

Mental Illness Status and Gender Differences in the Naturalistic Expressions on Student Loan Debts on Twitter

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Background

Social media data are filling data gaps in investigating consumer behaviors and issues of public health importance, such as tracking influenza, understanding health communications attitudes, and mental health. Social media data is helping researchers to get access to unfiltered opinions, beliefs, and emotions of vulnerable groups which were difficult to access through traditional data collection tools (Sinha et al., 2020). The inherent originality and vast temporal and spatial reach in the expressions on social media data have made it a potentially important tool for researchers to examine consumer behaviors, attitudes, and perception in real-time (Sinha et al., 2023).

Leveraging data from one social media platform, Twitter, we build a model for identifying people with language markers of depression, anxiety and psychological stress to explore the relationship between student loan debt, gender, and mental health among individuals vulnerable to mental illness. Prior research demonstrated that people having direct experience with mental health disorders not only discuss their opinions and perceptions but also share their diagnostics regarding mental health on Twitter and other social media platforms. The objective of this research is to demonstrate the efficacy of Twitter posts as a source of data for studying mental health issues. We do this by comparing the student loan-related sentiments and emotions of Twitter users whose posts indicate markers of depression, anxiety, and/or psychological stress with those who express no markers.

Methods

Original tweets between 2009 and 2020 were collected using four key terms – “student loan”, “student debt”, “education loan” and “education debt”. The data was accessed via a university agreement with a company, Brandwatch. Only English tweets with gender (available only as male/female) and location information were used for this analysis (n=8,623). To ensure that tweets had a reasonable chance of being generated from individuals (about their personal experiences) two steps were followed: First person pronouns (e.g. I, me, and my) were used during data collection phase. Second, posts from known United States policymakers, including the current and last two presidents of the United States were filtered out. No personal information, except the publicly available data, were collected. The present study was part of a large study approved by the Institutional Review Board University of Illinois at Urbana-Champaign.

Twitter users’ mental health status was determined by a supervised machine learning process described as follows. First, 2% of the posts were manually annotated using markers from three standardized instruments – PHQ9 (depression), GAD7 (anxiety), K10 (psychological stress) – to train the model. Next, the trained model (accuracy = 95%, $p < 0.01$) was used to classify the remaining 98% posts using Support Vector Machine classification algorithm. Brandwatch’s artificial intelligence (AI) assigned emotions and sentiments were used for analysis of users’ feelings about student loans. Brandwatch’s AI algorithms classified sentiments as positive, negative, or neutral and emotions into 7 different categories – anger, sadness, joy, fear, disgust, surprise, and neutral. These classifications were based on constantly evolving lists of not only words but also sentences, phrases, and library of rules. Finally, bivariate analyses were conducted to examine group differences based on mental health status and gender.

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Results

Twitter users with markers of depression, anxiety, and psychological stress had more negative sentiments when compared to users without markers (84.1% vs 79.7%) and were more likely to express sadness (38.2% vs 29.2%) and fear (37.4% vs 31.1%) about their student loans ($p < .01$). Anger was higher among Twitter users without markers of depression, anxiety, or psychological stress (15.5% vs 14.2%). Additionally, males (82.4%) were more likely to express negative sentiments than females (80.2%), however, females expressed more anger (16.3% vs 13.5%) and more fear (33.6% vs 32.9%) than males ($p < .01$).

Significance and Implications

While the United States government has recently taken a bold step of one-time student loan debt waiver of up to \$20,000 for qualified borrowers, this step does not provide respite to millions of borrowers who still have outstanding loans. Given the increasing costs of higher education, such one-time waivers are not viable options for future governments and will not help individuals and families who acquire or accumulate student loan debts in the future. Until there are sustainable solutions to address the costs of higher education, there is an urgent need to address some critical issues associated with high levels of student loans.

Consistent with a growing number of studies on mental health consequences of student loan debts (Deckard et al., 2021; Jessop et al., 2020; Rodney & Mincey, 2020), findings from our study indicated disproportionate volumes of negative sentiments and emotions about student loans among Twitter users with markers of depression, anxiety, and psychological stress across genders. The confirmatory findings also provide evidence that Twitter contains unique information, which can be used as an important source of data to complement traditional data sources and can be leveraged to study consumer behaviors, attitudes, and perceptions regarding critical issues, such as mental health.

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