

Helping Hands of Autism Blogger Community in Social Media Platforms

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Abstract— With a high prevalence of autism among children, there is a shortage of autism support facilities around the world. Families dealing with autism use online social media to share experiences with other members of the community. Systematic analysis of the vast interaction between autism community members in blogs and Twitter can be used to build a learning tool for others who are dealing with autism. The study found that the autism blogger community provides substantial social support to other community members. Differences across various groups (autistic bloggers, mother bloggers with autistic kids, father bloggers with autistic children, and autism support group blogs) and different social media platforms (blogs and Twitter) were reviewed in context of social support. We found that the families dealing with autism have a better quality of life when facilitated with social support by community members.

Keywords—Autism; ASD; Social Support; Twitter; Blogger; Community.

I. INTRODUCTION

According to estimates by the Centers for Disease Control and Prevention (CDC) approximately 1 in 68 in the USA are diagnosed with Autism Spectrum Disorder (ASD). ASD occurs in all the ethnicities and boys are four to five times more likely to have autism as compared to girls [1]. Intervention and efficient treatment such as specialty services and early detection can help people with Autism to lead a better quality of life [2].

Social media has provided Internet users an open platform for discussions, communication, and information exchange for various health related topics. Families with a member diagnosed with autism share their life experiences in social media (almost on a daily basis). This exchange of information, which is by default archived, has become an immense source of knowledge for others dealing with the same situation. Organizations working on spreading autism awareness encourage creation of an open social media platform on autism where members can share their experiences and get advice from others. Shared experience by an individual dealing with autism in the social media platform, especially blogs, Twitter and Facebook shed light on various issues of autism. To raise awareness among autism community members, premier non-profit organization

like Autism Speaks [3] recognizes top autism bloggers based on feedback from families with autism. Shared know-how about autism helps to find a better way of life for the families dealing with autism. Social support in online platform can be defined as "information leading the subject to believe that he is cared for and loved, esteemed, and is a member of a network of mutual obligations" [4].

The purpose of this study is to offer a research-based understanding of the conversations in social media platforms especially blogs and Twitter among families dealing with autism. The study aims to shed light on characteristics of social support provided by autism blogger community towards other members of the community.

This paper is organized as follows: the prior related works are described in Section II, Section III depicts the methodology and data collection, Section IV shows the result, Section V discusses about the inferences drawn from the study; finally, in Section VII, we draw conclusions and possible future works.

II. RELATED WORK

Many clinical studies are ongoing to get an in-depth knowledge of causes and effective interventional strategies for ASD. These studies provide understanding of the outcome of various available therapy options for autism. With the high cost involved in clinical trials, the use of social media content in research analysis to assess the effectiveness of different intervention strategies for autism could be an economically viable option. Caregiver's preference for using social media platform as compared to any other communication platform was also established by Hamm, et al., [5]. Our study does not intend to provide a substitute for clinical tests of the intervention strategies. On the contrary, our methodology would provide the perceived effectiveness of the intervention strategies or the therapies from a practitioner's perspective. This would include clinically evaluated as well as unevaluated strategies. This in turn would help prioritizing resources on the testing procedures of intervention strategies. In this study, however, we address a tiny part of this bigger research agenda, which is does autism blogger community provide social support to other community members? Are there differences in the offered social support across various groups of bloggers (i.e., autistic bloggers, mother bloggers with autistic kids, father bloggers with autistic kids, and autism support group blogs) and different social media platforms (e.g., blogs and Twitter)?.

Answers to these questions will help conduct a more systematic evaluation of interactions occurring on various online platforms, especially the social media, for evaluating the efficacy of intervention strategies from the perspective of the practitioners.

Sociologists published many research works on the social support concept. The link between social support and health is addressed by two different hypothesis: the buffering hypothesis and the direct effects hypothesis. In the buffering effect hypothesis, social support enhance good health by reducing the effect of stressful life events [6] while in direct effect hypothesis, better health is provided by high social support [7].

Hamm et al., [5] found in their study that caregivers and patients started using social media to gather health information and exchange information related to health informatics. The mostly publicly available social media data facilitated by various healthcare communities can be analyzed effectively to build a knowledge-based source.

III. METHODOLOGY AND DATA COLLECTION

Social support concept, although widely studied in the social science literature, there lacks a formal mathematical definition. Hence, we leverage various empirical definitions available in computational science literature that overlap with or application domain, i.e., healthcare.

This study evaluates the social support using sentiments expressed by the interactions of the autism bloggers community. The social network analysis features are used to evaluate the structural aspect of the generation of the social support within the autism community. Our methodology consists of the following steps:

- 1) Collect data from Autism bloggers in different social media platform (blogs and Twitter).
- 2) Pre-process and filter noise.
- 3) Perform topic and word analysis to ensure the subject of discussion is autism.
- 4) Construct networks for autism community for each social media platform.
- 5) Analyze the sentiment of the content of the interaction of the members of autism blogger community.
- 6) Calculate the degree of social support provided by the interaction of the autism community members.

Web search on autism keyword shows, presently there are more than a thousand active autism bloggers. For the initial phase of the study, we selected the top 40 autism bloggers based on the recommended list of popular bloggers by the Autism Speaks organization. The content and metadata of blogs by the 40 autism was extracted and analyzed. Further, we cross-referenced their blogger profile and Twitter profile (wherever the blogger had provided a link to his/her Twitter profile) and collected their tweets, and other network information, including friends and followers.

We retrieved the most recent permissible tweets (up to 3,200 each) for the 40 autism bloggers, resulting in 118,531 tweets. All the tweets are in the English language. Some of

the tweets by autism bloggers are as follows, *“Autism is part of what we are. Neither good nor bad. Being unable to talk is a problem to be solved. Absolutely ”*, *“I am a strong believer in developing therapies and tools to help people severely disabled by autism. Always believed that..”*.

Profile analysis of the bloggers led to the classification of bloggers based on different characteristics. Classification of autism bloggers into different categories is done to deduce different capacities of social support based on defined blogger categories. Of the 40 autism bloggers, 13 were female bloggers with autistic kids who are termed as mothers. Male bloggers with autistic children termed as fathers are 10 in our database. Number of bloggers who blogged as groups to create autism awareness termed as autism support group are 13 and rest 4 termed as self-autistic bloggers who are diagnosed with autism and blogs for themselves.

To infer social support from the text content, the psycholinguistic analysis was used. De Choudhury [8] studied the online exchange of social support for health communities on depression using the psycholinguistic analysis technique. Blog content and tweets are categorized into psychological groups utilizing Linguistic Inquiry and Word Count (LIWC) program [9]. In LIWC, a word can belong to more than one groups. LIWC has been used by many researchers for text analysis, and promising results have been reported. Tov and Ng [10] found a consistent correlation between emotion rating values of LIWC with self-reported values.

LIWC categories used to infer social support were selected based on resemblance with social support concepts like the social process, which signifies feeling of solidarity. The definition proposed by Cobb [4] for online social support is used as the reference. The definition is quoted in Section 1. Social support in the text content is deduced primarily using the scale in the spoken category of assent along with positive emotion and social processes.

IV. RESULTS

To get an insight into social support characteristics of autism blogger community, various social network analysis techniques were used during the study. To infer network dimension of the autism blogger community, the activities like tweets, friends, followers, mentions, the hashtag of autism bloggers in Twitter and blogs were analyzed.

The autism blogger community interaction shows tightly linked community. The friend and follower Twitter network of autism blogger community is shown in Figure 1. The autism bloggers are annotated based on the classification defined in Table 1. Their real identity is anonymized. Different colors indicate various communities based on network modularity. For complex network structure, modularity is one of the effective function in community detection [11]. Figure 1 shows distinct characteristics of the autism blogger network on Twitter where any member of the community can reach a colleague on average 3.4 hops (average geodesic distance), as compared to the widely known 4.74 degrees of separation in Facebook network of active users [12].

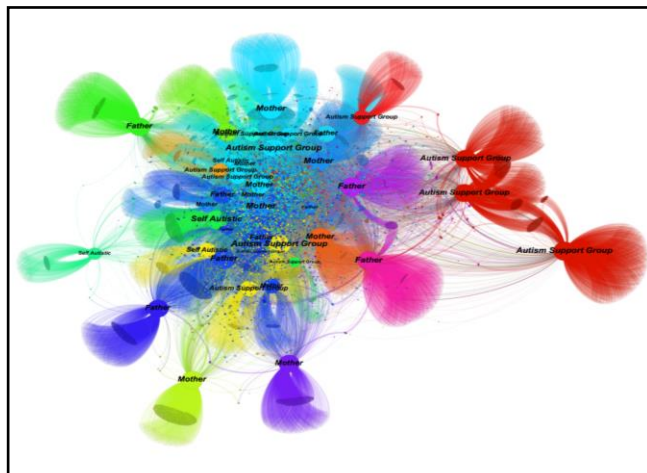


Figure 1. Friend and follower network of autism blogger community. Colors indicate different communities based on the network modularity.

The modularity of the Twitter network of autism bloggers is 0.623, which indicates that the community is well connected. The network is partitioned into 22 communities using Chinese whisper clustering algorithm [13]. The top hashtags of the autism blogger network are ‘autism’, ‘autismawareness’, ‘autismhoops’ and ‘specialneeds’ that indicate the network is highly focused on autism-based discussions. Wordpress, a very well-known platform for blogging, along with blogspot.com are found to be the top domains shared among tweets. Overall analyzed metrics of the Twitter friends and followers network is shown in Table 1. The tweets content of the autism bloggers found to be involved in many topics related to autism and the aim of the autism community bloggers’ Twitter network seems to be spreading autism awareness.

TABLE 1. OVERALL TWITTER DATA CHARACTERISTICS OF THE AUTISM BLOGGER COMMUNITY NETWORK.

Metric	Friends and Followers Network	Metric	Friends and Followers Network
Number of users	48030	Out-Degree	2011 (Max), 1.137 (Average)
Total Edges	98099	Connected Components	1 with 35787 Maximum Vertices
In-Degree	2018 (Max), 1.88 (Average)	Geodesic Distance (Diameter)	5 (Max), 3.408 (Average)

Tweets collected and analyzed for the study shows signs of sentiments associated. "I also really liked this positive post from about when and how to tell kids about their autism diagnoses", "The study means we are one step closer to understanding how one of the key components of autism happens in the brain" are some of the examples of tweets with positive sentiments.

Based on the author characteristics of the autism bloggers and choice of social media platform, the positive sentiment in the text varies. LIWC provides the baseline values for the control writing, science articles and conversation medium.

Chuang and Yang [14] in their study on online alcohol community found the presence of social support. Based on Chung and Yang [14] work we used the social support provided by the alcohol support forum as the baseline value to infer the presence of social support.

Major findings: Our study found average positive feeling of autism blogs is much higher as compared to another support forum like alcohol support community or by the general conversation medium. Moreover, mother of an autistic kid shows much more positive emotion on Twitter as compared to the father of an autistic child or autistic bloggers. For the autism support forum, the negative sentiment was evaluated to be a lot lower as compared to control writing and science articles. The negative attitude was quite higher for the father of an autistic kid, as compared to other categories of bloggers (i.e., mother and autistic bloggers).

Social support provided by the textual interaction was estimated using the scores of assent, positive sentiment, and social process in the text content. Our study found that in Twitter, mothers of autistic kids provide the maximum amount of social support as compared to other autism blogger categories. The autism bloggers’ community in Twitter and blogs as a whole provided high social support as compared to other forms of text writing such as emotional writing, scientific articles, etc. Further, social support provided by talking or verbal communication is quite higher as compared to all other modes of communication, including online forums and social media. This finding demonstrates that there is no substitute for the verbal communication medium. However, social media and other online communication media could possibly fill the gaps, wherever verbal communication with an expert is instantly unavailable.

V. DISCUSSION

The study sheds light on characteristics of social support provided by online support community of autism on the different social media platform. The social support provided by interactions within autism blogger community by identifying the bloggers and the community members was unfolded in the study.

The tightly knit interaction within the autism blogging community was revealed in our study. Members of the autism community provide extensive social support to its members, by sharing information and extending emotional support. Members of the autism bloggers community in Twitter and blogs provide high social support as compared to other health groups like alcohol support forum.

For the tweets of the mothers, the amount of social support provided is higher than fathers or autistic bloggers with a given amount of positive emotion, but the ratio is highest in verbal communication as compared to any written text interaction. Figure 2 shows the variation of social support with positive emotion. Verbal communication provides the maximum amount of social support for a given value of positive emotion in contrast to other communication modes.

Statistical analysis of our model for social support determination based on various psychological groups of LIWC scores shows impressive results. For the mother and father with autistic kids, the value of social support provided given the score of positive emotion came out to be statistically significant ($p \leq 0.001$). Positive emotion is highly correlated with social support. Figure 2 also depicts the high correlation between positive emotion and social support. The correlation, however, is not monotonically increasing, which means beyond a certain degree of positive emotion, social support provided is unchanged.

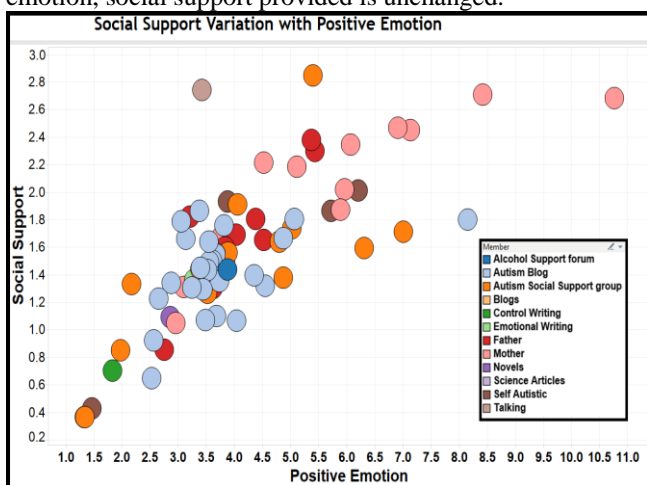


Figure 2. Social support variation with positive emotion. Vertical Axis shows the amount of Social Support and Horizontal axis represents positive emotion. Each circle represents a data point.

VI. CONCLUSION

In this research, we study the online social support provide by interaction among members of the autism blogger community in different social media platforms. The study extracts blogging activity of popular autism blogger and their Twitter activity including their friends, followers, tweets, retweets, mentions, and hashtags information. The tightly knit interaction within the autism blogging community was identified in our study. Our study found that Autism blogger community provides extensive social support to its community members in different social media platforms, especially on Twitter. The autism community members share a feeling of solidarity by providing support to other community members empathetically on social media. While negative sentiments are reflected in some tweets, the social support contributed by the autism blogger community overwhelmingly outweighs the negativity.

Social support provided by autism bloggers varies based on blogging characteristics and social media platform. Whether bloggers influence played a role in evoking social support within the readers/audience is an interesting question, which could be studied. Agarwal et al. [15] in their research suggested that influential bloggers are more likely to encourage discussions among the community members through comments in blogs or retweets in Twitter.

We envision our study will provide a mechanism to access social support in online health communities. However, the fact that autism bloggers also use other social

media platforms, such as Facebook presents a limitation in our study. The findings of this study lay the groundwork to study our bigger research agenda, i.e., evaluating the efficacy several of therapies for ASD as perceived by the caregivers through the experiences they have shared in online forums and social media. This will help build a knowledge base for interventions and experiences, which in turn could assist the clinical research in better understanding of behavioral interventions for various health disorders.

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