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SNS Use among Adolescents with Neurodevelopmental Disorders: Characteristics, Challenges, and Educational Implications

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Abstract

This study examines how adolescents with and without neurodevelopmental disorders differ in their use of Social Networking Sites (SNS). Individuals with ASD or ADHD tend to prefer interest-based platforms and one-way interactions, whereas neurotypical peers primarily use SNS to maintain offline relationships. Those with ASD or ADHD tend to prefer interest-based platforms and one-way interactions, while neurotypical peers use SNS mainly for maintaining offline relationships. The findings highlight the need for inclusive digital literacy programs in educational settings that accommodate diverse communication preferences.

Keywords: Adolescent, Neurodevelopmental Disorder, Social Networking Site (SNS), the Internet

1 Introduction

With the widespread use of smartphones and Social Networking Sites (SNS), online communication has become integral to adolescents' daily lives. Platforms such as LINE, Instagram, YouTube, and X serve as key tools for self-expression and maintaining relationships, especially when face to face interaction is limited. However, SNS use patterns vary depending on individual traits. Adolescents with neurodevelopmental disorders (NDDs) [1], such as ASD and ADHD, often engage with digital media differently than their neurotypical peers[2]. They may prefer interest-based, one-way content platforms and experience distinct challenges in online interaction. NDDs are lifelong conditions that affect communication, behavior, and learning. Co-occurrence of multiple diagnoses is common and often requires individualized educational support. Prior studies suggest that adolescents with these conditions are more likely to be passive information recipients and less engaged in reciprocal communication online. This study examines the frequency, mode, and psychological impact of SNS use among adolescents with and without NDDs. By identifying characteristic patterns, it aims to inform the development of inclusive digital literacy education and learning environments that better support neurodiverse students.

2 Previous Studies

2.1 Internet Use and ADHD

Neurodevelopmental disorders (NDDs), including ASD, ADHD, and learning disabilities, are lifelong conditions that affect cognitive, social, and behavioral functioning. In Japan, they are commonly grouped as “developmental disorders,” and awareness has increased across

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educational and clinical settings. Recent studies have shown a strong association between ADHD traits and problematic Internet use. Yen et al. [3], surveying over 2,000 adolescents, found that symptoms of ADHD and depression were particularly linked to Internet addiction. They noted that the fast-paced, highly stimulating nature of online platforms may attract individuals with ADHD due to tendencies toward inattention and impulsivity. Adolescents with depressive symptoms may also turn to online environments as a coping mechanism for offline social difficulties. These findings highlight the psychological mechanisms that may lead to excessive Internet use among neurodiverse youth and underscore the importance of digital literacy strategies that consider individual cognitive profiles.

2.2 Internet Use among Adolescents with ASD

Adolescents with Autism Spectrum Disorder (ASD) tend to favor passive and solitary digital media over interactive forms. Mazurek and Wenstrup [4] found that youth with ASD spent significantly more time watching TV or playing video games than engaging in non-screen or reciprocal activities. They rarely used social media or multiplayer games, likely due to core ASD traits such as social communication difficulties and sensory sensitivities. Davis et al. [5] also reported that parents of adolescents with ASD observed a strong preference for video games, which may serve as both a coping mechanism and a contributor to reduced offline engagement. These studies suggest that digital media use among youth with ASD reflects both behavioral comfort zones and social challenges, reinforcing the need for adaptive educational approaches that acknowledge such usage patterns.

2.3 Internet Use among Adolescents with NDDs in Japan

In Japan, studies have shown that adolescents with neurodevelopmental disorders (NDDs) face unique challenges in Internet and SNS use. Song et al. [6] reported that 12.9% of middle school students with ASD in psychiatric care met criteria for Internet addiction—over four times the general population rate. Despite this high risk, appropriate interventions remain underdeveloped. Shibata et al. [7] found that adolescents with NDDs used SNS less frequently than their peers, citing anxiety about delayed responses on platforms like LINE. Some reported panic or impulsive blocking behaviors. While online game use was higher, real-time competitive formats were often avoided in favor of offline, self-paced play. Platforms like Instagram were rarely used, perceived as favoring socially confident users. These findings suggest that SNS design can exacerbate stress for neurodiverse youth, even as their interest in digital media remains strong. This underscores the need for flexible support and inclusive digital environments that accommodate diverse emotional and cognitive needs.

2.4 Purpose of the Present Study

Building on prior research, this study hypothesizes that adolescents with neurodevelopmental disorders (NDDs) will show distinct Internet use patterns compared to their neurotypical peers. Specifically, they are expected to spend more time online and prefer passive, content-based platforms such as YouTube, while avoiding interactive SNS that demand reciprocal communication. These tendencies may reflect difficulties in offline relationships, sensory sensitivities, or attentional challenges. To test these hypotheses, the study conducts a comparative, quantitative analysis of adolescents with and without NDDs, focusing on usage time, platform preferences, and emotional impacts. Although exploratory, the findings aim to inform digital literacy programs and educational support strategies that accommodate neurodiverse needs.

3 Methods

This study conducted a web-based survey to examine Internet use among 634 adolescents (ages ~11–17) from Fukui Prefecture and across Japan. Participants were recruited via a nationwide panel (Macromill, Inc.), the Sakai City Board of Education, and the Hiratani Child Development Clinic. Adolescents with neurodevelopmental traits and their guardians were specifically targeted to ensure diverse representation.

3.1 Survey Items

The questionnaire, based on prior studies [8][9], included five main categories:
1. Daily Internet use time (weekdays vs. holidays)
2. Average sleep duration
3. Annual school (or work) absences
4. Frequently used websites and apps (SNS, video, games)
5. Diagnosis of neurodevelopmental disorders (ASD, ADHD, LD, etc.)

These variables allowed a multifaceted analysis of digital behavior and its psychological and social implications.

3.2 Web Survey Considerations

Web surveys offer broad reach but face challenges such as device access, literacy gaps, and response quality [10]. In this study, all respondents had daily Internet access and used it for both entertainment and learning, minimizing access bias. Nonetheless, limitations include reliance on self-reported diagnoses and behavior, which may introduce bias. Ethical approval was obtained from the Fukui University of Technology, and informed consent was secured from all participants. All data were anonymized prior to analysis.

4 Analysis

Data were collected from 634 adolescents, including 234 with and 400 without a reported diagnosis. Rather than classifying participants by diagnosis from the outset, we applied a data-driven clustering approach based on three behavioral variables: (1) daily Internet use time, (2) average sleep duration, and (3) annual school absences. This allowed us to identify distinct patterns without prior assumptions, reducing bias from sample imbalance as noted by Kato [2].

4.1 Numerical Data Analysis

K-means clustering was employed to group participants based on the above variables. To determine the optimal number of clusters, we used the Elbow Method, which identified $k = 3$ as the most appropriate solution (Figure 1). These clusters were then examined in relation to Internet use patterns and diagnostic status. This clustering strategy provided a framework for comparing behavioral tendencies across groups and assessing whether organically formed clusters aligned with diagnostic categories.

4.2 Text Data Analysis

To explore the variety of platforms used by adolescents, we collected free text responses about websites and applications. This open-ended format captured realistic, individualized patterns of Internet use, which may differ by age, region, or interest. A total of 634 valid responses were analyzed using KH Coder 3[11], a text mining tool designed for Japanese language data. This tool enabled systematic morphological analysis and helped identify usage trends in SNS and app preferences. To process informal or youth specific vocabulary common in digital contexts, we employed MeCab with the extended dictionary mecab-ipadic-NEologd, which enhances recognition of Internet era terms. The resulting analysis provided structured insights into qualitative differences across user groups.

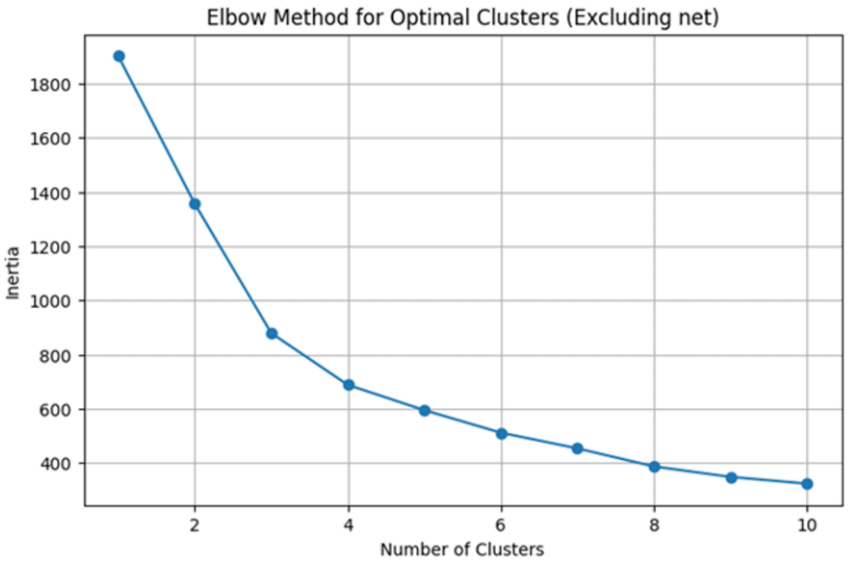

Figure 1: Elbow Method for Optimal Clusters

5 Results

5.1 Numerical Data Analysis Results

The results of the numerical data analysis are summarized in Table 1.

Table 1: Means of Internet use, absenteeism, sleep, and diagnosis by cluster

	Daily Internet Use (hours)	Annual Absences (days)	Sleep Time Duration (hours)	Diagnosis (0 = No, 1 = Yes)
Group0 (n=224)	3.52	7.22	7.79	1.00
Group1 (n=398)	3.62	3.75	7.58	0.00
Group2 (n=12)	4.54	152.58	7.2	0.83

5.2 Text Data Analysis Results

The results of the text data analysis are illustrated in Figure 2.

6 Discussion

6.1 Internet Use Time

The comparison of daily Internet use across clusters revealed that Group 2 (4.54 hours) > Group 1 (3.62 hours) > Group 0 (3.52 hours). However, the maximum difference among clusters was approximately one hour. Therefore, statistical significance must be evaluated carefully, and non-parametric methods may be necessary for more robust analysis.

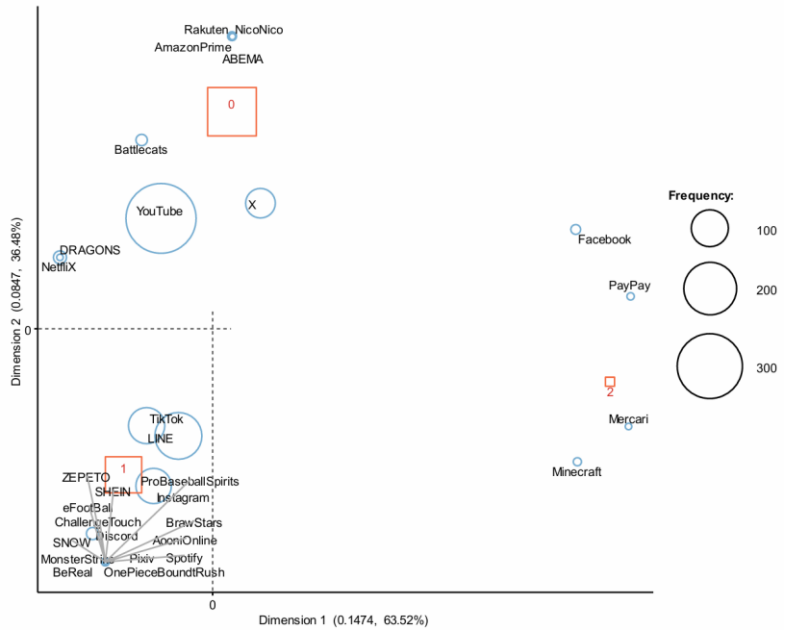

Figure 2: Correspondence Analysis

6.2 Annual Absences

In terms of annual school absences, Group 2 showed a substantially higher mean of 152.58 days, indicating a likely case of long term absence or school refusal. Meanwhile, Group 0 (7.22 days) showed more absences than Group 1 (3.75 days), suggesting a possible association between diagnosed neurodevelopmental disorders and school absenteeism. Due to large variance, the significance of these differences must be interpreted cautiously.

6.3 Sleep Duration

The comparison of sleep duration revealed minimal differences among the three clusters, with averages ranging from 7.2 to 7.79 hours. This implies that sleep duration may be less influenced by the clustering variables and could be more dependent on individual or

environmental factors not captured in this study.

6.4 Diagnostic Status

Group 0 was entirely composed of individuals with a diagnosis (1.00), Group 1 included none with a diagnosis (0.00), and Group 2 had a high diagnostic rate (0.83). These findings suggest that diagnostic status may be linked to Internet use patterns and absenteeism and offer foundational insight into understanding educational and media engagement among neurodiverse youth.

6.5 SNS Use by Cluster

The correspondence analysis results indicate distinct Internet use patterns between youth with and without neurodevelopmental diagnoses.

6.5.1 *Cluster 0 – Diagnosed Group*

Adolescents in Cluster 0 displayed strong preferences for video streaming services and games, such as YouTube, Netflix, Fortnite, Roblox, and Amazon Prime. They showed limited use of interactive SNS platforms like TikTok, Instagram, and LINE, suggesting a preference for one-way content consumption over real-time communication.

6.5.2 Cluster 1 – Non-Diagnosed Group

Adolescents in Cluster 1 actively engaged with two way interactive platforms such as TikTok, Instagram, LINE, Discord, and Spotify. These tools emphasize real-time communication and expression, indicating a tendency among this group toward dynamic interpersonal engagement.

6.5.3 Cluster 2 – High Absenteeism Group

Cluster 2 was marked by a unique profile, with heavy use of platforms like Mercari and Minecraft. The presence of economic or transactional activity and a preference for self-paced digital experiences may reflect tendencies toward social withdrawal or disengagement from structured settings.

7 Limitations and Future Directions

This study revealed clear differences in Internet usage patterns between adolescents with and without neurodevelopmental disorders. In particular, significant variation was observed in how SNS and online content were utilized. Future research should further examine how digital media use affects adolescents' psychological and social development. Moreover, it is essential to develop and implement targeted support strategies that promote safe and adaptive Internet use in both educational and home settings. As discussed in the introduction, Internet usage may differ not only based on the presence or absence of a neurodevelopmental diagnosis but also depending on the specific type of disorder. For instance, adolescents with ADHD may be more drawn to highly stimulating or extreme content, while those with ASD

may have difficulty interpreting the subtleties of text-based communication, potentially resulting in misunderstandings or online conflicts. In light of these considerations, future studies should aim to clarify how Internet use varies according to specific neurodevelopmental diagnoses, thereby contributing to more nuanced and effective support systems for diverse adolescent populations. However, comorbidity between ADHD and ASD is frequently observed in clinical contexts (e.g., Okada et al., 2024 [12]), and was also present in our dataset. As a result, the proportion of adolescents with pure ASD or ADHD remained limited. Future studies should increase the sample size to enable reliable subgroup comparisons by diagnosis. In addition to clinical relevance, this study offers important educational implications. The observed variation in digital media preferences and interaction styles among neurodiverse adolescents suggests that educational settings must adapt to accommodate these differences. Designing inclusive digital literacy programs and classroom practices that recognize communication diversity can help foster more supportive learning environments for students with neurodevelopmental conditions. Designing inclusive digital literacy programs and classroom practices that recognize communication diversity can help foster more supportive learning environments for students with neurodevelopmental conditions.

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References

[1] American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), Washington, DC: APA, 2013.

[2] C. Kato, “Internet Use among Adolescents with Neurodevelopmental Disorders,” presented at the 31st Symp. Social Information Systems, 2025. [Online]. Available: http://sig-iss.work/iss31/1-5.pdf

[3] J.-Y. Yen, C.-H. Ko, C.-F. Yen, H.-Y. Wu, and M.-J. Yang, “The comorbid psychiatric symptoms of internet addiction: Attention deficit and hyperactivity disorder (ADHD), depression, social phobia, and hostility,” J. Adolesc. Health, vol. 41, no. 1, pp. 93–98, 2007.

[4] M. O. Mazurek and C. Wenstrup, “Television, video game and social media use among children with ASD and typically developing siblings,” J. Autism Dev. Disord., vol. 43, no. 6, pp. 1258–1271, 2013.

[5] K. Davis, A.-M. Iosif, C. W. Nordahl, M. Solomon, and M. K. Krug, “Video game use, aggression, and social impairment in adolescents with autism spectrum disorder,” J. Autism Dev. Disord., vol. 53, no. 9, pp. 3567–3580, 2022.

[6] R. Song, K. Makino, M. Fujiwara, T. Hirota, K. Oshige, S. Ikeda, M. Tsubouchi, and M. Inagaki, “Screening and intervention needs for internet addiction comorbid with autism

spectrum disorder," Jpn. J. Psychiatry Neurol., vol. 121, no. 7, pp. 556–561, 2019.

[7] M. Shibata, Y. Hirai, and S. Takahashi, "Current status and challenges of SNS use among children and youth with developmental disabilities: Insights from a self-advocate survey," SNE J., vol. 26, no. 1, pp. 103–116, 2020.

[8] C. Katayama (same author as C. Kato), Why Girls Seek Connections Online: Analyzing Female Encounters via the Internet. Tokyo: Seikyusha, 2022.

[9] Children and Families Agency, Government of Japan, Survey on the Internet Use Environment of Japanese Youth, 2025. [Online]. Available: https://www.cfa.go.jp/policies/youthkankyou/Internet_research/results-etc.

[10] T. Miwa, K. Ishida, and A. Shimosegawa, "Opportunities and challenges of Internet-based surveys in the social sciences," Sociol. Rev. Jpn., vol. 71, no. 1, pp. 29–49, 2020.

[11] K. Higuchi, "Quantitative analysis of text-based data: Clarifying and integrating two approaches," Sociol. Theory Methods, vol. 19, no. 1, pp. 101–115, 2004.

[12] T. Okada, T. Sotodate, M. Ogasawara-Shimizu, and N. Nishigaki, "Psychiatric comorbidities of attention deficit/hyperactivity disorder in Japan: a nationwide population-based study," Frontiers in Psychiatry, vol. 15, Sec. ADHD, Article 1359872, Oct. 2024.