

# Analyzing the Relationships Between Internet Usage, Social Skill, and Anxiety Severity in Adults with Autism Spectrum Disorder

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## SUMMARY

The use of social media in adults with Autism Spectrum Disorder (ASD) is not very well understood. Online communication may provide these individuals with the opportunity to interact with others without having to engage in face-to-face conversation or interpret nonverbal social cues, which is often a challenge for this population. The goal of the Socialization Education and Learning for the Internet (SELI) study is to understand how adults with ASD utilize social media platforms to build relationships and to teach them how to act appropriately online. Specifically, this project compares anxiety levels and social skills between adults with ASD who spend different amounts of time on the Internet to observe the potential relationships between online communication frequency, anxiety, and social interaction. Based on current literature, we hypothesized that Internet usage would have beneficial effects, reducing anxiety and improving social skills in these adults. We found that a higher frequency of Internet usage correlated with less severe anxiety symptoms but did not have a significant relationship with the social skills of adults with ASD. This research furthers the SELI project, which will observe the consequences of social media usage in those with autism. Depending on the results of this study, we also aim to determine whether social media could possibly become a new intervention technique used to decrease anxiety in adults with ASD.

## INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that affects social communication and behavior. Individuals diagnosed with ASD may experience numerous challenges with social interaction that can hinder their ability to succeed in social situations. As a result, people with ASD have a difficult time forming and maintaining friendships, which can then lead to significant loneliness. Many intervention techniques, such as cognitive behavioral therapy (CBT) and applied behavior analysis (ABA), have been established to enhance social development in this population. However, none of these intervention tactics explicitly target the realms of online communication and social media usage, which can enhance the quality of existing relationships in individuals with autism and decrease loneliness (1).

Individuals with ASD also struggle with nonverbal social

cues, such as recognizing facial expressions and emotions, resulting in difficulty making friends and interacting with others. However, it has been previously demonstrated that the use of social media was significantly associated with high friendship quality in adolescents with autism, which was moderated by the adolescent's anxiety levels. As individuals with ASD get older and more aware of social difficulties, they are at an increased risk for social anxiety. Research results indicate that social media usage is not related to perceived loneliness (2). However, having more friends and closer relationships is significantly associated with a decrease in loneliness (2). Research has also suggested that adults with ASD who were active on social networking sites had a higher chance of developing close friendships and improving their social functioning, making electronic social media a particularly attractive form of social interaction for those with ASD (1).

Anxiety, in particular, is commonly experienced by individuals with ASD. It is hypothesized that anxiety in these individuals might stem from impaired emotional regulation (ER), a characteristic that is ubiquitous in ASD (3). ER is a person's ability to effectively manage and respond to an emotional experience, and having poor ER could make it harder for one to control intense, usually negative, feelings (4). Impaired ER may explain many common behavioral problems faced by children and adults with ASD, such as aggression, irritability, and anxiety (5).

The present study specifically uses data collected from those with high functioning autism (HFA) or Asperger syndrome (AS). These individuals usually possess high verbal ability and average or above average IQs but have difficulty with nonverbal aspects of social communication. In past studies, those with HFA or AS felt more comfortable interacting over the Internet rather than in person (6). This form of communication seemed to be less stressful for these individuals, and they felt less pressured because of the increased amount of time they had to formulate a proper response. They also experienced having more control over the situation and how they wanted the conversation to progress.

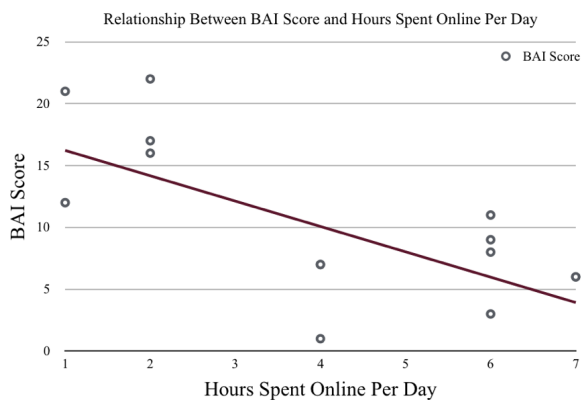
By comparing anxiety levels and social skills between adults with ASD who spent different amounts of time online, we hoped to understand the relationships between online communication frequency, anxiety, and social interaction. This study will contribute to furthering the Socialization Education

and Learning for the Internet (SELF-I) study and will observe the consequences of social media usage. Depending on the results of this study, we also aim to determine whether social media could possibly become a new intervention technique used to decrease anxiety in adults with ASD. If social media can be used as an intervention, it will be easier, cheaper, and more accessible for those with autism. Current intervention options, like Applied Behavioral Analysis can cost anywhere from \$15,000 to \$50,000 according to the Centers for Disease Control. We hypothesize that spending time online would lessen anxiety severity and improve social skills in adults diagnosed with ASD.

**RESULTS**

**Internet Use and Anxiety Levels**

Is an increased usage of the Internet associated with a decrease in the anxiety levels of adults with HFA? The Beck Anxiety Inventory (BAI) (7) was administered to participants prior to receiving treatment from the center. After recording the total hours spent online and the corresponding BAI score for each participant, the data was analyzed using SPSS analysis. Results indicated that anxiety levels and hours spent on the Internet were inversely correlated (Figure 1). A bivariate correlation, which determines the existence of relationships between two different variables, was then run and revealed that the correlation was significant (Table 1).



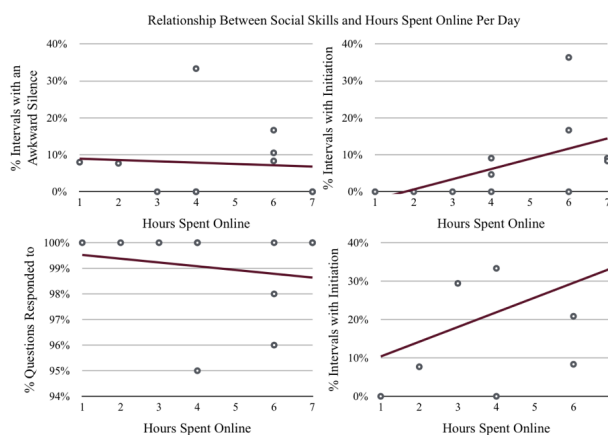
**Figure 1:** Relationship between Beck Anxiety Inventory (BAI) score and hours spent online. An increase in Internet usage is associated with a decrease in anxiety severity.

Bivariate Correlation Between Internet Usage and Anxiety Severity			
		BAI Score	Hours Spent on Internet
Hours Spent on Internet	Pearson Correlation	-.560*	1
	Sig. (2-tailed)	0.024	
	N	16	17

**Table 1:** Pearson's correlation between Internet usage and anxiety severity. The correlation between Internet usage and decreased anxiety severity is significant (P < 0.05), meaning that an increased amount of time spent online may be associated with a decreased anxiety symptoms. \* Correlation is significant at the 0.05 level (2-tailed).

**Internet Use and Social Skill**

To determine whether an increased amount of time spent online resulted in better social skills for adults with ASD, we ran a bivariate correlation with hours spent on the Internet, the percentage of 30-second intervals during which the participant asked a question, the percentage of questions the participant responded to, the percentage of 30-second intervals with a silence of four seconds or longer, and the percentage of 30-second intervals during which the participant expressed an initiation, all of which were documented from watching videos of the participant conversing with a center clinician (Table 2). The results indicated that the correlation between hours spent online and social skill was not significant (P > 0.05) (Table 2).



**Figure 2:** Relationship between social skills (questions responded to, intervals with a question, awkward silences, and intervals with initiation) and hours spent online. There is no significant relationship between increased Internet usage and improved social skills.

Bivariate Correlation Between Internet Usage and Social Skills					
	Hours Spent on Internet	% Intervals with a Question	% Questions Responded to	% Intervals with a Prolonged Silence	% Intervals with Initiation
Hours Spent on Internet	1	0.367	-0.161	-0.070	0.510
		0.267	0.636	0.838	0.090
	N	17	11	11	12

**Table 2:** Pearson's correlation between Internet usage and social skills. The correlations between Internet usage and improved social skills is not significant (P > 0.05), meaning that there is no strong association between an increased amount of time spent online and an improvement regarding questions asked, questions responded to, prolonged silences, or initiations.

**DISCUSSION**

This was the first study to examine the possible relationships between Internet use, anxiety levels, and in-person social interaction skills in adults with ASD. The results of this study suggested that use of the Internet is associated with decreased anxiety severity in adults with ASD but not with an ability to socialize appropriately. As anxiety is one of the most common co-occurring psychiatric conditions in

individuals with ASD, results from this study suggested that the Internet could be a tool utilized to combat that experience (8). The conclusions drawn from this study also supported the exploration of a social media-based intervention in adults with ASD. Eleven out of the 17 participants (64.71%) in this study reported some type of social media use (Twitter, Instagram, Snapchat, YouTube, etc.). This finding is consistent with usage in the general adult population as described in recent reports (11-13). Social media might be a more convenient way for those with ASD to interact with their peers in a less socially challenging environment. Social media and electronic communication tools can be used to enhance the quality of existing relationships in typical adolescents without reducing the amount of face-to-face interaction, thus decreasing loneliness (2).

The results of this study did not provide evidence of a relationship between Internet usage and social skill improvements. These results may be because our sample size was relatively small and did not encompass the full spectrum of ASD. Furthermore, the social skills that we observed may not have been the ones affected by the Internet. These results may seem to undermine the benefits that the Internet can have on adults with autism, but the overarching goal of the project is to improve the quality of life of these individuals rather than targeting one specific aspect of improvement. Because the dependent variable encompassed all forms of Internet usage and wasn't limited strictly to using the Internet for communication, the results from this study prompt further investigation of the social effects of increased online communication. While increased Internet usage did not have a significant correlation with individuals' social skills, social media shows promise in making conversation more comfortable for those with ASD.

Although the current study provides insight into the relationships between Internet use, anxiety severity, and social skill in adults with ASD, there are a few limitations that should be noted. The small sample size and cross-sectional nature of the study were two major limitations. The correlational nature of this study, however, makes it impossible to draw any conclusions about how these variables are related causally. Longitudinal and experimental studies would need to be conducted to confirm the effect of Internet usage on adults with ASD.

Additionally, the aspects of social interaction that we coded may not have been the skills that were actually affected by Internet use. We only examined four characteristics of social skills (questions asked, questions responded to, prolonged silences, initiations), but higher frequencies of Interest use may have had an effect on other social behaviors.

Finally, because only a subsample of the ASD spectrum was examined in this project, it should be noted that the results may not generalize to the entire population of adults with ASD. Only individuals with high functioning autism participated in this study, so we cannot yet generalize these findings to the entire autism spectrum.

The current study expands the minimal literature on the relationships between Internet usage and autism symptoms. The results suggest that a higher frequency of Internet usage correlated with lower anxiety levels but did not have a significant relationship with the social skills of adults with ASD. The cross-sectional relationship between Internet usage and anxiety suggests a need for further research to confirm the results of the present study. Testing the effects of more Internet use on other social behaviors like eye contact or empathy may also be a future direction for this study. Furthermore, the data revealed that over half of the sample population used some form of social media to communicate and interact with others. With further research, social media platforms may be utilized as new forms of intervention designed to decrease anxiety severity for adults with ASD. Eventually, we want these individuals to have in-person interactions; teaching them proper online etiquette can be an intermediary step to getting them to be comfortable meeting new people and eventually translating these skills to real life.

## MATERIALS AND METHODS

### Participants

The participants were 17 adults ranging from ages 19 to 54. Participants were previous or current clients receiving services at the Koegel Autism Center who have been diagnosed with Autism Spectrum Disorder, specifically high functioning autism. Of the 17 participants, 23.53% were female and 76.47% were male. 58.8% of the clients were Caucasian, 23.5% were Asian, 5.9% were Hispanic/Latino, and 11.8% were other. The mean age was 27.71 years with a standard deviation of 10.89.

### Measures

*Internet use:* Participants completed the Koegel Autism Center Adult Questionnaire before their first session at the center. Regarding Internet use, participants were asked: "On average, how many minutes/hours do you spend each day on the computer? How is this time usually spent?" The answers to these questions were self-reported and were not exclusive to interacting online via social media sites.

*Anxiety:* The Beck Anxiety Inventory (BAI) (7) was administered to participants prior to receiving treatment from the center. The BAI is a multiple-choice self-report inventory used to measure the severity of anxiety in children and adults. Symptoms of anxiety are rated on a four-level scale: Not at All; Mildly (It did not bother me much); Moderately (It was very unpleasant, but I could stand it); and Severely (I could barely stand it). The BAI is widely used and has shown validity and internal consistency across a variety of languages, cultures, and age ranges (7).

### Behavioral coding system

To assess social skill level, baseline videos of the participants

conversing with a Koegel Autism Center clinician were coded based off what we characterized as acceptable social behaviors, which are detailed below. These interactions were done in person to simulate a natural conversation. It is important to note that some participants did not have baseline videos, so not all participants had social skills coded for.

Number of questions asked: The questions asked by both the participant as well as the person they were conversing with were also tracked. For each 30-second interval, if the participant asked a question, we marked that down and did the same if the peer asked a question. Asking questions can demonstrate interest and engagement in conversation.

**Silences:** A study conducted by researchers in Holland reports that brief silences, specifically silences that are four seconds long, can promote negative feelings of anxiety and rejection (9). For every 30-second interval, we kept track of any silences four seconds or longer.

**Vocalizations:** Live social interactions were coded for "Responding and Initiating" based off of a study conducted by McMahon, Vismara & Solomon (10). We classified vocalizations directed toward another person in the absence of a conversation as "initiating" and vocalizations directed toward another person in the presence of a conversation (i.e. within approximately 10 seconds of a previous vocalization) as "responding" (10). To find the percentage of questions the participant responded to, we divided the number of responses by the number of questions asked by the stranger and multiplied by 100. For every 30-second interval, we noted if the participant exhibited any "initiations." This could suggest more back-and-forth conversations and fewer choppy conversations with pauses of four or more seconds (10).

### Calculations

To calculate the percentage of 30-second intervals with a question asked by the participant, we divided the number of intervals with a question by the total number of intervals present and multiplied by 100. We then performed the same calculation for prolonged silences and initiations. To determine the significance of our results, we ran bivariate correlations between Internet usage, anxiety severity, and social skills.

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