percent Clinical Language in Index Post (Given Clinical Language)	7.5%	7.7%	7.0%	6.1%
Percent Clinical Language in Support Response (Given Clinical Language)	8.7%	10.2%	8.7%	7.6%

Table 4. Individuals from the minority sample have fewer posts that use clinical language than individuals from the majority sample. However, when we restrict analysis to only posts that contain clinical language, posts from the minority sample have more clinical language.

to the majority sample for both index posts and support responses, with a statistically significant difference at $p = .01$. Thus, while a smaller fraction of posts in the minority sample use clinical language overall, there is a big variation in its use. Posts that do use clinical language tend to use many more terms per post than those from majority countries, suggesting that people who *do* use clinical language from minority countries are participating in a standard and globalized language around describing clinical mental health.

Table 5 confirms the above result when we look at the top unigrams, bigrams and trigrams of clinical language used by people from different countries. The percentages for each term or n-gram correspond to the fraction of occurrences of the n-gram relative to all clinical n-grams. We find that there is not much variation between the clinical language terms that are used across the different countries. The disorders that are talked about most explicitly (such as “borderline personality disorder,” “personality disorder,” or “social anxiety”) are used at relatively consistent rates between both the minority sample and the majority sample. As posited above, it is possible that this consistency in types of clinical language hints at some form of standardization in how those users who use clinical language use it, a globalized online clinical language around mental health and a potential difference between past work on expressions of distress in offline settings. That said, it should be noted that some of the most popular n-grams, especially unigrams, such as “sleep” and “night” can function as false positives, as not every mention of sleep or night on Talklife is a reference to a mental health issue (such as “sleep paralysis” or “night terrors”). These terms may also be used in different (and culturally bound) ways. More specific terms (bigrams such as “anxiety disorder” and trigrams such as “borderline personality disorder” are used rarely.

Finally, we also report potential cross-cultural differences when individuals first begin to use clinical language on Talklife. On average, Indians tend to use clinical language on the 6th post (mean = 6.3, $\sigma = 12.12$), whereas Malaysians, Filipinos, and the population from the majority sample tend to use clinical language on the 4th post (mean = 4.31, 4.51, 4.13, $\sigma = 5.7, 6.8, 6.6$). Interpretation of these results will require more work investigations the reasons why Indians use clinical language later in a thread.

On balance, these results shows that individuals from the minority sample use lesser amounts of clinical language overall, but also show more variation in use than people from the majority sample, and add nuanced perspective to past work [52, 53, 64] showing that individuals from these minority countries are often less likely to use clinical language when conceptualizing and describing their experience of mental distress.

4.3 Support Behavior and Cultural Homophily

Beyond language expression, there are also differences in help-seeking versus support-giving behavior among people from different countries. Indian Talklife users tend to begin their usage of Talklife starting fewer threads than the majority population, with 45 percent of first posts

Indians	Malaysians	Filipinos	majority sample
sleep (14.2%)	sleep (12.4%)	sleep (11.2%)	sleep (8.1%)
pain (8.5%)	night (8.4%)	pain (9.1%)	night (7.5%)
night (8.0%)	pain (7.2%)	night (7.5%)	pain (7.3%)
food (4.3%)	depression (5.4%)	depression (5.4%)	body (4.6%)
body (4.2%)	food (5.2%)	food (4.3%)	eating (4.4%)
personality disorder (0.5%)	personality disorder (1.3%)	personality disorder (0.6%)	personality disorder (1.0%)
social anxiety (0.3%)	social anxiety (0.5%)	bipolar disorder (0.6%)	eating disorder (0.6%)
anxiety disorder (0.3%)	anxiety disorder (0.2%)	social anxiety (0.4%)	social anxiety (0.4%)
eating disorder (0.1%)	eating disorder (0.2%)	anxiety disorder (0.3%)	anxiety disorder (0.3%)
sleep paralysis (0.1%)	bipolar disorder (0.1%)	eating disorder (0.3%)	bipolar disorder (0.1%)
borderline personality disorder (0.01%)	borderline personality disorder (0.1%)	borderline personality disorder (0.02%)	borderline personality disorder (0.03%)
social anxiety disorder (0.008%)	dissociative identity disorder (0.017%)	social anxiety disorder (0.010%)	binge eating disorder (0.008%)
major depressive disorder (0.006%)	major depressive disorder (0.008%)	binge eating disorder (0.010%)	major depressive disorder (0.008%)
dissociative identity disorder (0.003%)		attention deficit disorder (0.005%)	narcissistic personality disorder (0.007%)
avoidant personality disorder (0.003%)		obsessive-compulsive personality disorder (0.005%)	social anxiety disorder (0.007%)

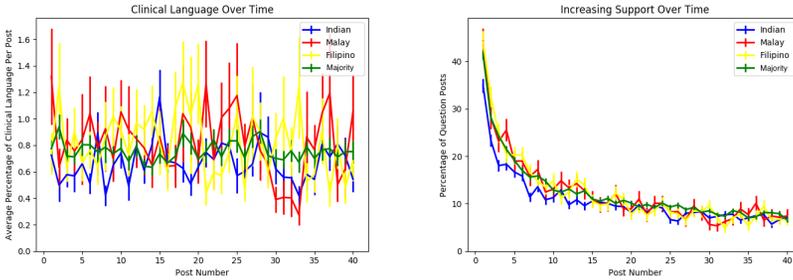
Table 5. The most frequently used clinical n-grams, with the percentage showing an individual n-grams’s share of clinical words in the entire set of all clinical n-grams used on the forum by all users from each country

from Indian users being index posts ($\sigma = .497$), whereas 56 percent of Talklife users from the majority population tend to begin their time on Talklife with a new thread. In contrast with Indian users, Malaysian and Filipino users follow the trend of the majority population, with 68 percent of Malaysian users starting a thread as their first post ($\sigma = .465$), and 60 percent of Filipino users starting a thread as their first post ($\sigma = .490$).

Individuals from the minority sample are more likely to participate in threads with people from their own country, demonstrating patterns of homophily [59]. On average, a thread started by a user from a minority country has 42-59% of users from the same country as the original poster. To put these percentages in perspective, we compare them relative to the overall fraction of Indians, Malaysians or Filipinos users on Talklife. Without homophily, we would expect the fraction of Indians in a thread started by an Indian user to be roughly the same as the overall fraction (baseline) of Indians on the platform. We find, however, that the fraction of Indians on a thread started by an Indian is 26 ($\sigma = 34$) times more than the baseline fraction. Similarly, Malaysian users were 64.58 ($\sigma = 110$) times more likely, and Filipino users were 16.33 ($\sigma = 32$) times more likely than the baseline to participate in threads started by people from their own country. Given that Talklife is a forum in which users are as anonymous as they choose to be, and that the majority language used in the forum is English, this result is particularly interesting, as it shows that people tend to seek out others from their own background online when providing social support, even when this functionality is not explicitly enabled by the platform.

This observation is strengthened when we look at the first respondents to threads started on Talklife. For threads initiated by users from minority countries, we find that the first respondents are also more likely to be users from the same country as the original poster among Indians, Malaysians, and Filipinos. Compared to a baseline of selecting posts at random, the effect is 9.94 ($\sigma = 4.74$) times more likely for Indians, 3.36 ($\sigma = 6.52$) times for Malaysians, and times 12.43 ($\sigma = 9.9$) for Filipinos.

However, it is possible that some of this cultural homophily might be the result of users from the same country being online at similar times due to a shared time zone. To factor in the impact of shared time zones on our observation of cultural homophily, we additionally compare the number of users from a minority country in a thread relative to the overall fraction of users from the same minority country active on Talklife during the hour that the index post was posted. Thus, the baseline now depends on the time at which an index post was posted: under no cultural homophily, we expect that the fraction of respondents from a minority country in a thread started during a particular hour will be equal to the overall fraction of users active at that hour from that country. We find that the fraction of Indians on a thread started by an Indian is 7.56 ($\sigma = 16.8$) times more



(a) Percentage of clinical language use as a function of post number. There is no changing trend in clinical language used over time.

(b) Over time, regardless of nationality, Talklife users start fewer threads and become more active supporters.

Fig. 2. In these figures, we look at trends as users post more on Talklife. We find that over time, there is no change in the level of clinical language used, a surprising result based on past work. We do find that over time, people tend to support more as they use the platform more.

than the baseline fraction, even when factoring in the effect of shared time zones. Similarly, with this consideration, Malaysian users were 406.89 ($\sigma = 1650$) times more likely, and Filipino users were 187.51 ($\sigma = 842.97$) times more likely than the baseline to participate in threads started by people from their own country. Note that our time-dependent analysis assumes that the bulk of responses to an index post happen within the same hour. When we only consider the first response to a thread started by a minority user, compared to baseline levels of Talklife usage, the effect is similar: Indian users are 3.03 ($\sigma = 6.17$) times more likely to be the first respondents for a thread started by an Indian, and the corresponding ratio is 160.82 ($\sigma = 623.53$) and 87.58 ($\sigma = 483.65$) times for Malaysians and Filipinos respectively.

The substantially higher ratios for the Malaysian and Filipino subset are the result of fewer Malaysian and Filipino users in comparison to the Indian subset, who have a less consistent use of Talklife throughout the day in comparison to the Indian subset. Longer conversations among these minority users that happen at low activity hours pull up the overall homophily ratio. When separating out our analysis between high activity hours (for Malaysia and the Philippines) and low activity hours, we find that during high activity hours, the likelihood is 4.01 ($\sigma = 6.18$) and 1.35 ($\sigma = 2.36$) times more than the baseline respectively, and during low activity hours, the likelihood is 487.28 ($\sigma = 842.97$) and 223.91 ($\sigma = 1796.90$) times more than the baseline respectively. Overall, these results provide strong evidence that even when factoring in the potential impact of shared time zones, there is still substantial cultural homophily in where individuals from minority countries find support.

5 LONGITUDINAL ANALYSIS

Having analyzed cross-sectional differences across countries, we now turn to studying the evolution of these differences over time, in terms of cultural identity, clinical language and supportive behavior on Talklife.

5.1 Identity-Based Expression of Mental Health

We found that while there were some small fluctuations in identity-based attributes, such as the amount in which an a user mentions their own country over time, we found that none of these fluctuations were different to any level of statistical significance.

5.2 Linguistic Differences in Mental Health Expression and Support

Next, we study the changes in use of clinical language as a user participates more on Talklife. Based on past work [52, 53] in medical anthropology showing the influence of environment on changing explanatory models of mental illness, we should expect an upward trend for minority countries in use of clinical language. For example, in research done on the the cultural dimensions of the Chinese experience of depression, Chinese individuals experiencing depression were found to express their symptoms using more Western idioms of distress after more exposure to psychiatry and clinical models of depression [52]. Past research has also shown that mental health forums are a ripe place for linguistic accommodation [86].

To investigate this question, one may look at the average use of clinical language as we go from post 1 to post k for users from each country. However, as we increase k , we may not be comparing posts from the same people, due to *survivorship bias* where the people that make up the earlier posts have dropped out and thus we compare a different set of people at different k . To counter such survivorship bias, we instead created a subsample of the top $n\%$ of users and looked at their first k posts, such that each of them had at least k posts. Figure 2b shows the use of clinical language over time for the top $n=10\%$ users and their first $k=40$ posts. Contrary to past work, we find that while clinical language does tend to slightly fluctuate over time, overall clinical language used by people from the minority sample does not fluctuate to any statistically significant level, or follow any particular changing trend over time. This result stays consistent irrespective of our choice for n , including for $n=50\%$.

To verify if these results could be due to lack of exposure to international users, we also constructed a subset of users from minority countries who contribute majority of their posts in international threads, or threads in which the majority of users are not from the same country as those from the minority country. We still find the same pattern across the three countries. Thus, our findings challenge theories from past work that suggest that individuals use more clinical language with exposure, at least for online support interactions.

5.3 Support Behavior and Cultural Homophily

When examining support practices, however, we do find differences over time. Talklife users tend to transition from starting threads to supporting other people on the website, regardless of national identity. As in the above analysis, we compute the ratio of index posts to support responses over time for the first $k=40$ posts by the top $n=10$ percent of users on the website, as shown in Figure 2a. We find that for Indians, while at first post, 35 percent of posts ($\sigma = 0.48$) are index posts and 66 percent are support responses, by post 40, only 6 percent of posts ($\sigma = 0.23$) are index posts, whereas 94 percent of posts are support responses. This same pattern follows for Malaysians and Filipinos, with the percentage of index posts dropping from 44 ($\sigma = 0.50, 0.50$) to 6 and 7 percent respectively ($\sigma = 0.23, 0.25$) between the first and fortieth post for both populations. This same trend can be seen for the majority sample, with a trend from 43 percent questions to 8 percent index posts by the fortieth post.

To see if this result could simply be explained by self-selection bias in that people who ask more questions are also more likely to drop out of the platform early, we also compare the index post-support response ratios of people with fewer total number of posts. For any $m > 1$, where m is the total number of posts by a user, we find that users have statistically significant reductions in the number of questions being asked, and trajectories that always tend towards higher eventual levels of support.

This finding suggests that regardless of cultural background, as people engage more with the Talklife support community, they end up becoming peer supporters. While there may be initial

cultural differences in whether individuals seek help or support more when they use the website, these cultural differences tend to be assimilated into the general community norms of helpseeking and supporting behavior on the website.

Finally, for cultural homophily effects in thread participation, we find that they remain relatively stable over time; the changes over time were not significantly different.

6 CROSS-PLATFORM VALIDATION

In our analysis of cultural differences in how users of Talklife use the forum, we find that users from the minority countries are more likely to mention their country when discussing their mental health, use lesser amounts of clinical language, and tend to support people that have a similar national background. We now check if these differences are generalizable to other global mental health platforms or are specific to Talklife.

To see if results from Talklife hold across platforms, we do a focused analysis of cultural differences between users from one minority country (India) and one majority country (the United States) on 7Cups. We pick these two countries as they are the countries in the Eastern and Western hemispheres that have the highest user populations on Talklife and 7Cups, as we detail in Table 2. Since the dataset provided to us from 7Cups was much smaller than that for Talklife, other Eastern countries did not have enough coverage. Additionally, to adapt our analysis to the platform-specific usage norms of 7Cups, we only do a cross-sectional analysis. This is due to the fact that most 7Cups users only post once (as detailed in Table 2) and seek longer pieces of advice than the back-and-forth conversational support practices of Talklife.

We analyze 7Cups data along the same dimensions of analysis as we do Talklife—identity-based differences, linguistic differences, and behavioral-based differences. We find that Indians are more likely to mention their country than Americans in their posts, that Indians do use lower amounts of clinical language specifically in their support posts, and that Indians tend to support other Indians on 7Cups, extending some of our findings on cultural differences from our analysis of Talklife.

6.1 Identity-Based Expression of Mental Health

When analyzing how often people from India and the United States mention their country in their posts, we find that individuals from India mention their country more often than Americans when describing their mental distress on the forum, with Indians mentioning their country .3 percent of the time ($\sigma = .06$) and Americans mentioning their country .2 percent of the time ($\sigma = .05$). This is significant at $p = .01$, and extends our finding that national identity is tied to how people frame themselves on Talklife to 7Cups.

6.2 Linguistic Differences in Mental Health Expression

6.2.1 General Linguistic Differences. When examining the most common unigrams used by Indians and Americans on 7Cups, like on Talklife, we find that users in India are more likely to talk about their distress in relation to others, with “person”, “friends”, and “alone” all being top n-grams used. However, when examining bigrams and trigrams, we find that Indians use more clinical language (such as “panic attack” or “social anxiety”) than Americans, which is a different user behavior than what we found on Talklife. This may be the case due to the fact that 7Cups organizes categories around forum around specific diagnoses, and as a result, people who are more aware of their mental health disorder or diagnosis are more likely to seek out and use 7Cups. That is, we posit that a user specifically browsing through and posting to a forum on “social anxiety” or “depression” is more likely to be aware of these clinical terms and to use them in their posts.

Indians	Americans
person	glad
friends	week
years	hey
alone	days
maybe	hugs
social anxiety	glad hear
panic attacks	hope get
panic attack	remove add
feel free	great day
someone else	better soon
join teh dat	take care awesome
teh dat oen	take care stay
anxiety panic attacks	take care hey
makes feel like	hope get rest
feel free message	care stay awesome

Table 6. On 7Cups, we find that Indians tend to use language surrounding people, friends, and relationships more than Americans, similar to our finding on Talklife.

6.2.2 Differences in Clinical Language Use. To further tease out this 7Cups-specific difference in clinical language use, we now look at clinical language specifically. Examining the top n-grams for clinical language used in Table 7, we find that the types of clinical language that is used is generally the same between Indians and Americans, similar to our findings on Talklife. Note, however, that 7Cups users use an order of magnitude higher percentage of trigrams that are specific to mental health disorders, compared to Talklife users.

On prevalence of clinical language use on 7Cups, we find that Indians and Americans use clinical language in their questions at approximately the same amount of frequency, at 75.3% and 76.7% of questions asked containing clinical language respectively (Table 8). Unlike Talklife, there is no statistically significant difference between the level of clinical language used in questions. As 7Cups is a forum organized around types of disorders and diagnoses, this is not unexpected—it is more of a norm on 7Cups for people to ask longer and more specific questions about their mental health than it is on Talklife. Still, our finding of individuals from minority countries using less clinical language does hold for answers, as only 25.7% of answers from users from India have clinical language, whereas 31.0% of answers from users from the United States have clinical language. In addition, when we look at the fraction of clinical language terms in a post, we find that Indians use higher levels of clinical language in questions, but lower levels of clinical language in answers, both when considering all posts and when considering only posts with clinical language. All comparisons made above are statistically significant at a level of $p < .0001$.

Overall, thus, we find that 7Cups exhibits fewer differences in clinical language use between users from majority and minority countries, suggesting the possibility that forum design is associated with the expression of mental health by people from different countries. However, we cannot say whether forum design *causes* a change in expression, since the findings could easily be explained by self-selection of users into different platforms: one can argue that users from minority countries who are not familiar with clinical terms are less likely to find a specific subforum on 7cups and consequently less likely to contribute. At the same time, on both Talklife and 7Cups, we do find a

Indians	Americans
depression (10.8%)	anxiety (14.8%)
sleep (8.73%)	depression (10.2%)
night (7.53%)	night (5.40%)
anxiety (6.73%)	sleep (5.14%)
stress (5.81%)	stress (4.05%)
anxiety disorder (0.77%)	anxiety disorder (2.40%)
personality disorder (0.515%)	social anxiety (1.36%)
social anxiety (0.49%)	personality disorder (.974%)
specific phobia (0.26%)	generalized anxiety (.277%)
eating disorder (0.19%)	panic disorder (.209%)
seasonal affective disorder (.062%)	social anxiety disorder (.092%)
binge eating disorder (.051%)	generalized anxiety disorder (.086%)
borderline personality disorder (.041%)	dissociative identity disorder (.0738%)
social anxiety disorder (.031%)	major depressive disorder (.055%)
major depressive disorder (.031%)	borderline personality disorder (.026%)

Table 7. On 7Cups, we find that Indians generally use the same kinds of clinical language as Americans. Percentages show the total share of clinical language from a sample of all clinical language used by users from each country.

	Indians	Americans
Percentage of Questions With Clinical Language*	75.3%	76.7%
Percentage of Answers With Clinical Language	25.7%	31.0%
Percent Clinical Language in Question (General)	.6%	.1%
Percent Clinical Language in Answer (General)	.1%	.5%
Percent Clinical Language in Question (Given Clinical Language)	1%	.1%
Percent Clinical Language in Answer (Given Clinical Language)	.3%	2%

Table 8. On 7Cups, we find that Indians tend to use significantly less clinical language than Americans, similar to our finding on Talklife. An asterisk indicates no statistically significant difference between Indians and Americans.

lower use of clinical language for answers from minority countries. We also find that when we consider only the posts that do contains some clinical language, there are no significant differences in either the frequency of use or actual n-grams used by people from minority and majority countries.

6.3 Support Practices and Cultural Homophily

When analyzing whether there is cultural homophily in who Indians choose to support on 7Cups, we take a similar approach as our analysis on Talklife, scaling the average percentage of incidence of people from the country of origin of an OP on a thread. However, as the 7Cups dataset is one that upsamples Indian users, the value of homophily we get is an lower-bound on how likely it is for an Indian supporter to respond to a thread started by an Indian. With these constraints, we still find that there is an effect of homophily, as Indian users are at least 3 times more likely ($\mu = 3.4, \sigma = 3.9$)

to respond on a thread started by an Indian on 7Cups. This extends our finding from our analysis of Talklife that people want to support people from their national background to 7Cups.

7 IMPACT ON FORUM SUCCESS

Through our analysis on two different online platforms, we find that there are significant differences in how people from minority countries talk about their mental health on online support platforms. We now show that these cultural differences make a difference with regards to whether an individual from a minority community successfully feels better through use of online mental health support platforms.

7.1 Characterizing success: “Moment of change”

Though rich with data, online mental health forums are characterized by an absence of the kind of post-conversation survey that signifies whether a user has had a positive experience that has been analyzed in past work, such as in Althoff et al. [9]. To determine whether a conversation has successfully helped an individual on an online mental health forum, we follow Pruksachatkun et al. [75] in defining a successful thread as a thread with a “moment of change.” A thread with a moment of change is a thread in which the OP has a positive change in sentiment towards a topic that they were previously feeling some distress towards. To construct a dataset of these threads, following Pruksachatkun et al., first we identify threads in which the original poster (OP) initially described being in pain or distress through using words identified as *trigger words* by Talklife (such as “cut” or “kill”), and then later expressed that they were feeling better or that the other comments on the thread changed their mind about that topic of distress. Second, we look for a moment of change in these threads through the use of regular expression search for common phrases that signify a reduction in distress, as done in [75] (e.g., “thanks, I feel better now” or “you are right”). The list includes an extensive set of 10 phrases (and subsequent variants) and is designed to minimize the number of false positives for detecting a moment of change. As noted by Pruksachatkun et al., this method of deriving a ground truth has been validated via showing consistency between the method and manual annotation by crowdworkers on the relative sentiment between beginning and ending posts by a user. That said, these phrases do not account for the many different ways in which users might express a moment of change. Overall, regular expressions provide an approximate way of detecting specific kinds of moments of change that can be applied to large forum datasets.

Using this filtering procedure, we find 295 threads started by Indian users that have a moment of change. The rate at which moments of change occur is approximately the same across the Malaysian, Indian, and Filipino subgroups. However, since Indian users are the largest non-Western minority community on Talklife, Filipino and Malaysian users have less than a third of such threads—less than 100 threads each with moments of change. We thus restrict our analysis to threads started by Indians with moments of change and compare it to 25,537 threads started by Indians that do not have moments of change from Talklife. For comparison, we find 6396 threads started by users who are not Indian with moments of change, and 14,604 threads started by users who are not Indian without moments of change. Through use of these two datasets, we look to see whether there are differences between Indian users who have a moment of change and Indian users who do not have a moment of change based on the cultural differences we identified and validated in the last two sections.

Given the likelihood of cultural differences in how people express that they are feeling better, there are some limitations to this approach. As Pruksachatkun et al. [75] discuss, the relevance of a phrase, “I feel better now” as a marker of a moment of change may vary across cultures and thus is a very approximate metric for identifying whether a thread might have a moment of change. More

Moment of Change Threads	Non Moment of Change Threads
pain (10.5%)	pain (13.2%)
night (6.33%)	depression (5.99%)
anxiety (5.23%)	sleep (5.98%)
depression (4.41%)	night (4.39%)
social (4.13%)	attention (4.08%)
stress (3.86%)	anxiety (4.03%)
male (3.58%)	body (3.98%)
physical (3.03%)	eating (3.95%)
personality (3.03%)	social (3.62%)
eating (3.03%)	food (3.09%)

Table 9. The most frequently used clinical unigrams between threads started by Indians with moments of change and threads started by Indians without moments of change. We find no significant differences between the language used, suggesting that the relation between lower clinical language and a higher rate of success is not due to a difference in the severity of specific issues being discussed.

analysis is necessary to have a deeper understanding of these cultural differences in expression of a moment of change, which we leave for future work.

7.2 Impact of Cultural Differences on Forum Success

Below, we show how cross-cultural differences are associated with an individual being effectively helped on an online mental health support forum. In particular, we find that people who use lower clinical language and who are helped by people from a similar cultural background receive more effective support.

7.2.1 Identity. When looking at whether there is a difference in how often country of origin is mentioned between threads started by Indians with moments of change and threads started by Indians without moments of change, we find no statistically significant differences. Threads with moments of change are made up of an average of .1% ($\sigma = .007$) mentions of India, whereas threads without moments of change are made up of an average of .1% ($\sigma = .006$), showing no real difference.

7.2.2 Language. Interestingly, we find that there is less clinical language from in threads by Indian users that have a moment of change. We find that threads by Indian users with a moment of change have an average of .6% ($\sigma = .007$) clinical mental health language, whereas threads by Indian users without a moment of change have an average of .9% ($\sigma = .02$) clinical mental health language. When only looking at posts by the OP, these averages are more stark, with .5% ($\sigma = .009$) for threads from Indians with moments of change and 1% ($\sigma = .04$) for threads from Indians without moments of change respectively.

One way to interpret this result is that threads on less severe mental health issues are more likely to be have a moment of change, and those on severe mental health issues are less likely so. To verify, we look into the specific n-grams that were found in both types of threads: whether a lower overall clinical language also corresponds to less severe symptoms or disorders. First, it is important to note that disorders with severe symptoms more often have a formal diagnosis in India [53], and it is also the case that undiagnosed mental distress that is less severe is often couched in language that is less clinical (such as descriptions that use words like “stress” or “tension”) [25]. To confirm that the relation we find between lower clinical language and a greater rate of success on threads was not due simply to less severe issues being discussed in threads that have moments

of change, we did a search on the clinical n-grams found in both types of threads to see if there was any significant difference in the types of symptoms or diagnoses being described (such as “bipolar” or “schizophrenia” as opposed to “depression” and “anxiety”). Though this analysis would likely be more accurate if done with human coders, we use this n-gram based approach as an approximate measure to check for any substantial differences in severity of issues discussed. As seen in Table 9 for unigrams, for example, we find no significant differences in the specific diagnoses being discussed. This suggests that lower clinical language in threads with a moment of change is not simply due to difference in severity of mental health issues, but rather a complex linguistic phenomenon that merits further investigation.

However, in light of this result, we find that a lower amount of clinical language in threads without moments of change follows general patterns on Talklife for users who aren’t Indian. We find that threads by users who aren’t Indian with moments of change have an average of .9% ($\sigma = .012$) clinical language, whereas threads without moments of change have an average of 1% clinical language ($\sigma = .017$). In comparing the two results, we find that Indians have a greater difference in clinical language than users who aren’t Indian, when comparing those who do end up successfully finding help on a thread versus those who do not successfully find help. All comparisons above are with statistical significance of $p = .004$ or below. This difference between Indian and non-Indian users demonstrates that the language and framing of mental distress that may lead to a moment of change may not be the same across cultures, and is something we address further in Section 8.

7.2.3 Homophily. Looking at threads by Indians with moments of change and threads by Indians without, we find a strong association between the amount of cultural homophily and ending success of a thread. The fraction of Indians on a thread started by an Indian in which there is a moment of change is 10.5 ($\sigma = 5.21$) times more than baseline, whereas a thread without a moment of change is only 6.9 ($\sigma = 5.87$) times more than baseline, with a statistical significant difference at the level of $p = 5.24 \times 10^{-25}$. This finding indicates that individuals in distress find greater success when being supported by people from their cultural background on online mental health support platforms, suggesting a substantial effect of culture on eventual success in providing effective support.

8 DISCUSSION

Through our analysis of Talklife and 7Cups, we provide one of the first studies of cultural differences on online mental health forums. We then validate that these differences exist across forums, and indicate the implications of these differences on how and whether individuals from minority communities find support. In this section, we discuss some of the broader implications of these differences and potential reasons for they were observed, as well as make design recommendations for the impact these differences have for designing more inclusive mental health spaces and algorithms.

8.1 Implications of Cultural Differences

8.1.1 The Importance of Cultural Differences Online. In this work, we find that there are specific cultural differences in how people from different minority communities use and express their mental health in online mental health support communities. More specifically, we find that individuals from underrepresented countries are more likely than the majority to mention their country of origin, are more likely than the majority to use lower amounts of clinical language, and prefer to be supported and be supported by individuals from the same national background. We also find that these cultural differences have significant impact on whether individuals are able to have interactions in which they have some positive improvement in their well-being, particularly with regards to being supported by people from the same community, and a lower level of clinical

language being used. We also find that over time, while some of these factors do not change (such as use of clinical language or expression of national identity), support behaviors do change, with the vast majority of users transitioning from expressing distress in index posts to primarily supporting others in subsequent posts.

Past work shows how stressful it can be to navigate a platform that is unwelcoming or unfamiliar to an individual [37, 48]. In showing that cultural differences exist in how minority users use online mental health support communities, as well as the importance of creating spaces in which participants have a shared cultural identity, we show that it is crucial to be considerate of minority groups when designing online platforms, particularly online mental health support communities. This is particularly the case on online mental health support communities, where individuals volunteer moments of vulnerability and distress in the hopes of gaining helpful support from the community, and exclusion or bullying could have serious consequences [44].

As a result, we urge community moderators and other stakeholders of online mental health communities to be more considerate of the cultural background of members when making design and organizational decisions for each platform. We detail specific methods for what this consideration could look like in Section 8.2.

8.1.2 Potential Reasons for Cultural Differences. As significant work from medical anthropology has shown, culture is a foundation for how people conceptualize their mental health, and how they express and frame their mental distress when describing it to others. In this work, we show that cultural differences broadly extend to online contexts, such as mental health support forums. Even when these forums are semi-anonymous, the language that people use, who they choose to support, and how they frame themselves when using the forum are all influenced by culture.

The cause for the cultural differences we observe is not clear—based on past work, we speculate that there may be several different potential causes for these differences. One theory for why people from minority countries may use less clinical language might be the influence of stigma—namely, that people use less clinical language due to the culturally-bound implications of thinking of themselves as ill, as detailed by Raguram et al [76] in the case of psychiatric patients in South India. Though the online mental health forums we analyzed were pseudo-anonymous, the impact of stigma still may be present in terms of how people conceptualize their distress and choose to portray it online, even in an anonymous and less stigmatized environment.

As seen in the higher incidence of clinical language used on 7Cups, it may also be the case that the type of forum and the way that it is framed influences how people express distress on the website. Websites organized around diagnoses may prove a destigmatized environment for people to be more specific and clinical about what they are experiencing. Additionally, it may also be the case that people from places with lower awareness of mental health and mental illness may learn about these terms via participation on these forums, although we did not find evidence for it in our longitudinal analysis on Talklife in Section 5. To clearly isolate what might cause these cultural differences necessitates more qualitative work to complement our findings.

It is also true that the cultural differences we find do not exist in vacuums [27], and may intersect with one another. For example, we find that both reduced clinical mental health language and cultural homophily relate to whether a minority user successfully finds help on Talklife. However, this higher incidence of lower clinical language may be a result of threads with moments of change having higher levels of people from the same cultural background as the original poster, particularly considering that Indians have lower incidences of clinical mental health language when seeking help or supporting others overall.

8.2 Design Recommendations

Just as it does when people support each other in real life, our work shows that culture matters when people support each other online, and that cultural differences are particularly important when making sure that people in minority groups feel included in an online mental health space. Feeling isolated and alone is a common symptom of mental illness [18, 28, 39], and design choices that cause minority groups to feel otherized could only serve to exacerbate symptoms. It is not enough to simply design for the majority, and this is particularly the case for spaces meant to help improve the mental health of a vulnerable population, as minorities are particularly vulnerable for mental health issues [19]. With this in mind, we make recommendations for the future design of more inclusive online mental health spaces, and algorithms that make use of mental health data.

8.2.1 Peer Matching and Community Building. In this work, we find that people prefer to support and seek help from people with their cultural background, and that support from people who have the same background is particularly helpful in successfully helping people feel better. When designing inclusive mental health spaces, one potential design consideration is deciding how users of the website are recommended (or matched) to threads. It may be beneficial for users in distress to have more users recommended to their thread from their cultural background or who use the same kinds of clinical language to describe how they are feeling in other posts. Matching based on cultural or linguistic-based attributes would lead well from work that has been done in offline contexts, such as racial [95] or gender [13, 43] based preferences when looking for effective counseling. Intelligent routing systems that take into account identity-based factors could lead to minority users of online mental health spaces feeling more included.

8.2.2 Building Predictive Models. Our work also shows the necessity of considering culture when building predictive models. Predictive models often use probabilities derived from majority data to make inferences about the future. However, in this work, we show that when analyzing along cultural dimensions, there are significant differences with regards to how people in minority communities express their mental health. It may be the case that an algorithm may make accurate predictions for the majority of a population, but consistently fail for some small minority due to a minority specific confounding factor, such as culture. For example, in our work, we find that individuals from minority communities use lower levels of clinical language when expressing that they feel better or have had a change of perspective. However, if an algorithm meant to predict when someone felt better used strictly medical language as a feature, this algorithm could potentially do poorly on minority users given that it does not account for this cultural diversity in expression of mental health. Given the importance to culture when expressing mental health, and the global need to help those most isolated and vulnerable to mental illness, we make the recommendation that it is important to consider culture when both designing any kind of machine learning algorithm on mental health data, and understanding kinds of user subgroups those algorithms do not work on.

8.3 Limitations and Future Work

There are some limitations to our work. One strong limitation is that we follow past work in assuming geographical location as a proxy for identity. However, all three of the countries we chose [77, 80, 84, 92] have rich subcultures and communities norms around mental health that are not reflected by a national identity. Future work could make deeper analyses into these subcultures, and investigate the interaction between subcommunity norms and cultural norms. Additionally, while users from the minority sample use clinical language at a lower rate and use similar words, it may be the case that the way that people use these words are different. For example, as Lang [53]

notes, the word “depression” is used in India to describe a wide variety of mental disorders. A deeper qualitative investigation of how clinical language is used would extend our findings.

Similarly, when looking at changes in clinical language over time, we find that clinical language stays constant over time. The question arises of whether this may be the result of an insufficient amount of time between posts, as some amount of reflection might be necessary to see some form of detectable change in language or explanatory model of illness. While this may be the case, past research in medical anthropology demonstrates that explanatory models of illness and fluid and continuous [66], in which an individual’s mental model changes immediately with new information and not necessarily with specific time for reflection. Rather, it is likely that this consistency in the level of use of clinical language is the result of the cultural homophily we find and a subsequent lack of exposure to substantially different expressions of mental health.

Additionally, when deciding whether a conversation was successful at helping an individual in distress, we used the “moment of change” metric, looking to see whether an original poster said they were feeling better or experienced a change in perspective after having expressed distress. Given the consistency in culture-based patterns of usage between Indian, Malaysian, and Filipino users, we suggest that our findings on this Indian subgroup might hold for other minority subgroups. However, as we see in this work, there is a significant culturally-bound impact on how people express distress, and thus may be a culturally-bound impact on how people express when they are feeling better that a simple regular expression would not be able to detect. A more diverse and localized variety of terms, derived from qualitative fieldwork with a minority group, could result in a richer analysis, and a greater understanding of the cultural differences between different minority subgroups. Our findings are also limited to users of online mental health forums — these findings cannot be extended to general cultural differences when discussing mental health anonymously, such as on non-mental health focused forums or on social media, which may have different community-based or cultural norms on use.

9 CONCLUSION

In this work, we show that there are cultural differences with regards to how people use online mental health support forums, that these differences extend to two different online mental health support forums, and that these differences matter with regards to how people from minority countries find support that successfully makes them feel better. Even with the norm of anonymity on these forums, we find that people still incorporate aspects of their cultural identity into how they use the forum, including mentioning their country of origin, using lower rates of clinical language, and supporting people from their country of origin. We also find that these factors, particularly the cultural homophily of a thread, are strongly related to whether the conversation will make the original poster feel better by the end of the conversation. Overall, these differences show the importance of considering culture, with a specific focus on cultural differences among users from minority groups, when designing inclusive online mental health spaces.

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