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Understanding Emotional Dynamics in Autism Social Media Communities

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Abstract. Searches for autism on social media have soared, making it a top topic. Social media posts convey not only plain text, but also sentiments and emotions that provide insight into the experiences of the autism community. While sentiment analysis categorizes overall sentiment, emotion analysis provides nuanced insights into specific emotional states. The objective of this study is to identify emotions in posts related to autism and compare the emotions specifically contained in posts that include the hashtag #ActuallyAutistic with those that do not. *Methods*: We extracted a sample of X' posts related to autism and used DistilBERT to assign one out of six emotions (sadness, joy, love, anger, fear, surprise) to each post. *Results*: We have analyzed a total of 414,287 posts, 98,602 (23.8%) of those included the hashtag #ActuallyAutistic. The most common expressed emotion was joy, which was expressed in 52.5% of the posts, followed by sadness, identified in 28.6% of the posts. 12% of the posts expressed fear, 4.9% reflected anger, 1.1% showed love, and 0.9% expressed surprise. Posts tagged as #ActuallyAutistic showed less joy (27.1% vs. 60.4% in posts without this hashtag, $p<0.001$) and more sadness (52.7% vs. 21.1% in those without the hashtag, $p<0.001$). *Conclusions:* The use of the hashtag #ActuallyAutistic is associated with a different emotional tone, characterized by less joy and more sadness. These results suggest the need for greater support and acceptance towards the autistic community, both online and in society in general. Insights from our study can be valuable for policy makers, health, educational or other programmes aiming at enhancing well-being, inclusiveness, improve services, and create a more compassionate and understanding atmosphere for autistic people.

Keywords. Autism Spectrum Disorder; Autistic Disorder; Social Media; Expressed emotions; Emotions

1. Introduction

Over the last decade, there has been a notable increase in searches related to autism spectrum disorder (ASD) on social media, making it one of the most frequently searched topics on these platforms [1-3]. ASD is a developmental disability characterized by social-emotional deficits, including abnormal social approaches, breakdowns in conversation flow, decreased sharing of interests or emotions, and difficulty initiating or responding to social interactions [4]. Studies suggest that autistic individuals view social

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media as necessary tools [5] for engaging with online autistic communities, sharing information, and exchanging emotional support, all without the pressures of in-person interaction. Since social media encompasses more than just plain text, often conveying sentiments and emotions through various media formats, understanding these expressions offers valuable insights into the experiences and needs of the autism community and its portrayal to the public.

While sentiment analysis categorizes overall sentiment, emotion analysis delves deeper, providing a nuanced understanding of specific emotional states. Research on sentiment expressed in social media posts related to autism reveals a wide range of emotions. Positive and supportive emotions are evident on social media posts in general [6], and specifically in messages posted on Reddit [7], Twitter [8-10], Facebook [11,12] and discussion forums [10]. Additionally, research has found a neutral sentiment in ASDrelated posts in messages posted on Twitter [13,14] and YouTube [15]. Negative or stigmatizing sentiment about autism has also been reported on Twitter [16], and in the comments on YouTube videos about ASD [15].

There seems to be a paucity of research investigating the analysis of emotions expressed in social media posts related to autism. A study that used thematic analysis to examine online blogs written by autistic individuals in the early 2000s revealed central emotions of alienation, frustration, depression, and a pervasive sense of fear or apprehension [17]. A study that used the tool Linguistic Inquiry Word Count (LIWC) to analyze emotions in a sample collected from Twitter in 2018 found that messages from autistic individuals showed minimal levels of anxiety, anger, or sadness [9]. A most recent study on messages posted on an autism question-and-answer forum highlighted negative emotions expressed in these posts, including anxiety, depression, humiliation, sadness or fatigue among others [18].

The objective of this study is to identify emotions in social media posts related to autism and to compare the emotions included in posts that contain the hashtag #ActuallyAtustic with those that do not include this hashtag.

2. Methods

This study focuses on Twitter, now known as X, which is one of the top 10 most popular social media channels [19]. These tweets are publicly accessible by anyone that registers into the platform and are useful in research endeavors. Leveraging the platform's Application Programming Interface (API) facilitates systematic extraction of data. For this study, we collected messages related to autism from February 10, 2022, to September 14, 2022, using various relevant hashtags, including #Actuallyautistic; #Autistic; #Autism; #Asperger; #AutisticMasking and other.

Due to API limitations, we can only download 900 tweets every 15 minutes. To collect a populated and comprehensive dataset, we devised a script capable of executing queries multiple times daily to overcome this restriction. In addition to the tweet content, we meticulously gathered all user available metadata. This holistic approach ensures a nuanced exploration of the Twitter data landscape within the specified timeframe.

For classifying emotions, we use a pre-trained emotion detection model, specifically DistilBERT [20] available at HuggingFace (https://huggingface.co/bhadreshsavani/distilbert-base-uncased-emotion). This model is a variant of BERT (Bidirectional Encoder Representations from Transformers) working with an accuracy of 93.8%[20]. The model has been fine-tuned for the task of emotion

classification, making it capable of understanding and categorizing six different emotions (sadness, joy, love, anger, fear, surprise) expressed in text. A custom Python function is defined to truncate the text to a maximum length of 512 characters, as this is the maximum token length that the BERT models can handle. It then passes the truncated text to the emotion detection model and returns the predicted emotion label.

We identified and compared the emotions in X's posts that included the hashtag #ActuallyAutistic (commonly used by individuals who identify as autistic) versus posts that did not include that hashtag. Statistical analyses were performed using SPSS (version 28.0.1.0; IBM Corp). The University Hospital of North Norway's data protection officer approved the handling of personal information (Ref: 02275).

3. Results

The most frequently detected emotion over the complete dataset was joy (52.45%), followed by sadness (28.58%), and fear (12.04%). The least frequent emotions we found were surprised (0.91%), love (1.11%) and anger (4.92%).

Posts of users self-identified as autistic, i.e., using the hashtag #ActuallyAutistic accounted for 23.8% of the total. When analyzing the posts of users who self-identified as autistic, joy and sadness remain the most frequent emotions. However, the percentage of these emotions is disproportionate compared to posts in which the emitter does not self-identify as autistic ($\chi2=43479.44$, df=5, $p<0.001$). Table 1 and figure 1 present a summary of the findings.

Table 1. Detected emotions in X's posts with vs. without hashtag #ActuallyAutistic

Emotions	Self-identified as autistic	Not self-identified as autistic	Total
Joy	26687 (27.06%)	190619 (60.38%)	217306 (52.45%)
Sadness	51936 (52.67%)	66477 (21.06%)	118413 (28.58%)
Fear	12882 (13.06%)	36986 (11.72%)	49868 (12.04%)
Anger	4785 (4.86%)	15588 (4.94%)	20373 (4.92%)
Love	618 (0.63%)	3939 (1.25%)	4557 (1.11%)
Surprise	1697 (1.72%)	2076 (0.66%)	3770 (0.91%)
Total	98602 (100%)	315685 (100%)	414287 (100%)

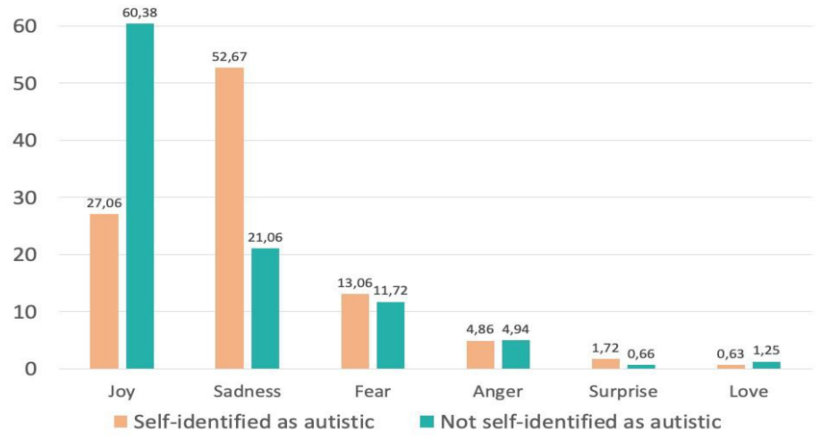

Figure 1. Proportion of detected emotions in X's posts with vs. without hashtag #ActuallyAutistic

4. Discussion

In this study, we have found that the predominant emotion conveyed in X's posts related to autism was joy and sadness. Some posts also expressed fear and anger, while very few expressed love or surprise. Posts with the hashtag #ActuallyAutistic showed statistically less joy and more sadness compared to posts without the hashtag.

Our findings, suggesting that posts about autism (not specifically posted by individuals identifying themselves as autistic) express more joy, align with previous research, and might indicate a more positive and supportive sentiment towards ASD [612]. When it comes to messages posted by individuals that explicitly identify themselves as autistic, our results indicate a presence of negative emotions, i.e., less joy and more sadness. Our findings are consistent with previous research that observed feelings of depression or sadness on blogs written by autistic individuals [17] or in an online forum [18]. These results may reflect the acknowledged comorbidity of depressive symptoms in autism [4]. However, these findings contrast with the study that utilized LIWC to analyze emotions on tweets posted in 2018, which found minimal presence of sadness [9]. This contrast could be explained by potential evolution in emotional expressions over time, or by the methodologies used to analyze the data.

In a previous study where we analyzed the main topics discussed by the subsample specifically using the hashtag #ActuallyAutistic, we found that most posts focused on presenting general aspects and experiences of being autistic, raising awareness, and expressing dissatisfaction with certain interventions [21]. The prevalence of posts focusing on these themes may reflect the pressing need for more comprehensive support and acceptance within the autistic community. Furthermore, the finding that half of these posts express sadness could suggest that individuals sharing their experiences may often encounter difficulties or negative emotions associated with their condition or societal attitudes towards autism, as has also been suggested by others [5,18].

This study has several limitations. The study focuses solely on X, and our findings could differ if other social networks were included. While we have analyzed a large number of posts related to ASD, it should be noted that some autistic individuals may lack the cognitive skills to post on social media. While it is not possible to guarantee that posts tagged with #ActuallyAutistic belong to autistic individuals, explicitly including this hashtag suggests that the post emitter may be autistic. Additionally, we chose the DistilBERT method to analyze emotions due its smaller size and faster processing compared to BERT, both trained on the same dataset. While we did not assess its quality on our data set, we are not expecting significant deviations in our analysis when applying another method. Our database contains many emojis, however, we did not used a DistilBERT model fine-tuned to emojis (https://huggingface.co/qilin1/distilbert-baseuncased-finetuned-emoji) due to lower reported quality compared to our chosen model. The selected algorithm distinguishes six emotions: sadness, joy, love, anger, fear, and surprise, although other emotions may also be relevant for our study.

5. Conclusions

The analysis of posts related to autism indicates the presence of several emotions. In the general analysis, we observe that more than half of the posts reflect joy, and almost a third express sadness. However, upon closer examination, we found that posts tagged with #ActuallyAutistic, and therefore published by individuals who identify as autistic,

reflect more sadness and less joy. Our findings contribute to a better understanding of the emotions, experiences, and challenges that autistic people face. Furthermore, these findings suggest the need for greater support and acceptance towards the autistic community, both online and in society in general. Insights from our study can be valuable for policy makers, health, educational or other programmes aiming at enhancing wellbeing, inclusiveness, improve services, and create a more compassionate and understanding atmosphere for autistic individuals.

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