

Bridging Human Insight and AI: A Comparative Study of Neurodivergent Workplace Experiences through Large Language Models and Manual Coding

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This research aims to explore the diverse experiences of neurodivergent individuals, particularly those with Attention Deficit Hyperactivity Disorder (ADHD), within workplace environments. By analyzing a dataset of 57,000 Reddit posts published from 2020 to 2023, this study investigates the challenges, stigma, and discrimination these individuals face, as well as their engagement with technology for social communication and support. A comparison of GPT-4 and PaLM Large Language Models (LLMs) with manual coding is used to explore the nuances of neurodivergent experiences in professional settings, how technology contributes to support, and how effective LLMs are at identifying and categorizing these experiences compared to human coders.

1 INTRODUCTION

Neurodivergent individuals often navigate unique challenges in the workplace, including but not limited to stigma, discrimination, and difficulties in social communication [3, 4]. In addressing the complex challenges faced by neurodivergent individuals in the workplace, this study leverages the cutting-edge capabilities of Large Language Models (LLMs), specifically GPT-4 and PaLM. By employing these models to analyze a large dataset of personal experiences shared on Reddit, we aim to systematically uncover the nuanced experiences of neurodivergent individuals. This innovative approach not only enhances the scalability of our analysis but also enables a comparison of the efficacy and insights provided by AI-driven and manual coding methods.

2 METHODOLOGY

Utilizing the advanced natural language processing capabilities of GPT-4 and PaLM, this study aims to analyze and understand the complex narratives shared by neurodivergent individuals on Reddit. GPT-4 [1], developed by OpenAI, is renowned for its deep understanding of natural language, enabling it to interpret and categorize vast amounts of unstructured text data with remarkable nuance. Similarly, PaLM [2], a model developed by Google, stands out for its ability to generate, understand, and translate languages, making it particularly adept at analyzing diverse narratives and sentiments. These models' unique strengths in language comprehension and sentiment analysis allow for a nuanced exploration of the lived experiences of neurodivergent employees in the workplace.

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2.1 Data Collection

We extracted 57,000 Reddit posts using inclusion keywords such as "job," "workspace," "workplace," and "employment." The posts dated from 2020 to 2023. This comprehensive dataset serves as the foundation for our analysis, providing a wide array of narratives that reflect the varied experiences of neurodivergent individuals who use Reddit and discuss about professional settings. To ensure the relevance and specificity of our dataset, we employed a two-tiered filtering process. Initially, we extracted Reddit posts using a set of strategically chosen keywords related to employment, such as "at work," "workplace," and "job." This step was aimed to gather a broad pool of data, encompassing a wide range of discussions potentially relevant to neurodivergent experiences in professional settings.

Following the initial keyword-based extraction, we utilized OpenAI's GPT API to further refine the dataset. We developed a specific prompt for the GPT model, asking it to assess whether each post was explicitly related to workplace and job contexts. This additional layer of AI-driven filtering allowed us to focus on content directly pertinent to our study's aims, significantly enhancing the relevance of the data. Through this method, we successfully narrowed down the pool to 29,077 posts that explicitly discussed workplace-related themes from the perspective of individuals potentially experiencing ADHD. This refined dataset forms the basis of our analysis, ensuring that our findings are grounded in genuinely relevant narratives.

2.2 Data Analysis

For a comparative approach we combined automatic coding using LLMs and Manual coding.

2.2.1 Automatic Coding with LLMs. : "Employing the GPT-4 and PaLM models, we automatically classify posts according to predefined themes and questions. The sample themes such as 'ADHD challenges in the workplace', 'the use of technology for mental health support', and 'the need for workplace accommodations' were initially identified through a subset analysis of 1,600 Reddit posts in our prior study [5]. Building on this foundational work, we continued the analysis by refining our thematic codebook by three researchers. This codebook was then adapted into specific prompts for the LLMs, ensuring that the AI analysis aligned closely with the nuanced categories we identified manually.

2.2.2 Manual Coding. : To ensure the validity of our findings, a team of researchers will manually code a subset of the data based on the codebook we used for the automate coding. This process allows us to validate the classifications made by the LLMs, ensuring that the nuances of neurodivergent experiences are accurately captured. Manual coding also serves as a benchmark for evaluating the effectiveness of the LLMs in understanding and categorizing complex human experiences.

2.2.3 Comparative Analysis. : A key aspect of our methodology is the comparative analysis between labels generated by LLMs and those derived from manual coding. This comparison will allow us to assess the reliability and accuracy of LLMs in qualitative research, particularly in the context of studying neurodiversity in the workplace. By identifying areas of agreement and discrepancy, we can refine our analytical models and improve the precision of AI-driven analyses in future studies.

This methodological approach allows us to leverage the power of AI to understand the complexities of neurodivergent experiences in the workplace, while also grounding our analysis in the rigor of traditional qualitative research methods.

3 RESULTS

The study seeks to answer several questions, categorized into three main sections:

- **Challenges and Supports:** What are the specific workplace challenges faced by individuals with ADHD? How is technology used by them to access mental health resources and support?
- **Technology and Productivity:** How is technology employed to track work progress and manage ADHD symptoms? What are the apps and tools mentioned?
- **Perception and Integration:** How or what they discuss overcoming workplace obstacles? What are the shared experiences regarding job complexities, task preferences, and perceptions of job coaches?

Next, we provide some examples of the posts from the dataset, as well as the sample questions submitted to the LL models.

3.1 Reddit Post Example

An example of a post from a user discussing their experience with ADHD and its impact on their life and work:

“Hi everyone. I’ve realized that I have ADHD, diagnosed alongside anxiety and depression at 15. I was initially on Concerta, but stopped due to severe nausea. Despite my academic success and organizational skills, accepting my ADHD was hard. Recently, working with a colleague who’s open about her ADHD made me reconsider my stance. Her habits mirror mine, yet she manages her ADHD proactively. This conversation made me reflect on my own struggles, especially my current depressive episode, which seems like a result of years of overcompensation and burnout. At 25, I’m doing okay job-wise, maintain my home, and take care of my basic needs, but that’s where my energy ends. I’m questioning if medication is necessary since I’m managing, yet everything feels increasingly overwhelming. Is it common for coping to become more difficult with age?”

Analysis Questions	GPT-4 Responses
What challenges related to ADHD are mentioned in the post?	The user mentions exhaustion and difficulty in managing daily activities as major challenges, which suggests a struggle with ADHD-related symptoms.
Are there any mentions of the workplace or content related to job or employment?	Yes, the user discusses their job performance and the coping mechanisms they have developed, which indirectly relate to their workplace.
Do any posts or comments mention technology being used to track progress or measure productivity at work?	No, there is no mention of using technology to track progress or productivity in the workplace.
What keywords can be identified in a post that would help to determine the main subject or topic being discussed?	Keywords such as ADHD, medication, exhaustion, coping, and workplace are relevant to the main subject of the post.
Is the person who shared the post speaking in the first person or sharing someone else’s experience?	The user is speaking in the first person about their own experiences.

At what age were they diagnosed with ADHD?	The user states they were diagnosed at the age of 15.
Do they talk about their relationship with coworkers and, if so, what is the main topic and sentiment?	The user mentions a coworker positively, discussing their own ADHD in relation to their coworker's openness about her ADHD. The sentiment is one of camaraderie and shared experience.
Is there any mention of a specific medication?	Yes, Concerta is mentioned as the medication prescribed for ADHD.
Is there any talk about the side effect of any specific medication?	Yes, the user mentions stopping Concerta due to experiencing bad nausea.

Table 1. Sample of GPT-4 responses to analysis questions

4 DISCUSSION

In this research, employing Large Language Models (LLMs) like GPT-4 and PaLM offered advantages, particularly in the scalability and efficiency of processing large data volumes. LLMs provide consistency in data analysis, minimizing human error and interpretation biases. However, these models also present limitations, particularly in understanding context and nuances compared to human analysis, which can be pivotal when interpreting posts with sarcasm or subtle emotional cues. Regarding validity and future potential, the study faces threats like selection bias from keyword-based post selection and subjective biases in the initial creation of the codebook used for theme definition. These factors could limit the generalizability of the findings and influence data classification by both human coders and LLMs. Ethically, the research necessitates careful handling of privacy and anonymity when using public posts from platforms like Reddit.

5 CONCLUSION

This research contributes to the understanding of neurodivergent experiences in professional settings, highlighting the potential of LLM as a supportive mechanism. By analyzing discussions from an extensive dataset of Reddit posts, this research illuminates the real-world challenges and support mechanisms relevant to neurodivergent individuals, thereby offering valuable insights into improving their workplace integration and success. Our methodology, which combines the innovative use of Large Language Models (LLMs) like GPT-4 for data analysis with traditional manual coding, stands at the forefront of empirical research techniques. This dual approach not only enhances the rigor of our thematic analysis but also contributes to the theoretical understanding of neurodiversity in the workplace.

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