

# **Content Analysis of Suicide-Related Tweet on Twitter/X for Mapping Early Signs of Suicide Ideation**

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Submitted to: JMIR Mental Health  
on: August 08, 2024

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# Content Analysis of Suicide-Related Tweet on Twitter/X for Mapping Early Signs of Suicide Ideation

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## Abstract

**Background:** Suicide is a serious public health concern in Indonesia. Suicide often starts with suicide ideation, considered the most significant factor leading to suicide. Suicidal ideation is often shown on Twitter/X as one of the most popular social media in Indonesia. Interaction in social media could affect individual responses and emotions about suicide.

**Objective:** This research aims to understand the expression of suicidal ideation and intention to commit suicide among users of Twitter/X in Indonesia. The first study focused on analyzing the content of suicide-related tweets. The second study focused on exploring purposes, motives, desire, and plan to commit suicide among the users.

**Methods:** This research was conducted in two parts. The first part was a content analysis of expressions of suicide ideation among users of Twitter/X in Indonesia. Content analysis was done by Twitter data harvest and MAXQDA. The tweets were filtered out with exclusion and coding by researchers. The second part aimed to obtain a deeper understanding of intention and motivation to express suicide ideation by using five open-ended questions and Suicide Ideation Scale. The analysis was done by thematic analysis (qualitative) and descriptive statistics (quantitative).

**Results:** From the 512 tweets collected in the first study, several topics were also expressed along with suicide ideas, such as: relation, financial and academic problems, tiredness and loneliness, expression of negative emotions, hesitations, and pain. From the 34 tweets collected in the second study, five themes were found, such as: purposes and reasons for tweeting, emotions after tweeting, expectations about responses, and help-seeking intentions. The result shows that intention to commit suicide among the users is quite high, with mean score 32.8 out of 50 as maximum score. The desire to commit suicide is higher (mean score 14.1 out of maximum score 20) than the plan and preparation to commit suicide (mean score 15 out of maximum score 25).

**Conclusions:** Eventhough the results show that desire to commit suicide is higher than the plan to commit suicide, suicidal ideation tweets should not be underestimated. Suicidal ideation tweets can be seen as means to vent negative emotions, seek attention, support and help. The users also speaks about depression, physical and emotional pain, loneliness and other life problems, revealing the reasons behind their suicidal tweets. Social media-based intervention, such as chatbot and psychoeducation campaigns can be considered as alternatives for intervention to prevent escalation from desire and planning to the act of committing suicide itself. Clinical Trial: -

(JMIR Preprints 08/08/2024:65200)

DOI: <https://doi.org/10.2196/preprints.65200>

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## Original Manuscript

## Original Paper

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**Keywords:** Depression; early signs; preventable deaths; suicide; suicide ideation; tweet; twitter; X.

## Introduction

Suicide is a serious public health concern in Indonesia. The suicide rate in Indonesia was 5.8 per 100.000 population in 2016 [20]. Even though it is considered low if compared to other

countries, a study revealed that suicide is underreported in Indonesia with underreporting rate as high as 859.1%, one of the highest in the world [14]. Suicide also caused severe negative impacts for family, relatives and friends left behind, such as guilt, depression and trauma [3]. Suicide results in decreasing productivity and financial income for some countries [5]. Suicidal behavior often starts with suicidal ideation, which constitutes thoughts and wishes related to self-harm or suicide [21]. Suicidal ideation is considered the most significant factor leading to suicide [10].

Suicidal ideation can be attributed to various internal and external factors, such as mental health disorders [6], mental health stigma [4], social isolation [17], history of abuse and trauma [15], substance abuse [1], history of suicide in family [2], social media [9], and demographics [14].

Social media is significantly prevalent in Indonesia, with over 139 million active users and an average of more than three hours of screen time per day [19]. One popular social media platform is Twitter, currently named X. Twitter is used by 57,5% of Indonesians aged 16-64 years, with an average screen time of more than six hours per month [19]. The focus on Twitter/X was due to the large number of tweets about suicide. Users are more free to show suicidal intentions on social media by selectively presenting themselves as vulnerable, needing help and not in a good psychological condition [8]. This use of social media shows potential for obtaining a deeper understanding of suicidal ideation and its expressions in Indonesia.

International studies point out the importance of content analysis pertaining to suicide on social media, which functions as a manifestation of suicidal intention and behavior [10]. Social media interactions can affect individual responses and emotions related to suicide. Users who are vulnerable and have various risk factors such as mental disorders, relational problems and substance abuse are predicted to be more easily affected and empathize with suicidal ideation tweets [12]. However, no specific study has explored this phenomenon in Indonesia.

Given the high prevalence of suicide and social media use in Indonesia and the need to understand suicide more holistically, this research aimed to understand the expression of suicidal ideation among Twitter/X users in Indonesia. Through content analysis, this study aims to fill this gap by exploring tweets on Twitter/X that might display early signs of suicide or suicidal ideation on Twitter/X. With a better understanding of these contents, it is hoped that more targeted and effective prevention strategies can be developed so that this study can make a positive contribution to suicide prevention in Indonesia.

## Methods

### Recruitment

The first part of the study was conducted in three stages. The first stage was data mining in Twitter/X with several keywords both in Bahasa Indonesia and English, such as *tw*, *trigger warning*, *suicide*, *su\*cide*, *s word*, *d word*, *bunuh diri*, *gantung diri*, *overdosis*, *bundir*.

Data mining was conducted for 7 days, following Twitter/X policy by NVivo 12. To safeguard user privacy, any identifying information such as usernames, details in bios, and other potentially identifying information was removed. The tweets were dated from April, 18<sup>th</sup> – 24<sup>th</sup> 2024, which coincided with Eid-al-Fitr, the Islamic holy day when families gather together in a ritual called *mudik*. Suicidal ideation tweets are predicted to appear more frequently on special days than regular days. A total of 5,575 tweets were filtered out, leaving 831 tweets eligible for next stage.

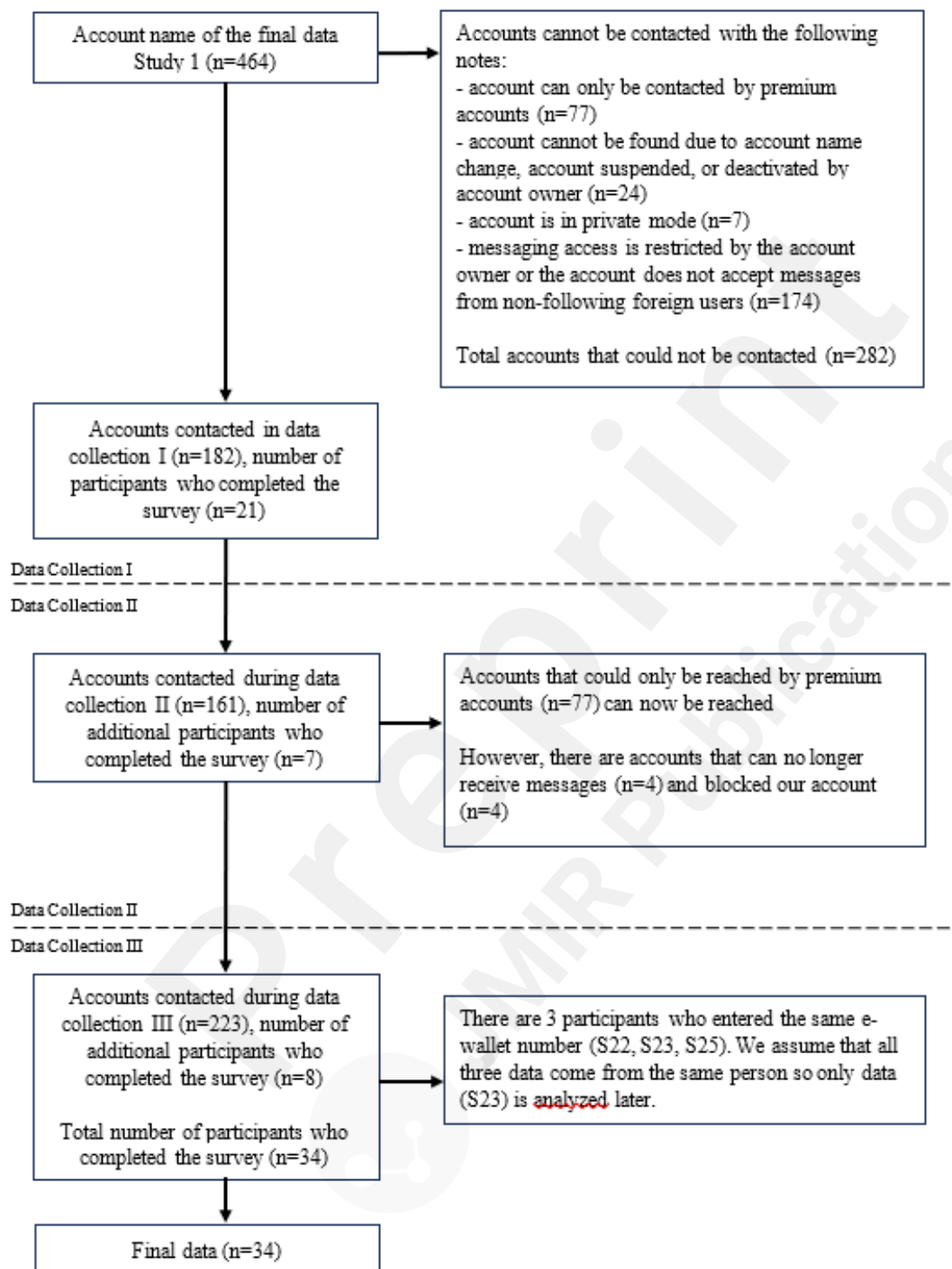
The second stage was identifying tweets about suicidal intentions based on the Suicidal Ideation Scale (SIS) (Fitriana et al., 2022). Separately, each author gave code 1 for tweets that referred to suicidal desire, code 2 for tweets that included resolved plans and preparations, and code 0 for tweets that did not fit either criteria (n=831). We gathered 512 respondents who met our coding standards. The third stage was content analysis on the final data (n=512) by using MAXQDA application to obtain themes related to suicide in social media in Indonesia. The researchers also used word cloud analysis to see the words most often used by respondents in expressing suicidal ideation.

The second part of the study aims to obtain a deeper understanding of the intention and motivation for expressing suicidal ideation using open-ended questions and scale. Users who met the coding standards in study 1, could be contacted, and were willing to participate (as evidenced by informed consent) were eligible to participate. We conducted the data collection on June 5-9, 21-23, and July 28-1, 2024 by sending an invitation to participate via direct message on X. However, not all accounts could be contacted. Drop-off was caused by inability to send messages (account changed to private, changed username, suspended or inactive, account restricted to receive messages from followers). From 512 tweets, 259 accounts were successfully contacted. However, only 34 accounts filled out the survey.





Figure 1.



Participants were asked to complete the ten items of SIS (Suicide Ideation Scale; Rudd, 1989) with their consent. SIS has shown high internal consistency with Cronbach Alpha ranging from .86 to .91 (Fitriana, et al., 2022). This study used the Indonesian version of the SIS, which has satisfactory content and convergent validity (Fitriana, et al., 2022). There are two dimensions in SIS, desire to commit suicide which consists of 4 items and resolved plan or preparation to commit suicide which consists of 6 items. The questionnaire also contained five open-ended questions developed by the author. The five questions were "What was your goal when you posted the suicide-related tweets?", "Describe your reasons for deciding to publicly share a suicide-related tweet", "Describe how you felt after posting suicide-related tweets", "What kind of response did you expect when posting suicide-related tweets?", "Have you ever had or do you currently have intentions to get professional help for your mental health problem?". The second stage was conducting a thematic analysis of the qualitative data by atlas.ti and descriptive statistics of the quantitative data by Jamovi.

## Statistical Analysis

We used descriptive statistics to provide a concise overview of the data using measures such as mean, minimum-maximum score, standard deviation and distribution of the data.

## Data Exclusion

Tweets containing keywords such as *gol*, *bom*, *drone*, *idol*, *kasus*, *kakek*, *ancem/ancam* were excluded. Data that were not relevant to suicidal ideation, such as: campaign about suicide and mental health awareness; reporting a suicide case; commenting on a suicide case; hate speech or telling others to commit suicide; or commenting on movies, soap operas, animations, comics, songs, etc. that related to suicide, were excluded.

## Results

### Content Analysis

Based on the results of the analysis conducted, several topics were also expressed along with suicide ideas by X users in their tweets.

#### 1. Expressing the situation and problems being encountered

##### a) Relationship problems

Most of the posts described how they had problems related to their relationships with others such as, family (nuclear and extended), partners, and friends.

*Do you know that without my children, if I didn't think about my children, I would have killed myself. I'm so stressed, I've been denying that it's okay, this is how the household is. But the more it goes on, (the more I wonder) how come I'm the only one who's troubled, he always wants me to listen to him, (but) he doesn't want to ask (my opinion).*

##### b) Financial and career problems

Some of the posts described financial difficulties, such as unstable income and not being able to meet family needs, still being financially dependent on others, and difficulties in getting a job.

*Throughout the fasting month (I am) staying at friend's place. (I) went from home to other regions with the excuse of looking for a job, but didn't get any of it. (I) want to go back to my hometown, (but) there's nothing to do and I'll be questioned constantly, especially since (I) can't provide for (my) wife and children, so why do (I) come back home. I want to kill myself more and more.*

##### c) School problems

School problems that were often mentioned included failure to enter college and difficulties about undergoing education at university.

*Plan A: SNBT Plan B: Suicide I'm sorry but this is too much, yeah I'm mentally*

*screwed up, I'm tired, I can't stand it, sorry.*

## 2. Tiredness and loneliness

Feeling tired (both physically and psychologically) and alone were the most frequently mentioned topic. Some of the keywords related to this topic included: tired, not strong, alone, until when, again, spite, endure, long, continue.

*I'm not excited about the Eid this year. (I celebrate) Eid alone, carry the burden of problems and thoughts alone too, (I) want to share with someone, (but) he also has his own struggles. Strengthen me, O God. May I never think of making the s word again.*

## 3. Expression of emotion

The emotional expressions shown were negative emotions such as sadness, fear, disappointment, guilt, confusion, anxiety, jealousy, and anger. Related keywords included: stress, really sad, crazy, crying, oh my God.

*Everything will be over if I die, right? I'm so tired of being talked about, being pitied I don't need to be pitied by all of you \*\*\*!!!*

## 4. Hesitations

The hesitation experienced by users on this topic was implied to be one of the reasons to not committing suicide. It could be the fear of death or the consequences that must be faced in the afterlife. Related keywords that often appear included: if, sin, hell, Allah, god, heaven, faith, failure, pain, afterlife, reward.

*That was the hardest for me, as a child I felt like a failure and there was a moment when I wanted to commit suicide if I didn't remember the sin, but I went back to Allah to ask for strength and patience and believe that this is the best for us and Allah has other plans for us, but it still took a long time to heal.*

## 5. Pain

Users expressed their feelings of pain and illness, both physical and emotional, that led to suicidal thoughts. In some posts the keyword pain was also associated with discussions or questions on how to commit suicide painlessly. Other words that were also used included: heart, fast, lost, inner, info, medicine, patient, failed, and healed (cured).

*Info on how and where to commit suicide that is certain to die immediately without failing at all! The longer I live, the more I suffer. I just regret why I lasted until 34 years. I should have ended my life a long time ago, so I didn't have to feel this much pain.*

## Word Cloud

The figure below shows word cloud visualization to illustrate the weight of each word that appears in posts on the topic of suicide on X social media. The larger the word sizes, the more they appear on suicide-related tweets. It is shown that the words that have a large size and are closely linked to suicide-related tweets are *mati* (death), *gantung* (hanging), *hidup* (life), *dosa* (sin), *rasanya* (feels), *sakit* (pain), *takut* (fear), *mikir/kepiikiran* (thinking), *capek* (tired), *keluarga* (family), etc.

Figure 2. Word Cloud



	N	%
<b>Age</b>		
(leave blank)		
18-22	21	62
23-27	12	35
28-33	1	3
<b>Gender</b>		
(leave blank)		
Male	9	26
Female	25	74
<b>Educational Level</b>		
(leave blank)		
SMP (Junior High School)	2	6
SMA/SMK (Senior High School or Vocational School)	18	53
Undergraduate	14	41
<b>Domicile</b>		
Metropolitan city	21	62
Suburban/satellite city	11	32
Rural	2	6

	N	Scale	Mean (SD)	Min	Max	Normality
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						Shapiro Wilk
<b>Suicidal Ideation</b>						
(leave blank)	34	1-5	32.8 (9.39)	13	46	.042
<b>Suicidal Desire</b>						
(leave blank)	34	1-5	14.1 (4.93)	4	20	.004
<b>Resolved Plans and Preparations</b>						
(leave blank)	34	1-5	15 (5.17)	5	24	.459

It is known that the mean total SIS score is 32.8 out of 50 as the maximum score or 65,8% out of 100%. This means that respondents reported rather high intention to commit suicide. The respondents also reported a high frequency of desire to commit suicide with a mean score of 14.1 out of 20 (70%) and also a rather high frequency of planning and preparing for suicide with a mean score of 15 out of 25 (60%). The answers are moderately varied, from high score to low score. However, the data for suicidal ideation and desire to commit suicide were not normally distributed. Based on the analysis above, it means that respondents' tweets of suicidal ideation could be considered as early signs of intention to commit suicide.

## Thematic Analysis

Table 3. Thematic Analysis

Themes	Sub-Themes	Quotes
<b>Purpose of Tweeting</b>		
(leave blank)		
	Venting	To vent. Not intending to inform others, but the post could serve as an answer if I suddenly become inactive on my Twitter account.  I just need to vent.
	Seeking attention and support	A silent cry for help that I'm suffering.  Maybe slightly hoping for some attention or awareness from the people on my Twitter, that I was not okay at that time and was even thinking about committing suicide.
	Seeking safe place	Because for me, Twitter is a safe place for me to vent and post those suicidal tweets.
<b>Reasons for tweeting</b>		
	Inability to talk to significant others	But on the other hand, I don't want to burden the people I know with this negative energy, so I feel that tweeting is one way for me to express the heavy feelings in my chest without burdening anyone by telling them.  I was ashamed to tell my friends about my problem, at least my account could not be seen by my friends.
	Presence of close friends	Because there are my close friends on Twitter.
	Supporting other suicidal person	I want others to feel that they are not alone in having suicidal ideation.
	Documenting thoughts and emotions	I want my tweets to be the documentation about: what happened, where did it go wrong, what could've been prevented, and what should others should do next time.  Because there is no place to share my stories, I pour everything out through my X account. I use that account as a diary and to vent my daily frustrations.
	Seeking attention	I want to feel relieved. Maybe others will reach out to me after I speak up.
<b>Emotions after tweeting</b>		
	Relieved	Relieved, because I wasn't actually suicidal but I was angry with the situation.

		Feel a little bit relieved? Like there is someone who listens to me.
	Shame and regret	Regret because I feel embarrassed.  A little bit embarrassed.
	No difference	Nothing in particular.  I feel that my suicidal thought is still there and ended up hurting myself.
<b>Expectation about responses</b>		
	No expectation	I don't want any comments, I just want to feel relieved.  I don't expect any responses, I tweeted because I was confused about finding someone to talk to. So, when my mind went to dark place, I immediately tweeted. When I cooled down, I realized why did I tweet like that and deleted it.
	Expecting supportive response	Positive affirmations but not toxic positivity. Emotional supports or "hey, do you want to talk?", "I'm here for you, I'm all ears"
	Ambivalence	I often hoped that my friends found my account and then reached out to me or anyone else can do. But sometimes, I didn't expect any responses.  I don't expect anything. Even if there's someone giving me support, it will barely make any effects. But, if there is one, I would feel that there is someone out there who cares for me.
<b>Help-seeking intention</b>		
	No help-seeking intention	Never.
	Want to seek help, but haven't done it	I want to visit psychologist but I was too afraid to do it even though I really need this.  I often wanted to get help, but I was concerned about the expensive cost because of financial limitation.
	Already got help	I already got professional help from psychologist but I did not come back routinely. I came back only if I had severe depressive episodes for a week in a row.

		I have visited psychologist, I also used AI to express my problems and it make me feel relieved (laughing expression).
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## Discussion

### Principal Results

#### 1. Content Analysis

Life problems, such as relationship, financial, career and academic problems are one of the main reasons behind suicidal ideations. Based on their tweets, it seems that those problems were beyond their capacity to solve, thus created a feeling of hopelessness that leads to suicidal ideation. Feeling alone or unable to connect with their significant others also leads to loneliness and suicidal ideation. Suicidal ideation tweets were almost always accompanied with negative emotions expressions, such as anger, sadness, anxiety or hopelessness. The tweets also talked about hesitation to commit suicide in fear of sin and divine punishments.

#### 2. Word Cloud

The words that are closely linked and were frequently used in suicide-related tweets are *mati* (death), *gantung* (hanging), *hidup* (life), *dosa* (sin), *rasanya* (feels), *sakit* (pain), *takut* (fear), *mikir/kepipikiran* (thinking), *capek* (tired), *keluarga* (family). It shows the possibility of hanging as the most used methods to commit suicide and family as the main reason behind the intention to commit suicide.

#### 3. Descriptive Statistics

The intention to commit suicide among the respondents were quite high. Desire to commit suicide were more intense if compared to resolved plans and preparations to commit suicide. This shows the possibility of suicidal-related tweets as a manifestation of desire more than the actually planning and preparing for suicide.

#### 4. Thematic Analysis

Most of the respondents tweet about suicidal ideation to vent and validate their negative emotions. Their tweets mostly talk about sadness, tired of living and depression. Some respondents admit that they seek support and attention from other users. Tweeting about suicidal ideation is sign that they are not okay and they need help. Twitter/X is also considered a safe place as they perceive that they can't ask for support from real life friends. They receive unwanted response from their real-life friends such as blaming them for suicide ideation and suggesting they should pray more. Interestingly, the respondents think that expressing suicidal thoughts on X/Twitter can make others who have similar thoughts feel less alone. Many respondents think they need a place to document moments in their life, like a diary and Twitter/X is considered as a perfect platform.

Most of the respondents feel relieved after tweeting their suicidal ideation on Twitter/X as a mean of expressing negative thoughts and emotions, although they experience it with different intensity. Some of them express shame and guilt because suicide is prohibited in religion. Few of respondents still feels numb as their tweets don't change what they feel. Respondents expect no response from followers because they only want to vent and they already feel better after venting their suicidal intention. In some cases, respondents expect supportive responses from anyone who reads their tweets, whether it's strangers or friends. They want to get positive affirmation and get asked about their condition as sign of attention. One interesting thing is ambivalence when respondents expect supportive responses but are unsure whether they will get them. So, they ended up not expecting supportive responses. Respondents tend to tweet their suicidal intentions impulsively, when they are experiencing



negative thoughts and emotions.

Several respondents don't have intention to seek help as they believe they don't need help from professionals. Some respondents show intention to seek help but haven't visited professionals because of financial condition, shame, fear and lack of access. Some respondents have already sought help from professionals and feel benefit from their visit. However, some don't perceive benefit and state that their condition remains the same after visits to professionals. Respondents tend to visit professionals again only if they feel their condition worsens, which shows a lack of continuity in getting treatment, and also if they already in a better shape financially. One interesting thing is the use of AI as media to express the respondent's condition and to seek support.

## Limitations

Due to the twitter API policy, the data crawling was only limited to a range of 7 days. Future research is expected to conduct data crawling with a wider duration so that the results obtained are more diverse. The response rate in study 2 was low at 13% due to the nature of social media, where users could restrict messages or change their account. Future research is expected to conduct research with a wider range of participants.

## Comparison with Prior Work

This result is consistent with that of other studies. Talking about suicidal ideation is positively associated with suicide attempts [21]. Talking about suicide on social media or other websites is a strong predictor of suicide [13]. Commenting, reposting, and talking about suicide indicate the possibility of committing suicide [12]. In social learning theory, the retention process is the remembering, relating and making meaning of the behavior that one learns from another. On social media, many features such as comments, bookmarks and reposts make the retention process easier and faster [12]. This makes suicidal ideation more contagious on social media platforms.

Based on this analysis, the desire to commit suicide was more intense than the plan or action to commit suicide. Therefore, not all users who show an intense desire to commit suicide have plans or actions to do suicide. Those who tweet they "want to commit suicide" are more likely to attempt suicide than those who tweet "want to die" [15]. It was also found that one of the respondents' purposes for tweeting about suicidal ideation was to express negative emotions. Venting negative emotions is associated with the decreasing of suicidal symptoms, particularly in those who perceived lack of social support [23].

In addition to being predictors of suicidal intention and venting emotions, suicidal tweets are a means of asking for help and attention. Seeking help was rated first as the reason for suicidal ideation disclosure [9]. Suicide attempt survivors also mention their suicidal ideation disclosure and withdrawal behavior as cry for help [14]. However, only 14% of suicide attempters inner circles are considered safe for sharing their suicidal ideation [14]. Fear of rejection, stigma and feeling like a burden to others are barriers to seeking support from friends or family [7,9]. People with suicidal ideation are more comfortable sharing their thoughts on social media because of lower perception of threat [26]. Reduced social cues, anonymity and disinhibition encourage tweets about suicidal ideation [22,26].

Hanging is the most frequently used methods to commit suicide in Indonesia (Onie, et al., 2024). Eventhough the respondents in this study mostly lived in cities, Indonesia is agricultural country where most households have access to rope or other properties needed to commit suicide by hanging [19]. The ownership of firearms is also restricted, making suicide by firearms much harder to commit [19].

## Conclusions

Suicidal ideation tweets could be considered as manifestation of desire and plan to commit suicide. Eventhough the results show that desire to commit suicide is higher than the plan to commit suicide, suicidal ideation tweets should not be underestimated. Suicidal ideation tweets can be seen as means to vent negative emotions, seek attention, support and help. The users also speaks about depression, physical and emotional pain, loneliness and other life problems, revealing the reasons behind their suicidal tweets. Social media based intervention, such as chatbot and psychoeducation campaign could be considered as alternatives for intervention to prevent escalation from desire and planning to the act of committing suicide itself.

## Acknowledgements

This study was funded by Faculty of Psychology, Universitas Airlangga, Surabaya, Indonesia.

## Conflicts of Interest

On behalf of all authors, the corresponding author declares that there are no conflict of interests. All data, materials and softwares used are complied to field standards and available on request to authors. Informed consent was obtained from all individual participants included in the study.

## Abbreviations

SIS : Suicidal Ideation Scale

SMA : Sekolah Menengah Atas

SMK : Sekolah Menengah Kejuruan

SMP : Sekolah Menengah Pertama

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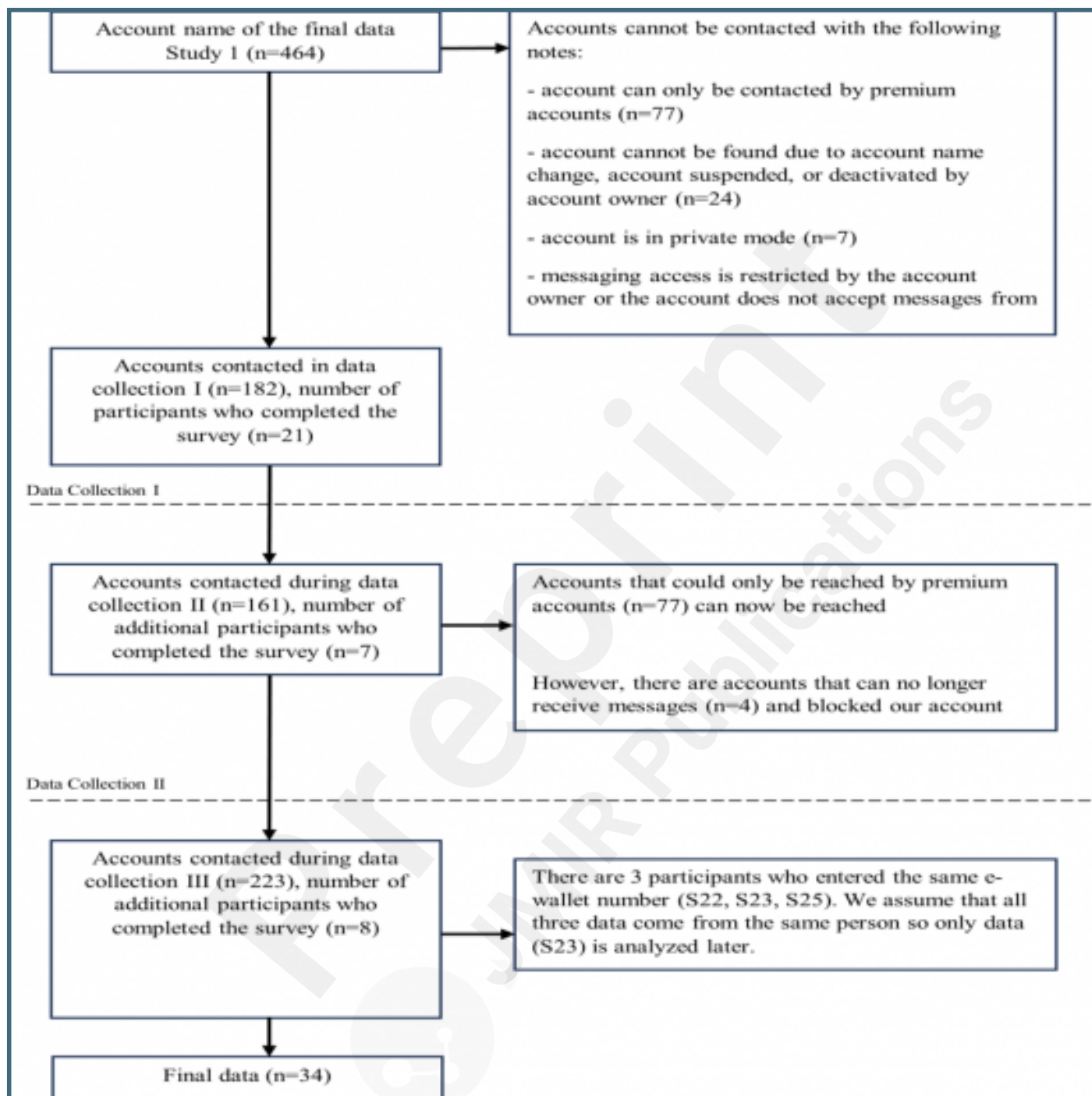
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## Supplementary Files

## Figures

Data collection procedure, explains data crawling and filtering procedure.



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