Suicide Risk on Twitter

Samah Jamal Fodeh, Yale University, USA
Edwin D. Boudreaux, University of Massachusetts Medical School, USA
Rixin Wang, Yale University, USA
Dennis Silva, Worcester Polytechnic Institute, USA
Robert Bossarte, Department of Veteran Affairs, USA
Joseph Lucien Goulet, Department of Veteran Affairs, USA
Cynthia Brandt, Yale University, USA
Hamada Hamid Altalib, Yale University, USA

ABSTRACT

While many studies have explored the use of social media and behavioral changes of individuals, few examined the utility of using social media for suicide detection and prevention. The study by Jashinsky et al. identified specific language patterns associated with a set of twelve suicide risk factors. The authors extended these methods to assess the significance of the language used on Twitter for suicide detection. This article quantifies the use of Twitter to express suicide related language, and its potential to detect users at high risk of suicide. The authors searched Twitter for tweets indicative of 12 suicide risk factors. This paper divided Twitter users into two groups: “high risk” and “at risk” based on two of the risk factors (“self-harm” and “prior suicide attempts”) and examined language patterns by computing co-occurrences of terms in tweets which helped identify relationships between suicide risk factors in both groups.

KEYWORDS

Categorization, Medical Informatics, Mental Health, Social Media, Subnetwork, Suicide Risk Factor, Twitter

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INTRODUCTION

Suicide ranks as the second leading cause of death among individuals 25–34 years old and the third leading cause of death among 15–25 years old (Sussman, 2002). Preventing suicide is inherently complicated by the heterogeneity of individuals who commit suicide and the lack of strong, reliable predictors of suicide. Less than 50% of suicide victims contact a mental health or primary care provider within one month of their suicide attempt (Luoma, 2002). As such, there is more interest in leveraging social media platforms to detect suicidality and intervene in high risk cases outside the healthcare delivery system (Robinson, 2015). To better detect suicide risk, previous research manually analyzed the contents of suicide notes/letters as they include thoughts and feelings of completers that may be indicative of their emotional and mental state directly before they die (Barr, 2007; Foster, 2003; Ho, 1998; Kuwabara 2009).

Recently, researchers investigated the utility of applying automated and computational methods to suicide notes to find patterns of behaviors or language associated with suicide. Ultimately, the objective is to describe patterns that would guide early interventions that would prevent active suicide. For example, in (Pestian, 2008; Pestian, 2010), natural language processing approaches were applied to distinguish between classes of suicide notes (of completers versus not). In a different study (Lewinsohn, 1994), a self-administered risk assessment tool has shown that adolescents with previous suicide attempts have many psychological risk factors (i.e. current suicidal ideation and depression, recent attempt by a friend, low self-esteem, and having been born to a teenage mother) in common. Although these studies are important, the reported results were based on small scale data; therefore, conclusions need to be further investigated with larger and other samples, perhaps using big data, before generalization. Social media, a big data resource, has been recently utilized for promoting positive behaviors such as help seeking for depression management (Guan, 2015), surveying social needs (Hui, 2015) and preferences on receiving mental health services using technology (Krueger, 2015). Social media has also been used to identify users with high suicide probabilities (Lal, 2015).

In this paper, we leverage Twitter to better identify high risk suicide behavior. Twitter is a social media forum by which users (tweeters) socialize and communicate (tweet) through the network. Users on Twitter interact through tweeting new thoughts, retweeting and replying to other tweets. Previous research has utilized Twitter as a source of information for suicide prevention and learning more about suicidal behaviors and ideations (Abboute, 2014; Gunn, 2012; Jashinsky, 2014; Dewwi, 2014). Jashinsky (2014) tracked suicide risk factors through Twitter following an event of a live Twitter feed of a pending suicide which demonstrated that at risk tweets about suicide can foretell suicidal behavior (Markman, 2013). They identified a list of terms and language associated with suicide risk factors. Tweets that include this language were considered risky. We extended their study to quantify the presence of high risk language of suicide risk factors. We divided Twitter users into two groups: “high risk” and “at risk” based on two of the risk factors (“self-harm” and “prior
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