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COVID-19, Social Distancing, & Adolescent Mental Health on Twitter: An Online Content Analysis

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Abstract

Background: In the early days of the coronavirus disease 2019 (COVID-19) crisis, high engagement with pandemic-related social media was correlated with a 22.6% increase in anxiety and a 48.3% increase in depression. Before the start of the pandemic, young people were already at an elevated risk of anxiety and depression, with 20% of college students reporting at least one mental health condition. Currently, it is unclear what role COVID-19 messaging on social media has played in the adolescent mental health response to the pandemic.

Objective: The purpose of this study was to explore co-occurrences between mentions of social distancing and mental health on Twitter, as well as linguistic elements of these posts.

Methods: Our study was an online content analysis on Twitter. Tweets with hashtag #COVID19 were sampled from March 2020 and April 2020. Social media demographics were determined for both months. These Tweets were then evaluated for individual and co-occurrence mentions of social distancing and mental health. The presence of media (images, videos, or hyperlinks) was also recorded. The Linguistic Inquiry and Word Count (LIWC) program we used measured the prevalence of language under the categories of anxiety, anger, sadness, and risk, as well as the usage of 1st person singular pronouns and 1st person plural pronouns. Additionally, overall emotional tone was determined for both datasets. Descriptive statistics were used to analyze social media demographics and post content. LIWC scores between March and April were compared with independent t-tests.

Results: A national sample of 100 Tweets with hashtag #COVID19 were collected. 50 Tweets were sampled from March 2020 and April 2020 respectively. Among March Tweets, 44% (n = 22) referenced social distancing, 48% (n = 24) referenced mental health, and 22% (n = 11) referenced both. Among April Tweets, 54% (n = 27) referenced social distancing, 22% (n = 11) referenced mental health, and 12% (n = 6) referenced both. The mean LIWC scores between March and April decreased 1.46 points for singular pronouns (p = 0.0271). There was no significant difference between March and April Tweets in the LIWC scores for anxiety, anger, sadness, risk, and plural pronouns.

Conclusions: Between March and April, we found that references to social distancing became more frequent, while references to mental health decreased. Likewise, singular pronoun usage decreased significantly. These findings do not imply a diminished mental health impact, but rather suggest an increased focus on collective action over individual sentiment. Future studies should utilize interviews and focus groups to further examine the relevant mental health implications among individual adolescents.

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Short Paper

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Conclusions: Between March and April, we found that references to social distancing became more frequent, while references to mental health decreased. Likewise, singular pronoun usage decreased significantly. These findings do not imply a diminished mental health impact, but rather suggest an increased focus on collective action over individual sentiment. Future studies should utilize interviews and focus groups to further examine the relevant mental health implications among individual adolescents.

Keywords : COVID19; coronavirus; social distancing; adolescent mental health; Twitter; social media

Introduction

As of November 29, 2020, the coronavirus disease 2019 (COVID-19) pandemic has claimed the lives of over 1.4 million globally, with 266,838 confirmed deaths in the United States alone.[1] Non-pharmaceutical interventions have been employed to curb the spread of the virus. Social distancing

has proven to be one of the most effective measures in reducing transmission of COVID-19.[2] In compliance with social distancing, most communications have been shifted to a virtual format. In turn, social media may play a significant role in communication regarding the risks associated with COVID-19 and social distancing measures.

In the early days of the first outbreak in China, high engagement with COVID-related social media was correlated with a 22.6% increase in anxiety and a 48.3% increase in depression.[3] Additionally, young people were already at an elevated risk of anxiety and depression, with 20% of college students reporting at least one mental condition before the start of the pandemic.[4] Among US adolescents, 98.1% reported compliance with social distancing.[5]

As a result of exposure to COVID-19 media, pre-pandemic rates of anxiety and depression, and reduction in social contact, adolescents are at a unique risk of mental health challenges. Currently, it is unclear what role pandemic messaging on social media has played in the adolescent mental health response to COVID-19. Thus, this study aims to explore co-occurrences between mentions of social distancing and mental health on Twitter, as well as the linguistic elements of these posts.

Methods

Study Design

We conducted a quantitative content analysis of Twitter to better understand the role of online messaging in the adolescent mental health response to the COVID-19 pandemic. Our social media unit of analysis was the “Tweet”, which we defined as a single post created by a user account containing between 1 and 280 characters of text. This study was determined to be exempt from human subjects review by the University of Wisconsin-Madison Institutional Review Board.

Search & Sampling Strategy

We sought to gain a representative sample of COVID-19 Tweets from March 2020 and April 2020. These Tweets were collected from the “Top” category of a custom Twitter search that employed a hashtag filter and date parameters. Twitter’s proprietary sorting algorithm governed the retrieval of Tweets via this mechanism. This design sought to replicate how adolescents might encounter COVID-19 Tweets available to the general public. Tweets favored by the Twitter algorithm are given more exposure on the platform, and thus are most relevant to the average adolescent Twitter user.

Social Media Inclusion Criteria

Sampled Tweets were included for analysis if they contained English language text and the hashtag #COVID19. If either of these criteria were not met, the corresponding Tweet was exempted from analysis. Likewise, duplicate Tweets were automatically eliminated from the sample set.

Measures

Our study utilized a codebook to measure three categories of data: social media demographics, post content, and LIWC scores.

Social Media Demographics and Post Content

Demographic information for each Tweet included its post date, number of likes, number of account followers, and account verification status. Similarly, post content data for each Tweet consisted of references to social distancing and mental health, as well as the presence of media in the form of a hyperlink, image, or video. References to social distancing and mental health were based on

keywords established in the codebook, which is defined in Table 1.

LIWC

In our study, we utilized the most recent version of the Linguistic Inquiry and Word Count (LIWC) program, which is a text analysis program.[6] This software analyzes bodies of text for the frequency of keywords associated with psychologically meaningful categories. LIWC is capable of uncovering thinking styles, attentional focus, and emotionality in a variety of experimental settings.[7] LIWC has previously been used in studies on news media coverage of cyberbullying[8], gender differences in pediatric residency personal statements[9], and linguistic convergence among friend groups.[10] Output variables, referred to as "LIWC scores" in this article, represent the frequency of keyword occurrence. Each of these numerical scores can be compared between datasets to illustrate relative trends in written materials. The only LIWC score that differs from this design is "*emotional tone*", which is evaluated as a percentile between 0% and 100%.[6] Sample keywords from LIWC dictionaries can be found in Table 2. Our LIWC dictionaries of interest were *anger* and *sadness* (emotions), *anxiety* and *risk* (perceptions), and *1st person singular* and *1st person plural* (pronouns).

Data Collection Procedures

Trained coders began data collection with an advanced search of Twitter. Tweet text verbatim was copied into a spreadsheet before the number of Tweet likes, number of account followers, and account verification status were recorded. Tweet text was analyzed by the LIWC program to determine LIWC scores. We did not collect any personally identifiable data, such as full names and Twitter handles. Data was collected between the dates of 7/22/20 and 7/26/20.

Analyses

Data was separated into two sets corresponding to March 2020 and April 2020 respectively. Descriptive statistics were conducted for the social media demographics and post content data collected in our study. Independent t-tests were conducted to compare LIWC scores between Tweets posted in March and April. Analyses were conducted using STATA 15.1, and $p < 0.05$ was used to indicate statistical significance.

Results

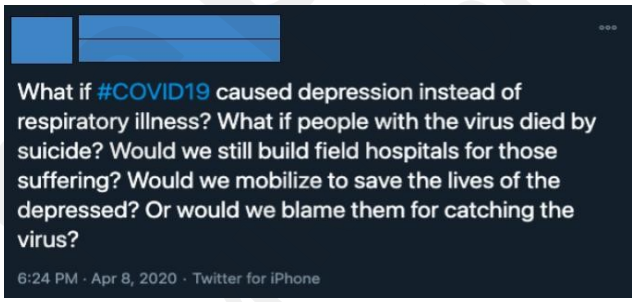
Social Media Demographics

We identified a national sample of 100 Tweets pertaining to the COVID-19 pandemic, with 50 sourced from March 2020 and another 50 sourced from April 2020. The March Tweets averaged 586.34 likes (SD = 1950.672) and 100103.5 account followers (SD = 167936.8), while the April Tweets averaged 358.5 likes (SD = 550.3136) and 482775.2 account followers (SD = 1208351). Account verification status in March Tweets was 62% (n = 31) verified accounts and totaled to April Tweets 60% (n = 30) verified accounts.

Post Content

Among the March Tweets, 18% (n = 9) contained a hyperlink, 40% (n = 20) contained an image, 16% (n = 8) contained a video, and 26% (n = 13) included no media. Among the April Tweets, 24% (n = 12) contained a hyperlink, 46% (n = 23) contained an image, and 12% (n = 6) contained a video, while 18% (n = 9) did not contain any media. Social distancing and mental health reference data is listed in Table 1.

Table 1. Social distancing and mental health reference coding criteria & results for March and April Tweets

	Codebook Keywords	Example Tweet Verbatim	March Tweets	April Tweets
			n (%)	n (%)
Social Distancing	Social distancing, physical distancing, stay home, shelter in place, lockdown, shutdown, quarantine, isolation, self-isolate, remote learning, remote work, flatten the curve		22 (44%)	27 (54%)
Mental Health	Mental health, anxiety, depression, anxious, depressed, stressed, frustrated, angry, sad, scared, afraid, resilient		24 (48%)	11 (22%)

Both	*(One or more keyword from Social Distancing & Mental Health)*		11 (22%)	6 (12%)

LIWC Results

An independent samples t-test showed that March 2020 Tweets had significantly more Singular (I) pronouns (M = 2.23, SD = 4.32) than April 2020 Tweets (M = 0.77, SD = 1.66, t (98) = 2.24, p = 0.027). The complete list of LIWC scores and t-test results are listed in Table 2.

Table 2. LIWC dictionary and example terms & LIWC scores for March and April Tweets with t-test results

LIWC Dictionary	LIWC Example Terms	LIWC Scores		*p-value*, adjusted
		March Tweets	April Tweets	
		M (SD)	M (SD)	
Emotional Tone	N.A.	50.25 (37.85)	38.98 (33.04)	0.1162
I	I, me, mine	2.23 (4.32)	0.77 (1.66)	0.0271
we	we, us, our	1.49 (2.56)	1.61 (2.39)	0.8042
anxiety	worried, fearful	0.67 (1.33)	0.75 (1.41)	0.7741
anger	hate, kill, annoyed	0.68 (1.52)	0.49 (1.27)	0.5075
sadness	crying, grief, sad	0.77 (1.76)	0.77 (1.85)	0.9925
risk	danger, doubt	0.99 (1.74)	1.60 (2.51)	0.1591

Discussion

Principle Results

We found that references to social distancing increased while references to mental health and both categories decreased between March and April. Additionally, *1st person singular* pronoun usage decreased significantly over the same timeframe.

Popular Discourse

Our results suggest that social distancing became a more salient topic of conversation as the pandemic progressed. In the early stages of the crisis, fears surrounding the coronavirus remained relatively consistent, as indicated by the lack of significant differences found between the March and April datasets of *anger*, *anxiety*, *sadness*, and *risk*. As social distancing was referenced more, *emotional tone* decreased slightly. These trends are congruous with previous research on adolescent mental health and social development. Adolescents are particularly sensitive to changes in social stimulus, specifically in reduction of interaction with peer groups.[11] Consequently, prolonged social distancing may have lasting effects on adolescents' mental health due to potential social deprivation.

Individualism vs. Collectivism

The significant drop in the frequency of "I" pronouns suggests a decrease in the usage of individualistic language as the pandemic progressed. On Twitter, this trend corresponds to public discourse increasingly emphasizing collective action. Fewer references to mental health may also be indicative of a societal paradigm shift away from the perspective of individuals. Collectivism may cause individual mental health to be referenced less, though it has been shown to be a beneficial influence on mental wellness. In one study, cultural collectivism was correlated with a reduction in suicidal ideation among grieving women.[12] In contrast with social distancing measures, a collectivist outlook may have a positive effect on adolescent mental health.

Limitations

In interpreting the results of our study, a few considerations must be taken into account. The breath of our content analysis provides insight into macro-level social trends. This data can be used to draw reasonable inferences regarding specific population segments, though the data will never be a perfect metric of individual attitudes and perceptions. In the future, surveys or focus groups can be used to corroborate content analysis findings. Additionally, the online/offline divide may play a role in our study. Opinions expressed online can differ from personal beliefs offline. Interviews with adolescents would provide an understanding of offline perceptions of social distancing and mental health.

Conclusions

In light of our study, clinicians must consider the type of content being consumed on social media when addressing adolescents' mental health during the COVID-19 pandemic. The overarching narratives of social networks are indicative of the psychological response to a crisis, both collective and individual. When discussing mental health challenges, clinicians should ask their adolescent patients about the tone of media they consume, and how that media affects their mood and thought process. These considerations will be especially relevant in treating the long-term mental health consequences of the pandemic.

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Conflicts of Interest

None declared

Abbreviations

COVID-19: Coronavirus disease 2019

LIWC: Linguistic Inquiry and Word Count

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