Analytical Models for Narrative and Sentiment Change Surrounding ASD Claims

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Abstract: This research investigates how public narratives and sentiment shift on social media platforms when public figures disclose that they are on the Autism Spectrum Disorder (ASD). It does that considering a cross platform analysis of Reddit and TikTok discourses and a comparative modelling approach that brings together classical machine learning and LLMs (Large Language Models)-based methods. To this end, a dataset is collected, prepared and analysed in order to understand the narrative and emotions' change considering pre- and post-moment dimension with attention to platform-specific discourse dynamics. The results show that disclosures are associated with measurable shifts in both affective and narrative content, including simultaneous increases in supportive and advocacy discourse as well as persistence of stigmatizing or misinformative frames, with effect sizes and temporal persistence differing across platforms. Hence, these findings show the value of platform-aware, mixed-method computational approaches for understanding public responses to ASD disclosure by public figures and for informing more accurate and stigma reducing communication strategies in digital platforms.

Keywords: Autism spectrum disorder, ASM, Narrative change, Topic modelling, Sentiment analysis, LLMs

1. Introduction

The Autism Spectrum Disorder (ASD) encompasses a heterogeneous group of pervasive neuro-developmental conditions characterized by persistent impairments in social communication and interaction, alongside restricted, repetitive patterns of behaviour, interests, or activities which collectively contribute to (degrees of) long-term functional disabilities across multiple domains of life (CDC, 2022; Ousley and Cermak, 2013). The spectrum nature of ASD reflects substantial variability in symptom presentation and severity which can complicate the diagnosis approach and intervention strategies. Over recent decades, the reported prevalence of ASD has risen markedly increasing from approximately 1 in 2,400 individuals in 1976 to 1 in 68 by 2014, a trend that has intensified both scientific inquiry and public health concern. This led through various studies to further investigation into underlying etiological factors, diagnostic practices, and societal awareness (Maenner et al, 2023).

Public discourse on autism has been further influenced by high-profile autistic disclosures from public figures. Along these lines, Elon Musk publicly disclosed his autism diagnosis in 2021 and Greta Thunberg has described her Asperger's diagnosis as her "superpower" (Skafle et al, 2021; Gabarron et al, 2022). To understand the shifts in public perception of ASD, it is important to distinguish between the two existing views of autism: the traditional and the modern view. The traditional view is based on the medical model of disability which sees autism as a disorder or deficit that needs to be diagnosed and treated. In contrast, the modern view of autism frames it not as a disease, but as a normal variation in human nature, where the challenges faced by autistic individuals stem to some degree more from society's lack of the structure needed to support and accept the difference than from deficits. Musk and Thunberg empower the modern view by challenging deficit-based narratives and leading to broader acceptance.

Despite the increased awareness, there remains a gap in how the disclosure of public figures shape the public online discourse and sentiment toward ASD. To address this aspect, this research conducts a social media-based in-depth analysis of the discourses and sentiments carried out in Reddit and TikTok platforms following the disclosures of Musk and Thunberg personalities. To this end, Reddit enables the examination of honest, discussion-based opinions, while TikTok capturing the perspectives of (younger) users through its short-form content. On this behalf, the following main research question is formulated: How do the discourses and corresponding sentiments of Reddit and TikTok public users toward ASD vary regarding the influence of prominent figures with autism, specifically Elon Musk and Greta Thunberg? With this scope, next to the in-depth NLP (Natural Language Processing)-based analysis conducted, the results obtained are further interpreted with domain experts from the Netherlands.

The remainder of this research is structured as follows. Section 2 discusses the core related studies to this research. Section 3 presents the methodological approach followed in order to achieve the goal of this study. Section 4 presents the results obtained from the in-depth technical analysis conducted on the data collected.

Section 5 discusses the interpretation of the results based on the perspectives illustrated by domain experts. And Section 6 presents concluding remarks and future research perspectives in this area.

2. Related Studies

In recent years, research on ASD has grown rapidly, drifting the view of autism away from the traditional medical model, which sees autism as a disability that needs to be treated (CDC, 2022; Anderson-Chavarria, 2021), into the modern social model that frames ASD as a natural form of human neurodiversity where the difficulties faced by autistics are shaped solely by societal structures and exclusion (Pisciotta, 2024; Shakespeare, 1997).

Historically, neurodiversity subtypes such as Asperger syndrome were included individually in diagnostic manuals, including the ICD-10 (WHO, 1992), and DSM-IV (APA, 1994), but were later merged into ASD in the DSM-5 (APA, 2013) and ICD-11 (WHO, 2019), reflecting a broader understanding. The prevalence of ASD diagnoses has risen significantly in recent years from 4 per 10,000 children in 1989 to 1 in 36 in 2020 (Maenner et al, 2023). This increase can be attributed to factors such as diagnostic changes, awareness, and possible genetic or environmental influences (Verhoeff, 2015; Fombonne, 2005). At the same time, the neurodiversity movement (Houting, 2018) supported by prominent autistic figures such as Greta Thunberg (Thunberg, 2019) and Elon Musk (Musk, 2021) strongly challenged the disability-based traditional view. Although autism was formally recognised as a distinct clinical condition for the first time (Kanner, 1943) in 1943 by Leo Kanner, other historical analyses suggest that autism has existed long before its formal recognition (Houston and Frith, 2000; Verhoeff, 2015; Fitzgerald, 2005).

Social media has become an important and influential aspect of daily modern life with a rapidly increasing number of users worldwide (4.76 billion as of January 2023) across its various platforms (Kemp, 2023). Such an expansion in the number of users made social media a valuable source of data on important topics such as health and other societal relevant topics (Andreassen et al, 2007). With the huge amount of available data on any topic, manual data analysis is not possible anymore. Nevertheless, NLP-based tools facilitate and support the development and use of automated analysis which allows understanding the perspectives captured in datasets of various size from different online content sources (Joseph et al, 2016; Harris, 1954; Sadeghi, McClelland and Hoffman, 2015). Along these lines, Peng et al (2020) built a method for extracting biomedical terms and Zhang et al (2022) to analyse early indicators that could be used for diagnostic purposes. At the same time, Skafle et al (2021) and Gabarron et al (2022) conducted initial studies on online discourses in relation to autistic public figures and Robinson et al (2019) focused on specific medical aspects in order to uncover existing biases and misconceptions surrounding mental health within the public domain.

To further enhance our understanding of the role of social media in understanding public disclosures and sentiments, this research focuses on two prominent platforms: Reddit and TikTok. We selected these platforms because of their distinct user demographics and unique usage patterns. Reddit, with its 57 million daily active users worldwide allows users to submit content personally or anonymously through text posts or links (Reddit, 2023). On the other hand, TikTok serves as a platform for entertainment, creativity, marketing, and social activism, boasting over 1.6 billion users globally registered in 2025 marked as the fifth most popular social media (BrightData, 2025) among young audiences, with 30.2% aged between 18 and 24 years old and 21% aged between 13 and 17 years old (ElectroIQ, 2025). Although multiple existing research studies have explored user interactions on platforms like Reddit, LinkedIn, and TikTok, different gaps remain in the context of mental health discourse and audience diversity on these platforms. For instance, Bellon-Harn explored Reddit conversations using linguistic analysis to investigate the potential of applied behaviour analysis as a possible treatment for ASD (Bellon-Harn, Boyd, and Manchaiah, 2021). Meanwhile Sumbaly presented LinkedIn's Hadoop-based analytics stack to support data mining applications (Sumbaly, Kreps, and Shah, 2013). Nevertheless, a limited number of studies focused specifically on how content formats influence users' engagement with ASD-related topics. On this behalf, this research addresses these gaps by applying NLP-based sentiment and topic analysis to ASD-related discussions on Reddit and TikTok discourses by focusing on the influence of Elon and Greta's ASD public disclosures while understanding the different identities of the social media platforms.

3. Research Methodology

This study investigates how public disclosures of autistic diagnoses by public figures, specifically Elon Musk and Greta Thunberg, shape online public discourses and sentiments toward Autism Spectrum Disorder (ASD) on Reddit and TikTok using natural language processing (NLP).

With this scope, this research aims to answer the following main research question: How do the discourses and corresponding sentiments of Reddit and TikTok public users toward ASD vary regarding the influence of prominent figures with autism, specifically Elon Musk and Greta Thunberg? To tackle this question, a logical split was applied in order to map the concrete research activities and technological methods that need to be applied, as follows:

- SRQ1: Which social media datasets can be used to understand public sentiment and discourses toward ASD regarding Elon Musk and Greta Thunberg?
- SRQ2: How are the narratives and sentiments on ASD analysed in the social media data?
- SRQ3**:** How do experts in the field of autism interpret the findings obtained from analysing topics, discourses, and sentiments associated with these prominent figures with autism?

To this end, an NLP pipeline was developed in order to capture corresponding topics and sentiments expressed by public users on Reddit and TikTok in the context of ASD. To ensure using a systematic approach, the project was divided into sequential phases following the Data Science methodology (Shearer, 2000): data collection, data pre-processing, and model development.

Phase 1: Data collection: Data were collected from Reddit and TikTok to address SRQ1. LinkedIn was initially considered but excluded due to limited data availability, as outlined below.

Table 1: Data Collection

Social media platform	Method	Number of records	Comments
Reddit	Reddit API	4.810	Included
TikTok	3rd party company (BrightData)	16.486	Included
LinkedIN	3rd party company (BrightData)	<100	Excluded (not enough data)

Furthermore, temporal subsets (quarterly, weekly, and daily windows) were identified around the public disclosure dates of Thunberg (August 2019) and Musk (May 2021) to capture both short-term and long-term discourse dynamics and remove any unwanted noise.

Phase 2: Data pre-processing: To address SRQ2, posts, titles, and comments were merged into unified records. A standard pre-processing pipeline was applied as follows:

- Text cleaning (e.g., URLs, symbols, non-alphanumerical characters).
- Language detection and translation to English.
- Tokenization and normalization.
- Stop-words removal.
- Lemmatization using spaCy.
- Bi-gram and tri-gram extraction using Gensim.
- TD-IDF (Term Frequency-Inverse Document Frequency) filtering to retain information terms.

Overall, the step-by-step pre-processing ensured coherence, usability, and robustness of the datasets, providing a strong foundation for subsequent topic modelling using LDA (Latent Dirichlet Allocation) and sentiment analysis.

Phase 3: Model Development: Building upon the step-by-step pre-processing outlined in phase 2, this phase developed models to address SRQ2 which focuses on analysing public discourse and extracting sentiment on ASD regarding Elon Musk and Greta Thunberg by integrating the LDA topic modelling, used to extract the public discourses, with the multi-model sentiment analysis framework, used to analyse sentiments, from the data collected from TikTok and Reddit as further discussed.

Topic Modelling: LDA is a machine learning technique applied to identify the main topics and their distributions across the records collected from Reddit and TikTok. Here, each record consists of one post, its title, and up to 10 associated comments. On this behalf, the following activities were considered:

- The pre-processed and filtered TF-IDF records were converted into lists of words representing the tokenised records for each of the datasets. TD-IDF filtering to retain information terms.
- A dictionary that maps each unique word to a unique ID was created for each of the datasets.

- A corpus indicating word frequencies across records was created for each of the datasets.

The optimal topic number and training chunk size for the LDA technique were determined using coherence scores, ensuring interpretability and semantic consistency. Furthermore, the datasets were split into three temporal subsets (quarterly, weekly, and daily) to enhance the analysis and identify even the smallest shifts in public discourse following public disclosures.

*Sentiment Analysis Framework***:** A multi-model sentiment analysis framework was applied to capture sentiments expressed in the data collected considering the following models:

- TextBlob: baseline polarity detection (TextBlob, 2025).
- VADER: strong performance on informal social media text (Vader Sentiment, 2025).
- Flair: contextual string embeddings for advanced sentiment variation (Flair, 2025).
- GPT-Turbo 3.5: transformer-based, high granularity sentiment classification with guided prompt (OpenAI, 2025).

Later, the sentiment scores were normalised into a common scale to allow the comparison across the models considered. Furthermore, to classify sentiments, a threshold-based classification was applied for TextBlob and VADER, while Flair and GPT-Turbo have their own model sentiment classifications. By combining these models allows a multi-faceted analysis is possible as TextBlob served as a starting point, VADER being directly tailored to social media content, Flair further adding value on its context-based insights perspective, and GPT-Turbo 3.5 provided further advanced flexibility.

4. Results

This section presents the results of the topic modelling and multi-model sentiment analysis conducted covering the period from January 2019 to December 2024. To examine both long-term and short-term shifts caused by Elon's and Greta's autistic announcements, three temporal resolutions were employed: quarterly, weekly, and daily. With this scope, a 50-topic configuration was used to capture a broad range of discourses on three different periods.

Quarterly Trends (2019–2024): Figure 1 presents the evolution of dominant topics and average sentiment scores across the quarters from 2019 to 2024 across Reddit and TikTok. The dominant topics consisted of keywords such as autism, identity, diagnosis, neurodiversity, family, experiences, and awareness. Although slight sentiment fluctuations were observed across the four sentiment models, no strong sentiment shifts were temporally aligned with the public Asperger's disclosures by Greta Thunberg (Q3 2019) or Elon Musk (Q2 2021). Overall, Reddit discussions exhibited more neutral-negative sentiment variability across all sentiment models except Vader which returned positive sentiment, whereas TikTok showed a more consistently positive sentiment trend for Vader and GPT and negative sentiment for Flair. Nonetheless, these differences appeared to reflect platform-specific communication styles instead of the responses to celebrity disclosures.

Weekly Trends Around Disclosure Periods: To capture medium-term dynamics, weekly analyses were conducted around the disclosure periods in 2019 and 2021. For this, Figure 2 illustrates the dominant weekly topics and sentiment during these periods. The dominant topics across both platforms continued to emphasise similar keywords, with additional references to disability, community participation, and public visibility. Despite increased topical diversity at the weekly level, no clear sentiment inflection points were observed in the weeks aligned with the disclosures. At the same time, sentiment fluctuations were short-lived and inconsistent across models, suggesting that weekly aggregation was insufficient to detect a measurable response attributable to Thunberg's and Musk's announcements.

Daily Trends Around Disclosure Dates: To further increase the temporal resolution, daily analyses were conducted around the exact two days of Thunberg's (on 31st August 2019) and Musk's (on 8th May 2021) autistic diagnosis disclosures. Figure 3 shows daily dominant topics and sentiment scores for Reddit and TikTok. Daily topics were dominated by generic autism-related terminology and personal expression keywords, with limited explicit referencing of the disclosures themselves. Although a short-term sentiment swing was detected, particularly in Reddit data, these variations were not sustained and did not consistently align with the disclosure days. Across both platforms, sentiment trends quickly returned to baseline levels, indicating limited short-term impact.

Across quarterly, weekly, and daily analyses, no conclusive evidence was found linking Elon Musk's or Greta Thunberg's public Asperger's disclosures to sustained changes in online discourse or sentiment on Reddit or

TikTok. While platform-specific differences in sentiment expression were observed, these patterns appear to be driven more by platform affordances and user cultures than by celebrity influence.

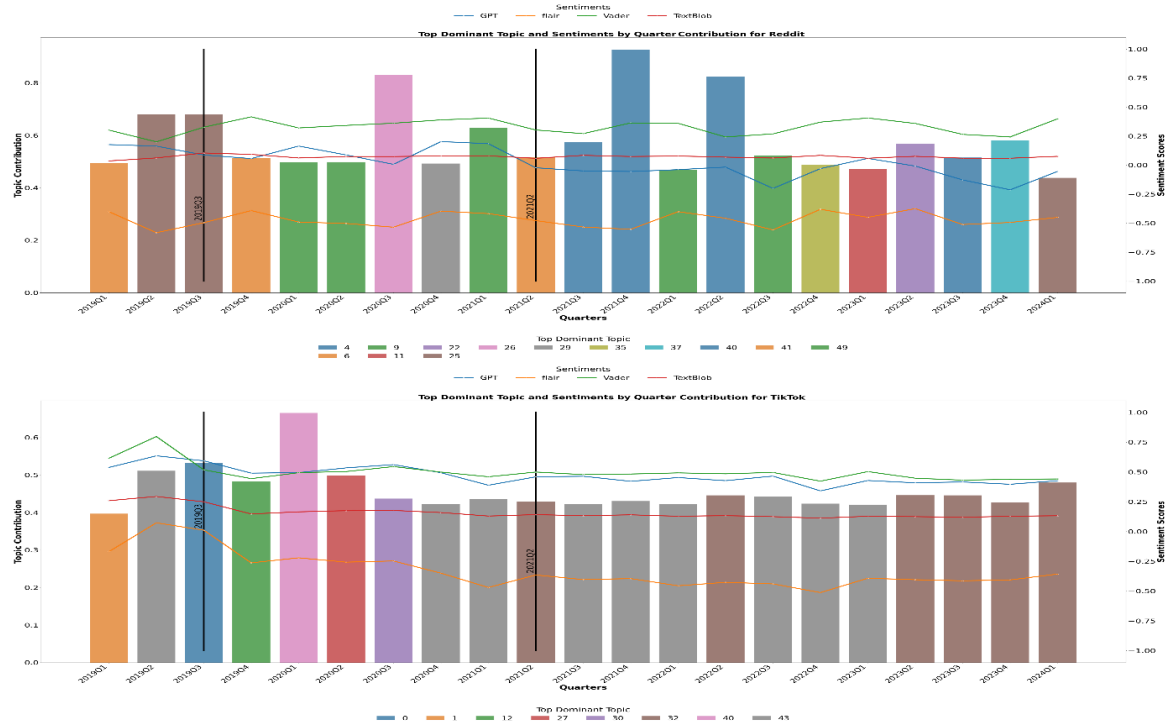

Figure 1: Sentiment analysis of Reddit and TikTok data (2019-2024) divided into quarters using 50 topics per quarter

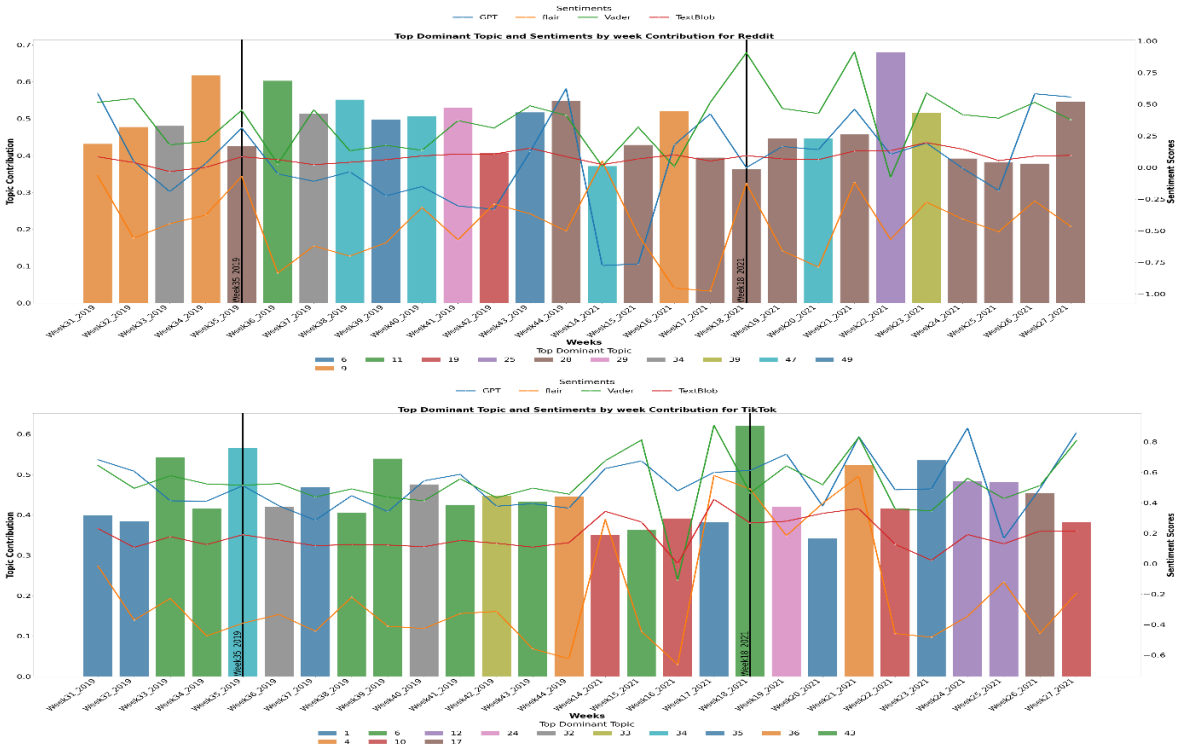

Figure 2: Sentiment analysis of Reddit and TikTok data (Aug-Oct 2019) and (Apr-June 2021) divided into weeks using 50 topics per quarter

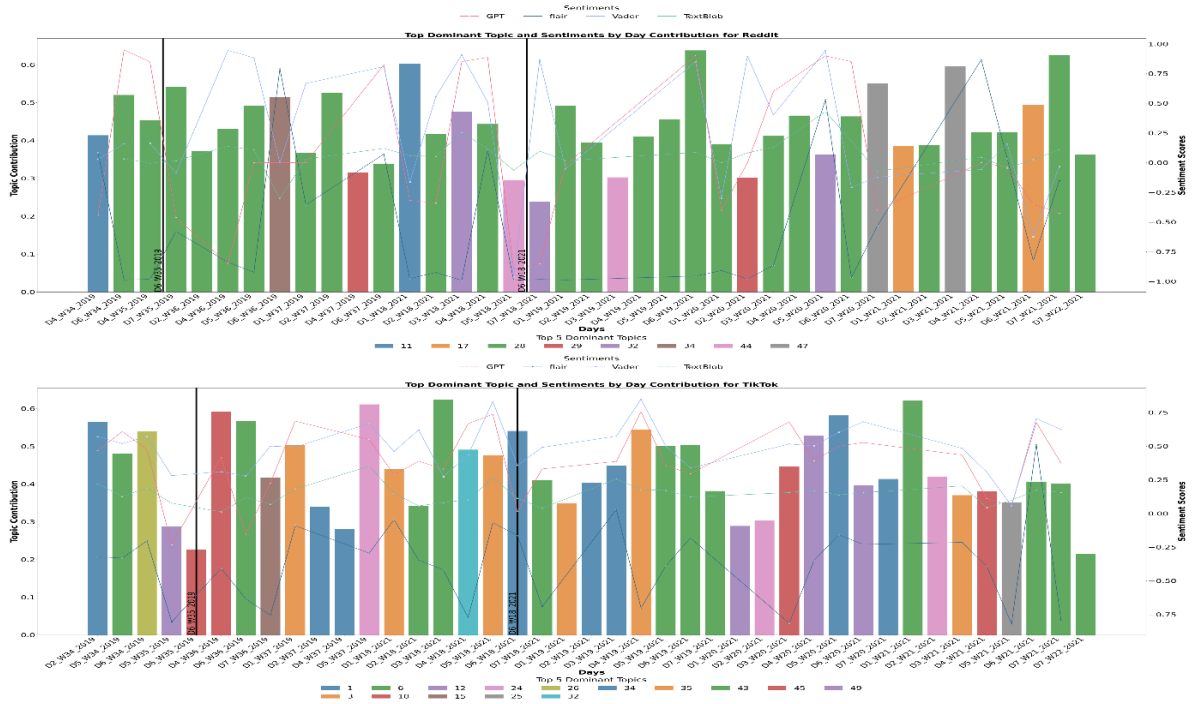

Figure 3: Sentiment analysis of Reddit and TikTok data (17 Aug - 14 Sep 2019) and (18 Apr-23 May 2021) divided into weeks using 50 topics per day

5. Expert-based Interpretation of Results

To enhance understanding of the results obtained and address SRQ3, we conducted an in-depth expert-based evaluation with five autism experts from the Netherlands. The experts have backgrounds in advocacy, research, and clinical practice with experience between 3-13 years. In this process, the experts analysed the results and responded to a semi-structured survey. On this behalf, the responses were analysed using thematic analysis (Braun and Clarke, 2006) which shows that the experts broadly agreed that public disclosures by Greta Thunberg and Elon Musk increased the visibility of autism, even though the quantitative analysis did not reveal any definite results. The experts emphasised that online reactions to any topic often reflected pre-existing attitudes toward the public figures associated with any topic rather than the topic itself, producing both supportive and critical sentiment.

Furthermore, the interpretation of the experts supports the initial assumption that platform-specific dynamics can explain the observed sentiment patterns. Along these lines, Reddit was described as enabling more structured and moderated discussions by aligning with the relatively stable sentiment detected in the quantitative analysis. In contrast, TikTok's trend-driven and performative culture was associated with emotionally volatile and short-lived engagement by helping to explain inconsistencies observed across sentiment models we saw. At the same time, the experts also highlighted limitations of the topic modelling and the sentiment analysis methods, noting that platform censorship, vocal minorities, and topic drift (e.g., technology or climate debates) can distort the discourses and the sentiment expressed toward autism. They stressed the importance of contextual and discourse-level analysis as well as considering a higher inclusion of under-represented silent majorities. Hence, the expert-based analysis and feedback supported the interpretation of the quantitative findings while stressing the need for careful interpretation of sentiment and discourses in charged contexts.

6. Conclusions

This research conducted a multi-platform in-depth analysis on public discourses surrounding the perceptions and dynamics of the narratives and corresponding sentiments that users have in relation to the disclosure of public figures on their own ASD diagnostic. In these lines, based on the data available and collected in this research, this study shows that public disclosures by Elon Musk and Greta Thunberg did not produce sustained or clearly attributable shifts in ASD-related discourse or sentiment on Reddit and TikTok, despite observable platform-specific differences in how users express opinions. Together with the experts' interpretations, this suggests that reactions to such disclosures are shaped more by platform culture, moderation, and pre-existing

attitudes toward the public figures than by the disclosures themselves, fact that stresses the need for careful interpretation of social media sentiment in autism research.

Future research is considered in order to extend this research by incorporating additional platforms, richer longitudinal sampling, and discourse-level methods that can better capture context, sarcasm, and topic drift, especially in highly charged online environments. In addition, it would also be valuable to include the *silent majority* through mixed-method designs that combine large-scale computational analysis with interviews, surveys, or participatory approaches involving both ASD individuals and experts so that future studies can more directly reflect lived experience and reduce the bias of vocal minorities.

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Ethics and AI Declaration: For this research, no ethical clearance is required, and no AI tools were used in the creation of this article.

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