Examining Reply Bias and Effectiveness of Online Community for Suicide Prevention: A Case Study of /r/SuicideWatch

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Abstract. Online community has become a new approach for suicide prevention with the rise of the Internet technology for the past decade. However, due to the various and dynamic ecosystem of online community, its effects on suicide prevention remain unknown. We selected SuicideWatch, a forum on reddit as our research context and investigated users' response bias and the effects of online response to suicide posters by linguistic analysis. Our findings indicate two important phenomena: (1) users' responses could be biased by linguistic cues in title and (2) online response has positive effects on suicide posters. We believe the findings and approach proposed in this study can offer insights for suicide prevention.

Keywords: Mental health · Social media · Computational linguistics

1 Introduction

Suicide has been a severe public health issue in the worldwide. According to the World Health Organization [50], suicide is the fifteenth leading cause of death and is the second leading cause of death among young people (15-29). More than 800,000 people are the victim of suicide and many people who have suicide attempt every day. Although national efforts have been made for reducing suicide risk, the evidence for effective suicide intervention is still limited in both clinical and school context [38]. A comprehensive strategy for suicide prevention is urgently needed.

However, the rapid growth of Internet technology makes suicide issue even more complicated. The increasing use of the Internet may have either positive or negative influences on users, especially for vulnerable individuals [10]. Several studies indicated that online users could search for information for suicide methods [1, 9, 15, 16, 32], look for suicide pacts [52], or broadcast their suicide [5]. On the other hand, online communities function as support groups and bring the positive effect to individuals with suicidal thoughts or attempts [3, 17–19, 24, 49]. Moreover, the anonymity afforded by online forums makes suicidal individuals more open to disclose personal feelings and experiences [10, 49]. Online forum becomes a new venue for suicide prevention.

While previous studies addressed a range of benefits for using an online forum as a tool for suicide intervention, its effect on users remains unknown. The variety and

anonymity of online forum make it even more difficult to assess the influence of online responses on individuals, such as the level of distress alleviation and emotional state [10, 38]. In addition, unlike the traditional telephonic communication provides immediate conversation, an online forum is usually asynchronous discussion. Then, will individuals receive different levels of attention when posting to the online forum?

In this study, we focus on a forum on Reddit called "SuicideWatch" as our research context. SuicideWatch (SW) is described as an online version of telephone crisis hotlines [23], which is also the biggest community (40,419 subscribers) among suicide-related forums on Reddit. Users on SuicideWatch may post their suicidal thoughts or scroll through others' posts and comments and either "upvote" or "downvote" them. In the light of text-based content of the forum, we employ linguistic analysis as a research approach, which has been broadly adopted in suicide-related research [12, 34, 35].

The first aim of this study is to investigate whether users have response bias by the language used in posts. We examined the association between linguistic cues and the number of upvotes and comments. Then, based on previous studies, we proposed four indicators: affective distress, cognitive thinking, social awareness, and interpersonal focus to assess the effect of online responses on posters by comparing their posts before and after receiving others' comments. Our research questions are addressed as follows:

- *RQ1: What type of linguistic cues of the original post may influence users' response to the post?*
- *RQ2: What is the effect of online response on posters?*

The rest of this paper is organized as follows: in Related Work, we review the relevant literature pertaining to suicide, online community and linguistic analysis. In Methodology, we present our research procedure and measurements. We then present our results for two research questions and discuss our findings and its implications and limitations. We conclude and summarize the contributions of this study.

2   Related Work

2.1   Suicide Prevention and Community in Online Forum

Online forums are a type of community where users participate via personal narratives and collective discussions [10]. For individuals with suicidal ideations, an online forum is a space to develop connections with others, seek empathy and support, and share feelings and experiences with people similar problems without being judged [3, 19, 41, 45, 49]. However, there was no consensus on whether supports from online forums enhance suicide preventions or not [26].

Several studies have found that participation in the online forum increase positive behaviors, such as seeing medical professionals for help, reciprocal helping among users, and alleviate psychological distress [2, 19, 31, 45]. However, other studies found that online forums become a source for sharing suicide method, finding suicidal companies and increasing hopelessness that may result in suicide contagion [4, 11, 13, 27, 52].

Even though the influence of online forum on suicide prevention remains unclear, researchers found that the majority of online responses to suicidal posts show caring, empathy or called for help [14]. Gilat, Tobin, and Shahar [17, 18] further found that trained volunteers and lay individuals exhibited different strategies to offer supports. Volunteers used more technique and responded with more strategies of empowerment, interpretation and cognitive change, which were rarely used by lay individuals. On the other hand, lay individuals used more emotional supports by disclosing personal experiences in their responses.

These studies provide different insights into suicide prevention and online forum, including its positive and negative effects, and language strategies adopted by users. However, online forum, unlike traditional telephone crisis line, provides immediate responses, mainly operates in an asynchronous way. Then, is there any potential bias that may exist to influence users' responses to suicidal posters? Our first question is to investigate what type of linguistic cues shown in a suicidal post may influence users' behaviors, including voting and comment.

2.2   Suicide and Linguistic Cues

Previous studies have investigated the association between linguistic styles and suicide. Because of the difficulties of obtaining information from suicidal individuals, most previous research uses poetry or publicly available suicide notes as the source of content for analysis [28, 42]. Stirman and Pennebaker [46] employed a popular and validated psycholinguistic lexicon LIWC to analyze the different linguistic constructs expressed in poems by suicidal poets. They found that the suicidal poets exhibited more self-reference, more death-oriented and sexual words in their writing when compared to non-suicidal poets. Other studies also found that suicidal poems showed more expressive writing [43], cognitive discordance [47] and less positive emotions and the reference to the self and others over time [29]. In the suicide note, an early work found the language used in the note tends to be short, simple and more repetitious [33]. Later research further found that the emotion exhibited in the suicide notes becomes more positive over time [35]. The suicide notes from completed suicides used more future tense verbs, social references to others, and showed more positive emotions than attempted suicides [20].

Our second question is to assess if the online response has positive impacts on individuals with suicidal thought. However, linguistic cue of suicide is dynamic and various by contexts. There is no absolute standard to evaluate the language use of suicidal individuals. The most relevant work to ours is by Kumar et al. [28]. They examined the Werther effect of a celebrity-suicide event on Reddit's forum SuicideWatch by measuring four attributes: affective, cognitive, linguistic style and social attribute. They found that suicidal posts on Reddit became more inward focused, less social concerns and more negative emotions after a celebrity-suicide event. Inspired by their study, we adopt their four concepts but define and measure in different ways based on the literature of psychology.

Literature in psychology indicates that mental disorders, cognitive vulnerability, family conflict, social isolation, and hopelessness are risk factors of suicide [6, 8, 25, 36, 44]. According to Interpersonal Theory [48], suicide is a consequence of thwarted

belongingness and perceived burdensome. Thwarted belongingness results from the lake of reciprocal care and loneliness; perceived burdensome comes from self-hate and liability. Interpersonal Theory suggests suicide prevention to decrease thwarted belongingness and perceived burdensome by maintaining social connections of individuals with suicidal ideation. Based on this theory, we consider online response as a way of providing connections and support of individuals who are going through suicide crisis. Then, their thwarted belongingness and perceived burdensome will decrease after supports. We assess these two psychological aspects by four linguistic indicators adopted from Kumar et al. [38], including affective distress (perceived burdensome), cognitive thinking (perceived burdensome), social awareness (thwarted belongingness) and interpersonal focus (thwarted belongingness).

Affective Distress. Affective distress has been considered as a risk factor for suicide evaluation especially for young people [7, 51]. Affective distress includes anger, anxiety, hopelessness, loneliness and so forth [21, 40, 48]. The intensity of affective distress is a signal of suicide crisis for depressed individuals [22, 30]. We hypothesize that individuals' affective distress decreases after receiving supports.

H1: Linguistic cues of affective distress decrease in original posters' comments.

Cognitive Thinking. Suicidal behavior is the manifestation of a cognitive evaluation that the pain of choosing suicide is bearable [48]. The cognitive vulnerability makes individuals difficult to redirect their thoughts and be trapped in a ruminative cycle of negative perception [44]. We assume that individuals' cognitive thinking will increase when having others' supports. Meanwhile, we expect the thought of death and self-denials will decrease as well. Therefore, there are positive and negative cognitive thinking. We hypothesize that positive cognitive thinking increases, and negative thinking decreases.

H2a: Linguistic cues of positive cognitive thinking increases in original posters' comments
H2b: Linguistic cues of negative cognitive thinking decreases in original posters' comments

Social Awareness. Social isolation and family conflict have critical effects on individuals' suicidal ideation and behavior [8, 25, 48]. We expect that individuals' awareness of social isolation and family conflict will decrease after having supports. Thus, we hypothesize that individuals express more agreement and focus less on family-related issues.

H3a: Linguistic cues of agreement increase in original posters' comments.
H3b: Linguistic cues of family-related concepts decrease in original posters' comments.

Interpersonal Focus. Previous studies point out that the frequent use of first-person pronouns by suicidal individuals indicates a higher self-focus tendency and lower social integration of suicidal individuals [35, 39]. When interacting with online

responders, individuals' focus may be shifted from the self to others, which facilitate their sense of reciprocal care. We hypothesize that their self-focus decreases and interpersonal focus increases.

> H4a: Linguistic cues of self-reference (1st personal singular pronouns) decrease in original posters' comments.
>
> H4b: Linguistic cues of social references increase in original posters' comments.

3   Methodology

3.1   Data Collection and Procedure

We use Reddit's official API to collect posts, comments and relevant metadata from the subreddit "SuicideWatch". The crawl of this subreddit in this study is employed from November 22 to 23 in 2015. The procedure of data collection includes three aspects: the original post, comment, and users. For the original post, we collect the title and content of post, username, posting date, number of comment and number of upvote and downvote. For each post, we record if original posters leave comments to their posts and document the first comment arrival time. For comment, we collected the content of comments, username, date, number of upvote and downvote. We further distinguish whether the comment was from the original poster and whether a comment was the first response to the original post. We then divide users into two categories: the poster who post initially and supporter who left comments to the poster. After completing data collection, the researcher scrutinized the data and deleted two posts generated by the board manager and its relevant comments. The details of data are exhibited in Table 1.

3.2   Measurement

We use psycholinguistic lexicon LIWC, including 90 variables, to examine the language used in the posts and comments. According to the purpose of research questions, we adopt different measurements for each of them. Our first question is to explore what type of language cue could influence readers' responses. We select word count, four summary language variables (analytical thinking, clout, authenticity, emotional tone), eight standard linguistic dimensions, 41-word categories of psychological processes, 6 personal concern categories, and 5 informal language markers as our measurements. Total 65 variables are examined in this study.

According to the aforementioned literature, we propose four indicators to measure the effect of online response on posters. These indicators are (1) affective distress, (2) cognitive thinking, (3) social awareness and (4) interpersonal focus. Affective distress consists of four measures: sad, anger, anxiety and swear words. Cognitive thinking includes six measures: insight, causation, certainty, health, death, and negations. Social awareness has five measures: affiliation, assent, family, friend, and home. Interpersonal focus includes five measures: first person singular, first person plural, second person, third person singular, and third person plural pronouns. These measurements are computed by LIWC.

Table 1. General information about /r/SuicideWatch dataset

Timeframe of post	November 04–22, 2015
Total post	977
Post with posters' comment(s)	523 (53.5%)
Post without posters' comment(s)	454 (46.5%)
Total comment	4990
First comment by original poster	20 (0.4%)
Not first comment by original poster	1633 (32.7%)
First comment by supporter	902 (18.1%)
Not first comment by supporter	2485 (48.8%)
Unique users	1647
Poster	893
Supporter	754
Average daily original post	51.42
Average comment	7.47 (SD = 5.36)
Average upvote	4.89 (SD = 6.57)
Average downvote	0
First comment arrival interval	1.94 h (SD = 4.63)

4 Results

4.1 Influence of Linguistic Cue on Supporters' Response Behavior

We conducted correlational analysis to explore which type of language used in titles and comments has influences on supporters' upvoting and comment behaviors. Downvote behavior is excluded because no posts received downvote.

Influence of Post Title on Supporters' Behavior of Upvote and Comment. According to Table 2, we found 15 variables are significantly correlated with the number of upvote. All variables have a positive correlation with the number of upvote, except emotional tone, positive emotion, and cognitive process. This means that titles displaying a more positive tone, positive emotion, and cognitive process have fewer upvotes. Additionally, the results show that the number of comments has a significant positive correlation with five types of linguistic cues, including word count, anger, relativity, time, home and assent. In another word, the title with more words and exhibiting more relevance to anger, relativity, time, home and assent, received more comments.

Table 2. Correlational analysis of linguistic cues. P-value is included if it is smaller than .05.

	Title (N = 977)		Content (N = 977)	
	Number of upvote	Number of comment	Number of upvote	Number of comment
Word count	.065, $p = .043$	.073, $p = .022$	−.031	−.042
Emotional tone	−.095, $p = .003$	.043	.044	.042
Personal pronouns	.075, $p = .019$	.020	.013	−.014
She/He	.117, $p = .000$	−.018	.061	−.055
Positive emotion	−.076, $p = .018$	−.006	.016	.021
Negative emotion	.072, $p = .024$	−.023	−.036	−.027
Anger	.137, $p = .000$	.072, $p = .024$	.002	−.005
Family	.108, $p = .001$	−.003	.017	.009
Male	.169, $p = .000$	.037	.059	−.015
Cognitive processes	−.076, $p = .018$	−.028	−.064, $p = .045$	−.034
Perceptual processes	−.026	−.038	−.022	−.078, $p = .015$
Feel	−.033	−.052	−.031	−.066, $p = .041$
Body	.063, $p = .048$	.007	−.021	−.002
Sexual	.063, $p = .048$	.022	.013	.012
Reward	−.038	.024	−.003	.085, $p = .008$
Relativity	.048	.071, $p = .027$	.012	−.059
Time	.097, $p = .002$	.085, $p = .008$	−.008	−.064, $p = .044$
Home	.001	.139, $p = .000$	.076, $p = .018$	.028
Death	.091, $p = .004$	.036	−.011	−.016
Swear word	.063, $p = .048$	.037	.038	.006
Assent	.012	.086, $p = .007$	−.001	.014

Influence of Content on Behavior of Upvote and Comment. Compared to the title, only two linguistic variables of content significantly correlate with the number of upvote. The results show that cognitive process has a negative correlation and conversely home as personal concern has a positive correlation with upvote. Also, we found that *perceptual processes, feel and time* have a significant negative correlation with comments. On the other hand, the *reward* has a positive correlation with comments. The correlational analysis indicates that the linguistic cue in the title of the post has more significant influences on supporters' upvote and comments than the content.

Furthermore, we also want to know if the linguistic cues in the title have predictable influences on upvoting and comment behaviors by conducting multiple regression analysis. To determine the best predictive model, we use a backward elimination approach, which starts with all variables in the model and eliminates the variable with the largest p-value of F-test greater than the criterion of 0.10. Then the model is refitted and repeats the process until all remaining variables have p-value smaller than the criterion.

The regression model for the behavior of upvote suggests that 11 predictors explained 9.1% of the variance ($R^2 = .091$, $F(11,965) = 8.734$, $p < .000$). As exhibited in Table 3, the language of *shehe, anger, family, body, space, time and death* have positive regression weight, indicating that the title using more words pertain to these linguistic cues would have more upvote. Interestingly, the title using more words with *female references and relativity (e.g., area, bend, exit)* would have less upvote. The cue of time is the most influential predictor on upvote followed by *shehe and female references*.

The regression model for commenting behaviors has 11 predictors explaining 5.9% of the variance ($R^2 = .059$, $F(11,965) = 5.473$, $p < .000$). The results found that social processes, time, home and assent have significant positive regression weights, implying that the title with more these linguistic cues would have more comments. The *affiliation (e.g., ally, friend, social)* has significant negative regression weights, meaning that the title with more affiliation cue would receive fewer comments. Also, the linguistic cue of 'home' has the most important prediction on comment followed by *social processes and affiliation*.

Table 3. Multiple regression model of linguistic cues in title of suicidal posts on reddit.

Variable	Standardized Beta	p-value (sig. <.05)
Dependent variable: number of upvote		
Shehe	.216	**.000**
Anger	.124	**.000**
Family	.089	**.025**
Female references	−.174	**.001**
Male references	.079	.057
Body	.074	**.017**
Relativity	−.147	**.046**
Space	.107	**.043**
Time	.219	**.000**
Money	.060	.051
Death	.070	**.027**
Dependent variable: number of comment		
WC	.055	.085
Analytic	.063	.066
Clout	−.082	.064
Social processes	.156	**.004**
Family	−.072	.061
Male	.066	.079
Affiliation	−.117	**.009**
Time	.087	**.006**
Home	.157	**.000**
Money	.060	.056
Assent	.084	**.007**

4.2   Effects of Supporters' Response on Posters with Suicidal Thoughts

Our second question is to investigate the effects of online response on posters by examining language use in their comments and posts. We selected posts with posters' comments and conduct Welch t-test to compare their language use in the content of post and comments. Considering the purpose of this question is to know the effect of others' supports, we exclude the first comments left by posters because these comments were not influenced by other comments.

Affective Distress. Affective distress has been addressed as an important antecedent for suicide [37, 42, 51]. Our first hypothesis is that posters' affective distress will reduce after receiving others' comments. As shown in Table 4, the results show that the use of anxiety, anger, sadness and swear words in comments is less than posts, implying that posters' affective distress decrease after receiving others' comments. The first hypothesis is supported.

Table 4. Comparison of linguistic cues in comment and content of post by original posters.

Indicator	Comment	Post (Content)	t-test	*p*-value (sig. <.05)
Affective				
Anxiety	0.41	0.65	−3.84	<.000
Anger	0.83	1.25	−5.50	<.000
Sad	0.96	1.35	−4.46	<.000
Swear words	0.41	0.53	−2.36	.018
Cognitive thinking				
Insight	3.29	3.04	1.89	.082
Causation	1.70	1.74	−0.33	.739
Certainty	1.73	2.10	−3.48	.001
Health	1.28	1.74	−3.77	<.000
Death	0.46	0.87	−4.36	<.000
Negations	4.10	3.38	3.71	<.000
Social awareness				
Affiliation	1.65	1.77	−0.98	.323
Assent	0.84	0.16	4.43	<.000
Family	0.38	0.61	−4.51	<.000
Home	0.29	0.43	−3.36	<.000
Interpersonal focus				
1st person singular (I)	10.95	12.40	−5.87	<.000
1st person plural (We)	0.21	0.20	0.22	.825
2nd person singular (You)	2.52	0.42	12.46	<.000
3rd person singular (She/He)	0.88	1.08	−1.76	.079
3rd person plural (They)	0.64	0.52	1.96	.051

Cognitive Thinking. We hypothesize that online responses increase posters' positive cognitive thinking and decrease negative thinking. For positive cognitive thinking, we found no difference for the use of insight and causation. The uses of certainty and health are significantly lower in the comments, which rejects our hypothesis of positive thinking. For negative cognitive thinking, the use of death significantly decreases. Conversely, the word of negations increases in comments.

Social Awareness. Social isolation and family conflict are two main factors of suicide [48]. The online response may decrease the sense of social isolation and family conflict. We assume that posters' awareness of affiliation and assent will increase after receiving comments from others. On the other hand, their use of family-relevant words will decrease because the awareness of family conflict is shifted.

We found that posters show no difference on the use of affiliation words, but the use of assent word significantly increases in the comment. The use of family and home words significantly decrease in comments, which supports our hypothesis.

Interpersonal Focus. Our assumption for interpersonal focus is that posters would decrease their use of 'I' word and increase the use of other pronouns, including 'we', 'you', 'she/he' and 'they' after receiving others' comments. The results demonstrate that the use of 'I' word is significantly lower and the use of 'you' word is higher in comments. The use of 'she/he' and 'they' word has no difference between comments and posts. The increasing use of 'you' word by posters may suggest their interaction with supporters.

5   Discussion

This study investigated the response bias and effects of response on posters on a Reddit forum, SuicideWatch, by examining linguistic cues in original posts and comments. According to the findings, certain types of linguistic cue could bias users upvoting and commenting behaviors to the post. For the effects of online responses on suicide posters, we proposed four indicators to assess including affective distress, cognitive thinking, social awareness, and interpersonal focus. The results show that online supporters; responses have certain positive effects on posters with suicidal thoughts. We discuss these results in the following paragraph.

5.1   Response Bias by Linguistic Cues in Title

The results reveal that more linguistic cues in title show significant correlation with the number of upvotes and comments than cues in content, which indirectly suggests that title, as the first "impression," will influence users' responses more than the content. Linguistic cues in the title can be classified into five categories: length, threat, emotion, relationship, and rationality (see Table 5).

For length, the longer the title is, the more supporters upvote and comment. A possible explanation is that the longer title provides more information to supporters, so they have more understandings about the situation of the poster. With the confidence of understandings, supporters are more willing to respond. Considering the context of

suicide, online supporters are also more aware of the title with threat signals, such as body (e.g., wrists, head, throat), sexual (e.g., pregnant, rape), and time (e.g., end, birthday, forever). Threat signals inform users that posters may be suffering from suicide thought with immediate danger, which urges them to respond.

Table 5. Category of linguistic cues in title

Category of signal	Cue
Length	Word Count (+)
Threat	Body (+), Sexual words (+), Time (+)
Emotion	Emotional tone (−), Positive emotions (−), Negative emotions (+), Anger (+), Swear word (+)
Relationship	Personal pronouns (+), She/He (+), Family (+), Home (+), Male references (+), Relativity (+)
Rationality	Cognitive process (−)

Supporters also tend to respond to the title with more negative and anger emotions, suggesting that emotion is an essential signal for users to decide whether the poster needs help. This also indicates that emotions may represent the impulsive action to users that strong negative emotions signal a high risk of suicide [48]. In addition, social isolation and family conflict also signal the danger of individuals' suicidal ideation and behavior [8, 25, 48]. Our findings show that more supporters respond to the title with relational cues, such as family (e.g., parents, brother), home (e.g., apartment, home), and male references (e.g., husband, boyfriend). Since the relationship is a common topic, users may feel more familiar with relationship issues and have more empathy.

The linguistic cues of the cognitive process exhibit rational thinking of an individual. With a comparison of emotions, users have fewer responses to the title with more rationality, implying that users may have a stereotype that a more rational individual also act more rationally. The rationality displaying in title sends a signal that the poster is not in the danger. According to multiple regression analysis, we want to particularly point out that the cues of time and home in the title are two important signals that can predict users' responses to the post.

5.2   Effects of Supporters' Response on Posters with Suicidal Thoughts

Since the influences of online community on suicide prevention are unclear, this study investigated the effect of users' response on posters by comparing four indicators of linguistic cues in their original posts and comments, including affective distress, cognitive thinking, social awareness, and interpersonal focus. Table 6 exhibit the overview of results and differences in posts and comments respectively.

Affective Distress. The findings show that posters' linguistic cues of affective distress decrease in their comments, indicating that posters' affective distress may be alleviated by others' responses.

Cognitive Thinking. For cognitive thinking, positive cues do not increase but decrease significantly, such as certainty and health. However, there is no sufficient information to evaluate if supporters' responses have positive or negative impacts on posters due to the ambiguous meaning of cognitive cues. For example, we did not know what posters have lower certainty about. If they have negative thoughts in their posts, then they may have less certainty about their negative thoughts in their posts, which is a positive sign. This may suggest that certainty is a counter signal that requires more investigation.

Moreover, the cues of death decrease, implying that posters' suicide thoughts may decrease after having others' responses. Yet, it is worth noting that the use of negations increases in their comments, demonstrating a denial thinking process still happens while replying to other responses.

Social Awareness. Based on the Interpersonal Theory [48], we assume that suicide posters will increase their agreements as interacting with others. Our findings show that the linguistic cues of assent did increase in their replying comments; yet, the affiliation cue did not significantly increase. These findings further suggest that posters may show agreement with others' responses but not necessarily increase their sense of social connections. Due to that family conflict is a critical factor of suicide [8], the decreasing use of family-related cues in comments can be a benign signal for reducing posters' rumination of family conflict. The findings show that family-related cues indeed decline in posters' comments. In another word, an online response may shift posters' focus from family conflict to other issues, which also helps them reduce the recursive cycle of negative thoughts about family conflict [44].

Interpersonal Focus. Prior research found that suicidal individuals showed the inclination of self-focus and used more 1st singular pronouns in their suicide notes [35, 46, 49]. Then, if posters lower their use of self-references and increase references to others, this may offer the evidence of positive effect on posters. We did find the use of self-reference declining and for social references, only 2nd singular personal pronouns "You" increases significantly. We believe this is a good signal representing that posters interacted and had a dialogue with other users. This further suggests that online response increases posters' social interaction with others.

Table 6. Overview of findings of hypothesis

Hypothesis	Findings
H1: Affective distress decreases in original posters' comments	Support
H2a: Positive cognitive thinking increases in original posters' comments	Reject
H2b: Negative cognitive thinking decreases in original posters' comments	Partial support
H3a: Agreement increase in original posters' comments	Partial support
H3b: Family-related concepts decrease in original posters' comments	Support
H4a: Self-reference (1st personal singular pronouns) decrease in original posters' comments	Support
H4b: Social references increase in original posters' comments	Partial support

5.3   Implications of Findings

There are several implications of this work. The online forum /r/SuicdeWatch may detect the potential response bias through linguistic cues presented in title. Then, for those ignored posts, SW can further detect which posts may needs urgent response by its content and adjust its ranking. In this way, SW can increase the exposure and response rate of ignored posts. Furthermore, SW can apply our four indicators to evaluate condition of suicide posters. If the psychological state of a poster remains the same or even exacerbate, SW may inform moderators/trained volunteers to provide professional responses and assistances.

5.4   Limitation and Future Direction

There are several implications of this work. The SW may detect the potential response bias through linguistic cues presented in the title. Then, for those ignored posts, SW can further detect which posts may need an urgent response by its content and adjust its ranking. In this way, SW can increase the exposure and response rate of ignored posts. Furthermore, SW can apply our four indicators to evaluate the condition of suicide posters. If the psychological state of a poster remains the same or even exacerbate, SW may inform moderators/trained volunteers to provide professional responses and assistance.

6   Conclusion

Online community has changed the scope of suicide prevention in the past decade. However, its effects on suicide prevention remain unclear. To fill this gap of knowledge, this study investigated users' response bias and the effects of response on suicide posters. We found that title is a critical signal for users' responses and identify five types of linguistic cues that influence. Moreover, in order to assess the effects of responses, we proposed four types of indicators based on the literature of psychology. The findings show positive effects of online community on suicide posters of SW. The contribution of this study is to provide different approaches to assessing potential bias and the effects of an online community for suicide prevention. We hope this study can deliver insights for developing an innovative and practical approach to suicide prevention.

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