

Social Influence on Social Media and Normative Perceptions of Health-Related Behaviors

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Despite growing recognition of promising opportunities to promote health through social media, much remains to be understood regarding novel ways in which information flows through social media and the impact of this transmission on users. Content shared over social media may have potential to shape attitudes and behaviors of other users. It may also shape normative perceptions surrounding health protective behaviors, such as childhood immunizations. Although social influence can occur in offline settings, social media possess unique properties that may affect the process by which social influence operates online. Social networking sites specifically can provide venues for collaborative information seeking, sharing, and content creation. Users can collectively look for information, discuss it, and respond to it on a scale not possible prior to the emergence of social media. This paper illustrates a social influence approach using theory applied to Twitter discourse on vaccine noncompliance in the state of California.

Social influence has been previously conceptualized as a psychological response that involves accepting a persuasive effort to adopt a particular belief or behavior. Increasing attention toward the manner in which social influence unfolds on social networking sites suggests a greater awareness that social networking and microblogging sites such as Twitter warrant further study. As a platform where users can read, post, and share content in the form of tweets, Twitter represents one of the most widely used social networking sites. Currently, about a third of adults in the U.S. between the ages of 18 and 50 have a Twitter account. Characteristics of Twitter, including the hashtag, can help magnify certain content and facilitate its spread within and beyond different social networks through several factors. These factors include but are not limited to a tweet's number of retweets, the number of hashtags included in the tweet, the number of followers of the tweet's source, the length of time the tweet travels across the social web, and the emotional value and persuasiveness of the tweet's content.

The emphasis and spread of certain content has potential to influence normative perceptions among Twitter users by strengthening or undermining existing norms, as well as laying the foundation for forming new ones. Prior research suggests the likelihood of shaping normative perceptions increases among users who organize and connect around a collective social identity. For example, individuals who self-identify as having a strong health orientation and consider their strive toward a healthy lifestyle to represent a critical aspect of their identity may look to socially connect with other individuals sharing the same outlook. If these individuals are parents, they may also be drawn to connect with other parents on a host of lifestyle views concerning children, including whether to vaccinate their children on schedule, or if at all. Descriptive norms (e.g., codes of behavior surrounding "what is typically done" – for example "parents in my social group are not vaccinating their children") in particular can exert a direct influence over the behavior of members in a social network. Even if parents are not personally strongly opposed to vaccinating their children, if the descriptive norms within their social network dictate that adherence to recommendations for childhood vaccinations is not observed among the majority of group members, they may conform by not vaccinating their children either. This conformity would be consistent with tenets of the theory of normative social behavior, which posits that the effect of descriptive norms, as perceived codes of conduct, on an individual's behavior is partly conditional on group identity.

According to the theory of normative social behavior, group identity is comprised of an individual's aspiration to become more like peers and one's perceived similarity to their peers. In the case of parental vaccine noncompliance, parents who are socially engaged within an anti-vaccination social network and aspire to be like other parents of this group will be most affected by descriptive norms that dictate noncompliance with vaccine recommendations. Likewise, if parents already perceive shared similarities with other parents of an anti-vaccination group (e.g., general tendency toward conspiratorial thinking and distrust of government institutions), they may be more influenced by descriptive norms supporting noncompliance with vaccine recommendations. This would also help explain why anti-vaccination groups tend to exhibit high group solidarity. Individuals who are already predisposed to certain world views are

drawn together and based on their shared similarities help reinforce group norms – in this instance, vaccine noncompliance.

Effects of descriptive norms on behaviors can be impacted by other factors, including injunctive norms and outcome expectations. In contrast to descriptive norms, injunctive norms represent perceptions about what behaviors should be performed (e.g., “what ought to be done”) in a given situation. In the context of vaccine noncompliance among parents, an example of an injunctive norm may be “parents should protect their children from the risks of vaccines.” Similarly, outcome expectations, or the likely consequences of engaging in a particular behavior, may also moderate the impact descriptive norms exert over the behavior in question. For example, the likelihood of an adverse reaction (a negative outcome) may represent a powerful outcome expectation with the ability to shape vaccine-related behavior among anti-vaccine parents. Hence, one would expect the effect of anti-vaccine descriptive norms on vaccination behavior to be significantly stronger among parents who perceive a greater likelihood of an adverse reaction from vaccines when compared to parents who do not perceive this as a likely outcome.

Social media analytics may benefit from integration of theory such as the theory of normative social behavior for a number of reasons. Theory can help guide the training of machine-learning algorithms in the detection of relevant Twitter messages. Once trained, these algorithms can quickly identify and retrieve geotagged tweets that convey content suggesting offline behaviors of users in real-time. In addition, analyzing the geospatial properties of tweets that discuss descriptive norms, injunctive norms, outcome expectations, or group identity surrounding vaccine issues and how they change over time may be useful for early detection of communities at elevated risk for an outbreak.

Theories of social influence such as the theory of normative social behavior are relevant for understanding complex social processes that unfold via social networking sites, including Twitter. In the context of health behaviors that have a social component (or social consequence, such as the spread of infectious diseases), understanding normative influences of behaviors becomes vital. One way to use social influence theories is to guide the training of algorithms. Algorithms trained to retrieve messages on social networking sites that contain factors theoretically expected to socially influence behavior can then be mapped in a geospatial context and visualized accordingly, potentially illuminating areas with lowered herd immunity (e.g., protection against diseases conferred when a significant portion of the population is vaccinated), and that could benefit from intervention. Additional research is needed to determine the value added to conventional approaches for detecting communities at risk for outbreaks of diseases that are vaccine preventable. This position paper proposes ways in which social influence theory may be useful toward this end.

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