Beyond Brain Fog: A Social Listening Analysis of Impaired Cognitive Functioning In Sleep Disorders

Maurice Flurie¹, Zachary Cline¹, Anne Marie Morse², Matthew Horsnell⁸, Jennifer Gudeman³, Lauryn Craine¹, Luis E. Ortiz⁴, Frederick Ascencion⁵, Diana Kimmel⁶, Puja Shah⁷, Shannon Burkoth⁸, Juliana Angelim Neves⁹, Jennifer M. Mundt^{10,11}, Christopher DeFelice¹, Maria Picone¹

¹ TREND Community Philadelphia, Pennsylvania, USA
² Geisinger, Janet Weis Children's Hospital, Geisinger Commonwealth School of Health Sciences, Danville, Pennsylvania, USA
³ Avadel Pharmaceuticals, Chesterfield, Missouri, USA
⁴ Johns Hopkins Medical Institutions, Johns Hopkins All Children's Hospital, St. Petersburg, Florida, USA
⁵ PWN4PWN, Tampa, Florida, USA
⁶ Hypersomnia Foundation, Atlanta, Georgia, USA
⁷ Sam Houston State University College of Osteopathic Medicine, Conroe, Texas, USA
⁸ Project Sleep, Los Angeles, California, USA
⁹ Brazilian Association of Narcolepsy and Idiopathic Hypersomnia, Salvador of Bahia, Brazil
¹⁰ Department of Neurology, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA
¹¹ Center for Circadian and Sleep Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA



#377

BACKGROUND

RESULTS

To best support a rare disease community, it is imperative to understand their unique symptoms and challenges.

In recent years, the experience of "brain fog" has been discussed across sleep-disorder communities, including narcolepsy and idiopathic

Figure 1a: Overall Brain Fog Mentions Over Time



Figure 1b: Brain Fog Mentions Over Time, by Term



hypersomnia (IH).

The term "brain fog" is a vague descriptor that is likely interpreted differently by both patients and clinicians.

We explored experiences with brain fog across sleep communities.

The primary goal was to identify self-reported cognitive challenges associated with brain fog and their impacts on daily living.

MATERIALS AND METHODS



We analyzed conversations in 2 online sleep disorder communities: narcolepsy (a private Facebook group, *PWN4PWN*; and a public subreddit, *r/narcolepsy*) and IH (a public subreddit, *r/idiopathichypersomnia*). This collectively resulted in 355,058 posts/comments. Figure 1a shows "brain fog" mentions experienced the largest increase from 2014-2017. There was a small increase in brain fog mentions in 2021-2022, potentially due to the increase in the term during the COVID-19 pandemic. Figure 1b shows the relative increase of "brain fog" vs. other "fog" terms. "Brain fog" and "fog/fogginess" are becoming the consensus terms for this symptom within the sleep community.



Separating the corpus into those posts/comments that discussed brain fog and those that did not, the association between mentions of brain fog and mentions of other clinical concepts was measured by odds ratio. The concept most associated with brain fog was "memory impairment". Another strongly associated cognitive concept included "inattention". Sleep-related concepts (e.g., "sleep drunkenness") were also associated with brain fog.





Amongst the topics in conversations discussing

with 325 posts/comments and the smallest was

"workplace & accommodations" with 53

"brain fog", the largest topic was "memory issues"

Posts/comments were explored using a natural language processing (NLP) engine designed to recognize and categorize clinical language on social media.

Conversations mentioning brain fog (e.g., "brain fog", "mental fogginess", etc.) across communities were isolated for analysis. This included 5,384 posts/comments from 2011-2023.

Odds ratios were calculated to identify clinical concepts associated with brain fog conversations (vs other conversations). Last, conversations were subjected to topic modeling, a process which reveals common conversational themes in community discussions.

CONCLUSION



Across sleep communities, brain fog experiences preceded the COVID-19 pandemic, with a substantial increase in mentions before 2020.

posts/comments.

Brain fog conversations were significantly associated with memory and attention difficulties, similar to other disorders. However, the association with sleep-related concepts may be unique in this patient group.

These findings suggest brain fog may impact certain mental processes more than others and may be exacerbated by—or at least perceived to be exacerbated by—poor sleep quality.

The daily impact of brain fog was elucidated by conversations centering around school and workplace experiences.



Beyond Brain Fog: A Social Listening Analysis of Impaired Cognitive Functioning In Sleep Disorders

Maurice Flurie¹, Zachary Cline¹, Anne Marie Morse², Matthew Horsnell⁸, Jennifer Gudeman³, Lauryn Craine¹, Luis E. Ortiz⁴, Frederick Ascencion⁵, Diana Kimmel⁶, Puja Shah⁷, Shannon Burkoth⁸, Juliana Angelim Neves⁹, Jennifer M. Mundt^{10,11}, Christopher DeFelice¹, Maria Picone¹

¹TREND Community Philadelphia, Pennsylvania, USA

²Geisinger, Janet Weis Children's Hospital, Geisinger Commonwealth School of Health Sciences, Danville, Pennsylvania, USA

³Avadel Pharmaceuticals, Chesterfield, Missouri, USA

⁴Johns Hopkins Medical Institutions, Johns Hopkins All Children's Hospital, St. Petersburg, Florida, USA

⁵PWN4PWN, Tampa, Florida, USA

⁶ Hypersomnia Foundation, Atlanta, Georgia, USA

⁷Sam Houston State University College of Osteopathic Medicine, Conroe, Texas, USA ⁸Project Sleep, Los Angeles, California, USA

⁹Brazilian Association of Narcolepsy and Idiopathic Hypersomnia, Salvador of Bahia, Brazil ¹⁰Department of Neurology, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA

¹¹Center for Circadian and Sleep Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA

Words: 349 (350 max)

INTRODUCTION

To best support a rare-disease community, it is imperative to understand the unique symptoms and challenges associated with their condition. In recent years, the experience of "brain fog" has been discussed across sleep-disorder communities, including narcolepsy and idiopathic hypersomnia (IH); however, the term "brain fog" is a vague descriptor that might represent several experiences. Here, we explored experiences with brain fog across sleep communities. The primary goal was to identify cognitive challenges associated with brain fog. Impacts on daily living were also characterized.

METHODS

We analyzed conversations in 2 online sleep disorder communities: narcolepsy (a private Facebook group, *PWN4PWN*; and a public subreddit, *r/narcolepsy*) and IH (a public subreddit, *r/idiopathichypersomnia*). Posts/comments were explored using a natural language processing (NLP) engine designed to recognize and categorize clinical language on social media. Conversations mentioning brain fog across communities were isolated for analysis. Odds ratios were calculated to identify clinical concepts associated with brain fog conversations (vs other conversations). Last, conversations were subjected to topic modeling, a process which reveals common conversational themes in community discussions.

RESULTS

Narcolepsy and IH communities contributed 355,028 posts/comments from 2011-2023. The NLP engine extracted concept mentions across communities. Brain fog mentions experienced the largest increase from 2014-2017. The concept most associated with brain fog was "memory impairment". Another strongly associated cognitive concept included "inattention". Sleep-related concepts (e.g., "difficulty sleeping") were also associated with brain fog. Topic analysis showed converging support for these findings by identifying topics such as "memory issues" and "ADHD". Topics related to daily living included "school" and "workplace".

CONCLUSIONS

The experience of brain fog is shared across multiple sleep communities. In both narcolepsy and IH groups, brain fog experiences preceded the COVID-19 pandemic, with a substantial increase in mentions before 2020. Brain fog conversations were significantly associated with memory and attention difficulties, similar to other disorders. The association with sleep-related concepts appears to be unique in this patient group. These findings suggest brain fog may impact certain mental processes more than others and may be exacerbated by poor sleep quality. The daily impact of brain fog was illustrated by conversations centering around school and workplace experiences.