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**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

## **A longitudinal case study of communication skills in neurotypical and autistic teenagers**

Clara Garcia

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Autism (ASD), nonverbal cognitive skills/communication, interaction and neurotypical.

### **Abstract:**

Difficulty in developing language skills as well as overall cognitive skills shows a considerable correlation with teenagers who are diagnosed with autism spectrum disorder (ASD). Previous studies have proven that autistic individuals often struggle with non-verbal communication or find it difficult to understand other communication signals. The aim of the present longitudinal case study is to illustrate the patterns of language use and behaviours that are found in teenagers with ASD, with a comparison to neurotypical teenagers. Four teenagers on-campus were selected based on their gender, age group, personality trait, along with their neurological profile. Two of these students are neurotypical, one is a male extrovert and the other is a female introvert. The remaining are two students on the autism spectrum disorders (ASD); both highly struggle with communication and social interaction on a daily basis. One is a male extrovert and the other is a female introvert. My goal is to collect effectual data through a set of questionnaires, assessing each teen individually under the same controlled environment. The responses will allow me to extract an excellent data analysis, an open inquiry that will interpret the difference in communication between neurotypical teenagers and autistic teenagers.

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Autism (ASD) is a complicated neurodevelopmental condition that is either congenital or acquired early in life, It is characterised by impairments with social skills, repetitive behaviours, speech, and nonverbal communication. We know that there are several subtypes of autism, the majority of which are influenced by a combination of genetic and environmental factors. Because autism is a spectrum disorder, each autistic person has a unique combination of strengths and challenges. People with autism learn, analyse, and solve issues in a variety of ways, ranging from very adept to profoundly disabled.<sup>1</sup> Autism Spectrum Disorder (ASD) can change a person's vision of the world. Individuals who are hypersensitive to specific stimuli, such as light, sound, and taste, may experience over stimulation of one or more senses.<sup>2</sup> This is referred to as sensory overload. Individuals subject to this condition usually share atypical speaking patterns and voice tone, late development of verbal skills, difficulty sustaining or responding to conversation, restricted eye contact, confined responsiveness to

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<sup>1</sup> "What Is Autism?." <https://www.autismspeaks.org/what-autism>. Accessed 5 Dec. 2021.

<sup>2</sup> "What Causes Autism? | Autism Speaks." <https://www.autismspeaks.org/what-causes-autism>. Accessed 5 Dec. 2021.

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

social engagement, recurring speech and behaviour patterns, difficulty comprehending and expressing one's own emotions, and the occurrence of limited and repetitive habits.

According to the Centres for Disease Control, autism affects around one out of every 54 children in the United States today. The symptoms begin to show in the early development period, commonly before the 12 months of life. The prevalence for ASD in the unspecific population is about 0.8% to 2%. (Baird, Simonoff, Pickles et al., 2006; Coleman & Gillberg, 2012; Nygren et al., 2012)<sup>3</sup>. Boys are four times more likely to be diagnosed with ASD. A short screening tool test does not provide a diagnosis, but it does indicate if a child is on the right developmental track or whether a professional should look into it further. A comprehensive developmental evaluation may be necessary if the screening test reveals a possible problem area. This formal assessment is a more thorough study of a child's development that is often undertaken by a multidisciplinary team, composed of a developmental paediatrician, child psychologist, speech-language pathologist, occupational therapist, or other specialist.

Autism changes your child's worldview and can make communication and social interaction difficult. ASD is characterised by difficulties in social interaction, communication problems, and a penchant for repetitive behaviours. The severity of symptoms, on the other hand, varies substantially throughout these three primary regions. When they are combined, they may cause modest difficulty for certain autistic people. Others may have more severe symptoms, such as when repetitive behaviours or a lack of spoken language interfere with everyday life.<sup>4</sup> Most autistic children, on the other hand, struggle with the give-and-take of normal human interactions. Many infants who are later diagnosed with autism show symptoms such as an inability to respond to their names, a loss of interest in others, and delayed babbling by the age of 8 to 10 months. Many autistic children have difficulty playing social games by toddlerhood, do not mimic others' activities, and prefer to play solo. Parents may believe that their child is uninterested. Autistic children frequently struggle to grasp what others are thinking and feeling. Subtle social cues, such as a grin, a wave, or a frown, may not convey meaning to an autistic person in the same way that they do to neurotypical people. They also struggle to see things from someone else's perspective. Finally, they struggle with emotional regulation. Some autistic children engage in troublesome behaviours, such as tantrums or weeping, when their actions do not look reasonable or make sense to others. Some behaviors may become disruptive or physically violent in such stressful or aggravating circumstances. It is also possible to engage in self-harming behaviour such as head pounding, hair pulling, or self-biting.

They have communication challenges in addition to social difficulties. When language development begins, an autistic person's voice may be used in unexpected ways. Some people struggle to string words together to produce cohesive statements. They may only say a few words or repeat the same statement several times. Some people repeat what they hear word for word. This is referred to as echolalia. Language is expressive as well as receptive. Many parents worry that a child who is unable to communicate in a language will also be unable to understand other people's languages. This, however, is not always the case. It is vital to understand the difference between expressive and

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<sup>3</sup> Baird, G., Simonoff, E., Pickles, A., Chandler, S., Loucas, T., Meldrum, D., & Charman, T. (2006). Prevalence of disorders of the autism spectrum in a population cohort of children in South Thames: The Special Needs and Autism Project (SNAP). *The Lancet*, 368(9531), 210–215. [https://doi.org/10.1016/S0140-6736\(06\)69041-7](https://doi.org/10.1016/S0140-6736(06)69041-7)

<sup>4</sup> "Day Kit - Autism Speaks."

[https://www.autismspeaks.org/sites/default/files/100\\_Day\\_Tool\\_Kit\\_Young\\_Children.pdf](https://www.autismspeaks.org/sites/default/files/100_Day_Tool_Kit_Young_Children.pdf). Accessed 5 Dec. 2021.

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**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

receptive language. Nonverbal communication, such as body language, tone of voice, and facial expressions, is also a problem. Some autistic persons may not use typical body language. Their facial expressions, mannerisms, and gestures could not match what they're saying. Their voice tone may not appropriately reflect their feelings.

Since each autistic kid has unique strengths and challenges, there is no one-size-fits-all autism therapy and treatment plan. Many autistic people suffer from co-occurring medical conditions such as sleep difficulties, seizures, and gastrointestinal (GI) discomfort. Addressing these difficulties can assist with attention, learning, and other related behaviours. Many people benefit from therapy to improve their speech, social skills, or motor skills, as well as to learn new skills such as eating or self-care. Each autism intervention or treatment strategy should be tailored to the individual's needs<sup>5</sup>.

The aim of the present longitudinal case study is to illustrate the patterns of language use and behaviours that are found in teenagers with ASD, with a comparison to neurotypical teenagers. Four teenagers on-campus were interrogated based on their gender, age group, personality trait, along with their neurological profile. The following observations and difference in responses/reaction will present how communication skills differ with autism.

## **Method:**

### *Participants*

The four teenagers participating in the present case study were recruited from Sotogrande International School (SIS). All of them are between ages 13 and 15. (THE NAMES USED IN THE PRESENT CASE STUDY ARE NOT REAL). Although most kids do not acquire epilepsy, the teen years are a danger phase for the beginning of seizures in autism. Childhood sleep issues may linger until adolescence, when insomnia and daytime drowsiness become the most serious difficulties. Anxiety is quite prevalent. During the adolescent years, the difference between individuals with autism and their counterparts expands in something called "executive functioning." Several autistic teens struggle with executive functioning. They may struggle with abilities such as planning, keeping organised, sequencing information, and self-regulation of emotions. Some people pay attention to little details but struggle to grasp how they connect into a larger picture. Others have difficulty paying attention in class or other contexts. When preparing to do a task, some people may struggle to arrange their thoughts and activities in order to determine what sequence of tasks is required. Poor impulse control might also be connected with executive functioning issues. Some people struggle with complicated thinking, which necessitates holding many trains of thought at the same time<sup>6</sup>. The following table shows the characteristics of each participant, their demographics demonstrate some traits that may affect their response.

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<sup>5</sup> "About Autism | NICHD - National Institute of Child Health and ...." 19 Apr. 2021, <https://www.nichd.nih.gov/health/topics/autism/conditioninfo>. Accessed 5 Dec. 2021.

<sup>6</sup> "What are the treatments for autism? | NICHD - National Institute of ...." 19 Apr. 2021, <https://www.nichd.nih.gov/health/topics/autism/conditioninfo/treatments>. Accessed 5 Dec. 2021.

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

**Table 1. Participant characteristics**

Demographics	Elected teenagers			
	Oliver	Stella	Elijah	Charlotte
Neurological comorbidities	Autistic	Autistic	Neurotypical	Neurotypical
Age	13	12	15	15
Sex	Male	Female	Male	Female
Personality	Extrovert	Introvert	Extrovert	Introvert
Additional medical conditions	ADHD	N/A	N/A	ADHD & Social Anxiety
Status/Role	Student	Student	Student	Student

The World Health Organization (WHO) defines adolescence as those people between 10 and 19 years of age. I have discarded those students who don't have so much demographic information to offer (like ADHD or ASD itself), those who are non-binary and those who do not belong to this age range. I have selected these two autistic students at SIS because personality-wise, they are quite the opposite, thus, I would be able to discuss how an autistics' ambivert personality or their gender affects their communication skills.

### *Materials*

An overview behind the given demographics in table 1 will be discussed.

### *Neurological comorbidities*

This demographic is our independent variable, whilst the others are controlled variables and the responses of each teen will be the dependent variable, what I will measure. The aim of the present longitudinal case study is to illustrate the patterns of language use and behaviours that are found in teenagers with ASD, with a comparison to neurotypical teenagers. This point will be discussed in my data analysis.

### *Age*

The ASU scientific team discovered that older persons with autism report more social communication challenges than younger adults with autism, although verbal fluency does not appear to worsen with age. They were also able to determine, using brain scans, that parts of the brain associated with social communication, cognition, and executive functions thinned more quickly in individuals with autism than in those without. "People with autism have a lot of these cognitive struggles and brain communication patterns that look more like what we know happens with ageing," Braden said.<sup>7</sup> Further into the relationship between autism and age, autistic teens actually have the most interesting form of communication. Teens with autism spectrum disorder may struggle with receptive communication. This implies that they may not always grasp all that is spoken to them, that they may

<sup>7</sup> "New research reveals the social communication challenges of aging ...." 29 Apr. 2019, <https://www.newswise.com/articles/new-research-reveals-the-social-communication-challenges-of-aging-with-autism>. Accessed 26 Nov. 2021.

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**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

require additional time to digest what is said, or that they may feel confused if someone says too much at once. Allow more time for the ASD person to process and formulate a response. Speak in straightforward, positive language that instructs the person on what to do ("stand still" rather than "don't move"). Utilise sarcasm, slang, or indirect meanings carefully (like, "hang-out" " or "take a chill pill")<sup>8</sup>. Adolescents with ASD may also struggle with expressive communication difficulties, which means they are unable to "communicate" their thoughts or feelings. Some people may not speak at all, but instead communicate by gestures and other actions. Others may utilise a communication board to spell words out loud or a tiny computer to talk for them. Expressive communication is the process through which someone "talks" to others and conveys a message or notion. Even if they comprehend what is being said, they may have trouble deciding how to respond. Never assume that because someone does not speak, they do not comprehend or are not intelligent. An adolescent with ASD may: be unable to communicate verbally and may rely on alternative means of communication, such as sign language or an electronic device. Use formal, precise language that distinguishes them from your other buddies. Repeat a sentence he or she has heard in a movie, video, or earlier discussion, even if he or she has no idea what it means. The sentence might be irrelevant or convey an incorrect answer. Having trouble keeping on topic during a chat. It is difficult to strike up a discussion. Say anything that comes out as impolite. Teens with ASD can be brutally honest, even if it isn't intended that way. Forget to utilise pleasantries and goodbyes like "hello" and "goodbye." Have difficulty determining when to start and conclude discussions, as well as when it is their turn to speak. Therefore, age is a predominant factor in an autistic communication skills.

## Sex

Autism sex ratio will be explained. Autism is far more frequent in guys than in girls. Since the first instances of autism were recorded in the 1940s, this skewed sex ratio has been known. The precise causes behind the ratio are unknown. It may be due to biological variations between the sexes. Some scientists believe it might be an artefact of how autism is defined and treated. At the time of calculating the actual prevalence for autism, researchers found that boys are more likely to have autism than girls. This was true whether the data came from parent-reported diagnoses, school and medical records reviews, or diagnostic exams of children.<sup>9</sup> The most extensive study on autism's sex ratio, released in 2017, used data from 54 prevalence studies throughout the world.<sup>10</sup> According to the findings, there are around 4.2 males with autism per each female. What variables might influence this gender ratio? Diagnostic bias is one possibly significant factor: Several studies show that females are diagnosed with autism later in life than boys, implying that the disorder is more difficult to detect in girls. There are other ideas to explain the sex-based disparity, including a hereditary protective effect, the excessive male brain theory, and phenotypic variations in presentation across sexes, all of which may be interwoven. Researchers have also questioned if a diagnostic gender bias is to blame for females being misdiagnosed with autism spectrum disease. Researchers have also theorised on a

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<sup>8</sup> "Growing Up - Autism Society."

[https://www.autism-society.org/wp-content/uploads/2014/04/NEWasa-growing\\_up-teen-final-rev.pdf](https://www.autism-society.org/wp-content/uploads/2014/04/NEWasa-growing_up-teen-final-rev.pdf). Accessed 28 Nov. 2021.

<sup>9</sup> "Reversed gender ratio of autism spectrum disorder in Smith ...." 8 Jan. 2018, <https://molecularautism.biomedcentral.com/articles/10.1186/s13229-017-0184-2>. Accessed 28 Nov. 2021.

<sup>10</sup> "Autism's sex ratio, explained | Spectrum." 13 Jun. 2018, <https://www.spectrumnews.org/news/autisms-sex-ratio-explained/>. Accessed 28 Nov. 2021.

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**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

gender bias in parental reporting as a result of societal expectations and indoctrination of gender roles.<sup>11</sup> A considerable amount of data indicates that males have a higher rate of autistic type difficulties than girls. One of the most frequent results in autism spectrum disorder is the 4:1 male to female ratio (ASD).

### Personality

The Myers-Briggs Type Indicator personality test<sup>12</sup> contains questions developed to evaluate if a person is either introverted or extraverted. These classifications are useful because they distinguish shyness and social anxiety from the urge for alone time. Whereas extroverts are people who draw energy and insight from social interaction, introverts do not seem to be timid or socially nervous. They could love spending time with other individuals. On the other side, they may find spending time in big groups exhausting, and they may prefer to think things out on their own rather than debating ideas with others. It is important to understand that this variable is completely unbiased; introversion is associated with autism. Since social communication is so difficult for autistic individuals, the majority of them are not particularly adept at it, and many find it both irritating and stressful. That doesn't imply they don't want to interact with others, but the process is neither straightforward nor natural. Even persons with severe autism find it difficult, if not impossible, to "read" facial expressions, conversational tone, and body language. People with autism may be unable to recognize a joke, detect sarcasm, or determine when it is appropriate to stop a discussion. Many persons with moderately severe autism struggle to keep up with fast-paced discussions or generate replies quickly enough to engage effectively. Even the most brilliant autistic persons must learn how to read facial emotions and understand body language through direct teaching or diligent observation. Teens may also need to develop their particular social communication skills, such as shaking hands, establishing eye contact, correctly smiling, and so on. Many autistic persons are not able to "pass" as neurotypical owing to abnormalities in tone, body position, or unsteady eye contact. People subject to autism may pick improbable subjects of discussion, obsess on preferred themes, or ask unexpected questions, in addition to issues with technical social communication skills. A person with autism who is intrigued with astronomy, for example, may find it difficult to focus on a conversation about any other topic. Because of these disparities, socialising may be boring, unpleasant, or humiliating. Finally, most autistic persons are extremely sensitive to loud noises, bright lights, strong odours, and tactile sensations. All of these obstacles make social engagement difficult and, in some situations, tiring (especially in big groups). As a result, some autistic persons may prefer to socialise only in small groups. Furthermore, many neurotypical individuals believe that a person who has difficulty communicating must choose not to socialise. It is vital to remember that due to their lack of eye contact or odd body language, autistic persons may appear to be introverted. This might be deceiving, since many persons on the spectrum are unaware of the influence their looks or conduct have on others. Thus, there are many theories that associate introversion with autism, but it is actually a social misconception or stereotype.

### Additional medical conditions

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<sup>11</sup> "Sex differences in autism - Wikipedia." [https://en.wikipedia.org/wiki/Sex\\_differences\\_in\\_autism](https://en.wikipedia.org/wiki/Sex_differences_in_autism). Accessed 28 Nov. 2021.

<sup>12</sup> "MBTI® Basics - The Myers & Briggs Foundation." <https://www.myersbriggs.org/my-mbti-personality-type/mbti-basics/>. Accessed 28 Nov. 2021.

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**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

If the individual is subject to any health condition it does have a potential influence on their communication skills. For instance, one of the autistics suffers from ADHD. Upwards of half of all people who have been diagnosed with ASD also show evidence of ADHD. Among fact, the most prevalent comorbid disorder in children with ASD is ADHD. On the other hand, up to a quarter of children with ADHD display low-level ASD symptoms, such as problems with social skills or being too sensitive to garment textures. ADHD and ASD are both neurodevelopmental diseases (brain development has been affected in some way). Such that, both conditions/disorders have an impact on the central nervous system, which is in charge of movement, language, memory, as well as social and concentration abilities. A variety of research investigations have demonstrated that the two illnesses frequently coexist, but experts have yet to determine why. Cognitive function has been altered in some manner by ADHD or ASD. Most crucially, this comprises executive functioning in the brain, which is in charge of decision making, impulse control, time management, attention, and organising abilities. Many children's social abilities are also harmed. Boys are more likely to have ADHD and ASD. Although adults might have both ADHD and ASD, the combination is less prevalent in adults than It is in children. While ASD is considered a lifelong illness, long-term studies have revealed that signs of ADHD are present in one-third to two-thirds of youngsters<sup>13</sup>. In addition, one of the neurotypical individuals suffers from social anxiety, this is a condition that can alter their results since anxiety affects your communication skills. Establishing and maintaining conversations is one of the most difficult problems for someone who suffers from social anxiety. It is natural to struggle a little while attempting to make small conversation because It is not always simple to come up with things to say. This is particularly true if you are nervous. On the other hand, some worried people talk excessively, which may be off-putting to others. According to this viewpoint, people with social phobia have enough social abilities, but their worry prevents them from focusing on social interactions and thus using their talents correctly. In theory, removing social anxiety by behavioural, cognitive-behavioural, or pharmaceutical treatments should allow social skills to develop. Social anxiety will alter Charlotte's response to the questionnaire and make her answers approximate to individuals with ASD.

### Status/Role

Studies have shown that communication skills develop with interaction and status. To plenty of people, social status is a sign of validity and legitimacy, and how sincerely others take what one says is affected by this<sup>14</sup>. Title, image, and the degree to which people can identify with the communicator's goals and aims are all important factors in an audience's appraisal. Status disparities can lead to a prejudice towards persons who are thought to be lower in status. A junior or lower-level employee, for example, who is requested to deliver a presentation to a group of more senior upper-level managers may struggle to hold their interest at first, even if his information and presenting abilities are excellent. Communication might also be difficult when you are an outsider<sup>15</sup>.

### Procedure

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<sup>13</sup> "ADHD and Autism Spectrum Disorder - CHADD."

<https://chadd.org/about-adhd/adhd-and-autism-spectrum-disorder/>. Accessed 30 Nov. 2021.

<sup>14</sup> "Social outcomes in children with autism spectrum disorder - NCBI." 20 Feb. 2017, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5325134/>. Accessed 30 Nov. 2021.

<sup>15</sup> "Effective Communication - Improving your Social Skills - Anxiety ...." <https://www.anxietycanada.com/articles/effective-communication-improving-your-social-skills/>. Accessed 30 Nov. 2021.

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

I will obtain my answers via a questionnaire. The questions I will ask were established with the help of a learning support teacher who constantly works with autistic students. After completing a research plan, I took into account the key factors of communication and decided how I will assess my individuals. The following table shows the questions I will ask each individual.

**Table 2. Questionnaire**

QUESTIONS	SCALE MEANING
How hard is it for you to interact with strangers from 1-10?	1 being very difficult and 10 very easy.
Do you get irony or sarcasm, on a scale of 1-10?	1 being very difficult and 10 very easy.
Do you feel uncomfortable when talking to other people, on a scale of 1-10?	1 being very uncomfortable and 10 being very comfortable.
Do you find it easy to make new friends, on a scale of 1-10?	1 being very hard and 10 very easy.
How well can you read facial expressions on a scale of 1-10?	1 being cannot read facial expressions and 10 reading them without problem.
How much can the environment overwhelm you, on a scale of 1-10?	1 being not affected and 10 extremely affected.
On a scale from 1-10, would you rather hang out alone or go to a party with your friends?	1 being hanging out alone and 10 with friends.
On a scale of 1-10, how much do you enjoy social gatherings?	1 being I don't enjoy them and 10 enjoying it to the fullest.
On a scale of 1-10, how many people tell you that what you say is impolite, even though you don't think so?	1 being no people and 10 many.
On a scale of 1-10, do you find it hard to figure out people's intentions?	1 being not at all and 10 very hard.

## Results:

**Table 3. Results**

QUESTIONS	Profiles			
	Neurotypical Male Extrovert — "Elijah"	Neurotypical Female Introvert - "Charlotte"	Autistic Female Introvert — "Stella"	Autistic Male Extrovert — "Oliver"
How hard is it for you to interact with strangers from 1-10?	10	8	3	6
Do you get irony or sarcasm, on a scale of 1-10?	9	10	7	7

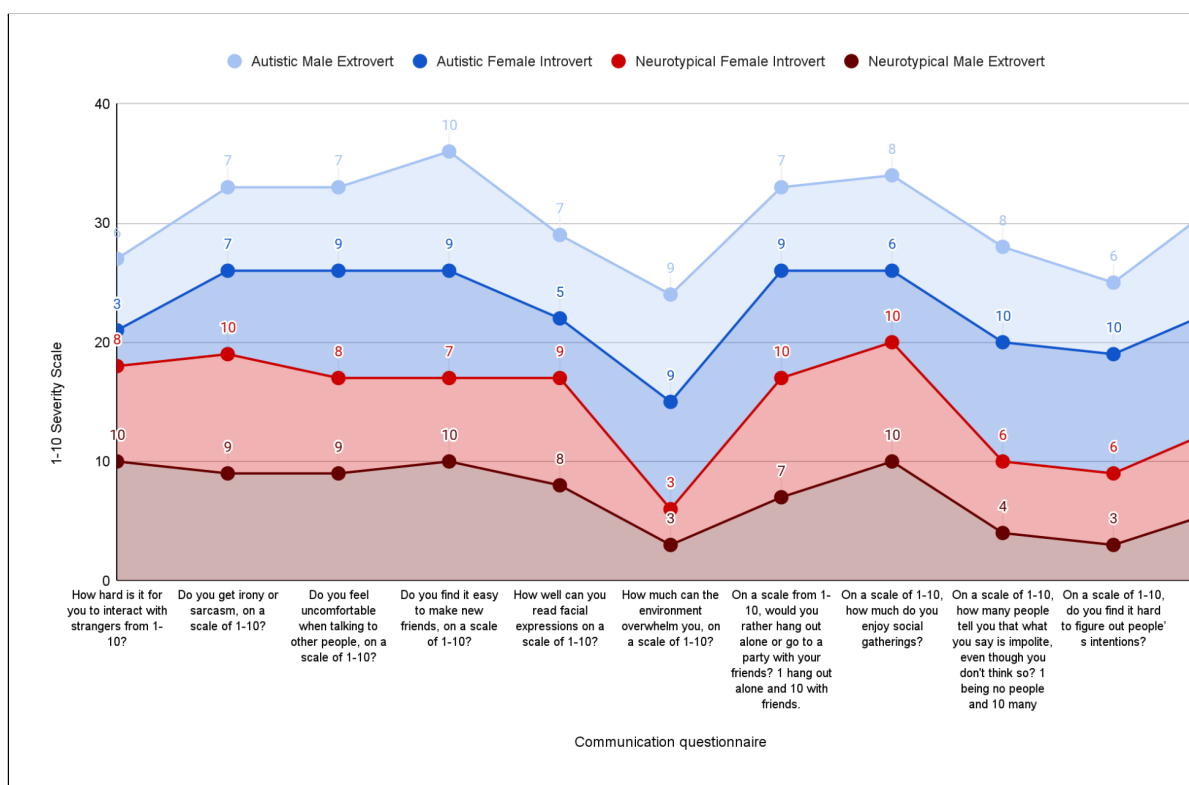


**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

Do you feel uncomfortable when talking to other people, on a scale of 1-10?	9	8	9	7
Do you find it easy to make new friends, on a scale of 1-10?	10	7	9	10
How well can you read facial expressions on a scale of 1-10?	8	9	5	7
How much can the environment overwhelm you, on a scale of 1-10?	3	3	9	9
On a scale from 1-10, would you rather hang out alone or go to a party with your friends? 1 hang out alone and 10 with friends.	7	10	9	7
On a scale of 1-10, how much do you enjoy social gatherings?	10	10	6	8
On a scale of 1-10, how many people tell you that what you say is impolite, even though you don't think so? 1 being no people and 10 many	4	6	10	8
On a scale of 1-10, do you find it hard to figure out people's intentions?	3	6	10	6

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

**Graph 1. Results:** The graph represents patterns of language use and behaviours that are found in teenagers with ASD, with a comparison to neurotypical teenagers; on a scale of 1-10. The following graph is a stacked area chart, the only chart type able to illustrate the differences between 4 responses. I have not done a line of best fit for each of my teens' responses because in some questions the value of 10 is the most challenging and in other questions 10 is the least challenging, therefore, to express a relationship in a scatter plot of different data points is meaningless if the questions are all very individualised. Considering that there is no (visual) graphical correlation, we can notice that sometimes, when the ASD teens spike in answers, the 2 NT teens have the lowest points on the graph. Take a close look at question 6, the two different-shaded blue lines peak in the graph and the two different shaded red lines are the lowest. This is a correlation between autistic teens responses and neurotypical teens responses, making these two groups inverse in response.



**“Oliver” Case 1, ASD**

Oliver is a 13-year-old male student at Sotogrande International School. He was diagnosed with ASD and ADHD, he considers himself to be an extrovert.

Based on his responses, he finds it difficult to interact with strangers. In comparison to the other teens, he is the second person who most challenging finds social interaction in a scale of 1-10, first being the autistic female. The second question confirms that he does not struggle to understand sarcasm as much as other ASD reported teenagers. Question 3 shows that the two teens with ASD have the same numerical response to how well they can understand sarcasm. Both of their responses are the lowest number in scale, a 7/10, meaning that they don't struggle with irony but don't handle it as well as neurotypical teenagers. The third question can deduce that Oliver does not find it extremely uncomfortable to talk with other people but can bring forth an awkward scenario. His

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

answer/numerical value is the lowest one in the scale in comparison to the other responses, this makes him the most uncomfortable/awkward person when talking to others, out of all the four teenagers. The fourth question verifies that he does not find it hard at all to make new friends, he supported in the interview that this may be due to his extroverted and friendly personality. Question 5 shows that he struggles to read facial expressions, he has the second-lowest response for this question, first being our autistic female; the lower the numerical value for this question, the more challenging you find it to decode someone's facial expression. Regarding his responses, he is easily overwhelmed by the environment. He specified that flickering lights, loud sounds, unfamiliar tastes and PTSD episodes can induce a sensory overload. For his case, he finds it very challenging to control such stimulation, a qualifying characteristic of teens with ASD. Question 7 exposes that he'd rather stay at home than hang out with friends. Post-interview, I noticed that he could not read within the lines of "hang-out". He was the only teen to not understand the meaning behind this slang; many patients with ASD often struggle with reading within the lines, related to their poor grasp of irony or sarcasm. In addition, his response shows that most of the time, what he says is considered to be impolite, even though he cannot comprehend why. In my graphical spectrum, he is the second most likely to experience that what he says is impolite, although he thinks that it is not. The last question of the questionnaire shows that he does not struggle as much when figuring out other's intentions, in fact he is the second teen that most struggles with handling people's intentions, making our case 2 (autistic female) the highest value and the person who mostly struggles to figure out people's intentions. These answers make case 1, the second person to most struggle with communication skills and social interaction.

### **"Stella" Case 2, ASD**

Stella is a 12-year-old female student at Sotogrande International School. She was diagnosed with ASD. She considers herself to be an introvert.

Based on her response, she finds it very difficult to interact with strangers. She has the lowest point in the graph, making her the most socially awkward teen. She finds it so difficult to interact with strangers due to her ASD and her introverted personality. Regarding her second response, she does not struggle very much with sarcasm or irony, in fact she answered with the same numerical value as Oliver. Both of their responses are the lowest number in the scale, a 7/10, meaning that they don't struggle with irony but don't handle it as well as neurotypical teenagers, who answered with an 8-10/10. Question 3 shows that she does not feel uncomfortable when talking to other people, this is quite interesting considering that she said that it was hard for her to interact with strangers. Her following response manifests that it is very easy for her to make friends, more than case 1, male autistic. However, she does struggle with reading facial expressions, in fact she is the teen with the lowest number in the graph, meaning that she has the most trouble reading facial expressions out of all the four teens. Question 5 shows that she is extremely overwhelmed by the environment, as much as case 1, the other teen with ASD. She specified that flickering lights, loud sounds, unfamiliar tastes and PTSD episodes can induce a sensory overload. For her case, she finds it very challenging to control such stimulation, a qualifying characteristic of teens with ASD. She also mentioned that she'd rather hang out with her friends than stay at home. She supported her response by saying that it is because she does not have many friends to hang out with and rarely goes outside her house, so she'd rather hang out with other people other than herself. On a scale of 1-10, she rarely enjoys social gatherings, she is the person who least likes to socially interact from the four teens. Regarding her next response, she is the person who most is told that her gestures and sayings are very impolite, though she thinks otherwise. This is a feature common for teenagers subject to ASD, she supported her answer (10) by

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**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

saying that she finds it very challenging to constantly mask her emotions, insisting that if she doesn't, she'd "let her darkest side show". Lastly, she finds it very hard to figure people's intentions, with the highest degree, reaching a level 10; the teen who finds it most difficult to understand intentions. Out of all the four teenagers, her response is affected by ASD and her social introverted personality, making her the teen with the most communication and social challenges. She often finds it hard to have conversations and may not pick up on social cues.

### **“Charlotte” Case 3, NT (Neurotypical)**

Charlotte is a 15-year-old female student at Sotogrande International School. She is neurotypical and was diagnosed in 2019 with ADHD and social anxiety, these conditions have challenged her social interaction and communication skills since then. She also considers herself to be an introvert, another variable that affects her communication skills. Her responses to the questionnaire are able to show that she does not find it hard to interact with others, but she is not the most confident. She does not struggle with understanding irony or sarcasm either, in fact she characterises herself as a very ironic person. Her response to question 3 shows me that she does not feel uncomfortable when talking to other people, but that digit could improve from an 8 to a 10. She argued that the reason for this rather poor digit is because of her social anxiety. She does not find it easy to make friends either, she has ADHD, conditions that worsen her ability to make new relationships. Question 4 represents that she does not find it difficult to read facial expressions, in fact she's the best person who can read facial expressions out of the 4 teenagers. In question 5, we can see that she is barely affected by the environment, in fact, she has the same answer as someone neurotypical too, thus they do not experience common sensory overloads, whereas the two autistic teens have the highest digit, meaning that they are highly affected by the environment. The following question shows that she'd totally rather spend her time at a party with friends than alone at home, this is supported by her second answer, insisting that she does enjoy social gatherings. In addition, her response to question 8 shows that what she says at times may be impolite, and it does not happen as often as with people with ASD, in fact she is aware of her impoliteness since she identifies herself as a very direct being. This is something that makes her response unique, ASD teens are not aware that they are being impolite, which causes them to mask their feelings and thoughts, but Charlotte acknowledges her harsh and direct way of communicating. Finally, Charlotte has no problem with figuring out people's intentions, she may struggle a little more than case 4 (NT male) but her answer is average. This neurotypical female student does not typically have difficulties with communication or social interaction, but when it does, she blames it on her social anxiety and ADHD. I will discuss how these two conditions affect her response to the questionnaire further into the case study, since there is a clear relationship between case 3 (NT FEMALE) and case 1 (ASD MALE), they both are subject to ADHD.

### **“Elijah” Case 4, NT (Neurotypical)**

Elijah is a 15-year-old male student at Sotogrande International School. He is neurotypical and does not endure any additional medical conditions that can challenge his communication skills. He considers himself an extrovert, too. His responses to the questionnaire deduce that he does not find it hard at all to interact with strangers, his numerical response is the highest; he is the most socially confident person out of all the four teens. The second question shows that he completely understands sarcasm, he also feels very comfortable when talking to other people. Question 4 reveals that case 4 is the easiest person to make new friends with, he does not find any problem in being introduced to new

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

people. However, he is not the most confident person when it comes to reading facial expressions, he supported this by saying that “people are hard to read sometimes, but I’m getting better at reading them”. In addition, he answered that the environment does not overwhelm him at all. Question 6 shows that sometimes he'd rather hang out alone than with friends; “I am pretty tired of hanging out with my friends, so I’d rather spend time with myself or my dog”. He vastly enjoys social gatherings, as much as case 3. Furthermore, he stated that people rarely tell him that what he said is impolite, in fact, he has the lowest numerical value on the graph; the higher the number for question 9 the more impolite or direct people consider you to be. Lastly, he answered that he does not find it hard to figure out people's intentions; “I understand their intentions based on their body language and their tone”. Case 4 does not struggle with their communication skills and believes that they're extroverted personality makes them a socially open person, who is always within reach when making new friendships.

### Observations:

The following table takes into account the teens' reaction and non-verbal response to the questionnaire, with the purpose of establishing patterns in their body language.

**Table 4. Observational aspects of the interview**

Non-verbal signs of communication based on their responses	PROFILES			
	Oliver — Autistic/Male	Stella — Autistic/Female	Elijah — Neurotypical/Male	Charlotte — Neurotypical/Female
Position	Straight/Kept readjusting position	Straight/Kept readjusting position	Crooked/Head tilt	Crooked/Head tilt
Body language	Hand movements	Hand movements	Hand movements	Head nod
Eye-contact	Avoid eye-contact. Looking out the window or floor	Avoid eye-contact. Looking out the window or floor	Firm and assertive	Firm and assertive
Distractions	Many filler sounds/words. Distracted by the environment=Stressed by a coin that felt	No distraction - Straight to the point	No distraction - Straight to the point	Many filler sounds/words. Distracted by exterior noises
Fidget	Scratches neck	Bites nails	NONE	NONE
Authority	Anxious/Stutter	Anxious/Stutter	Confident	Confident
“Emotional state”	Frustrated	Frustrated/Annoyed	Calm and pacific	Calm and pacific

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

<b>Leg position</b>	Leg bounce and re-position/The feet are tucked backwards	Leg bounce and re-position/The feet are tucked backwards	Still	Still
<b>Language use</b>	Extremely formal	Extremely formal	Colloquial/Informal	Colloquial/Informal
<b>Comprehension level</b>	Cannot read within the lines	Can read within the lines	No comprehension problems/No problem with the wording of the questions	No comprehension problems/No problem with the wording of the questions
<b>Interview Time (M)</b>	<b>13m</b>	<b>11m</b>	<b>6m</b>	<b>9m</b>

### Discussion:

Autism can make it difficult for teenagers to acquire language skills and grasp what people are saying to them. They also struggle with nonverbal communication, such as hand gestures, eye contact, and facial emotions. Some teenagers with ASD may be unable to communicate via voice or language, while others may have limited speaking abilities. Others may have extensive vocabularies and be able to speak in depth on certain topics. Many people have difficulty understanding the meaning and rhythm of words and phrases. They may also have trouble deciphering body language and the implications of various speech tones. The capacity of children with ASD to engage with others is harmed as a result of these challenges. Teens with ASD frequently struggle with communication and nonverbal skills. The aim of the present longitudinal case study was to illustrate the patterns of language use and behaviours that are found in two teenagers with ASD, with a comparison to two neurotypical teenagers. The key findings from this serial case study are that: (1) teenagers with ASD have more issues with communicating and often experience sensory overloads<sup>16</sup> on account of the environment/sensory input. (2) When communicating, they avoid eye-contact and do not recur to non-verbal cues. (3) When expressing themselves, they make use of an extremely formal language and fidget around. (4) When interacting with other people their leg position is significant, during the entire interview both students with ASD<sup>17</sup> bounced their leg and kept adjusting posture, a sign of frustration. (5) The autistic students used many filler words. If a filler word is used, it signals that the other person should continue to listen rather than talk. Filler words usually have little to no lexical meaning and instead give the listener hints on how to understand what the speaker has stated. (6) Teens with ASD often struggle with reading within the lines, this conclusion was made from both the autistic teens asking to interpret the meaning of “hang out”, whilst the two NT had no problem with knowing what this slang meant. (7) Teens with ASD have trouble understanding sarcasm & reading people's intentions or facial expressions. (8) Teens with ADHD struggle with communication skills<sup>18</sup>. They are more prone to stray off-topic when speaking, even if there are no specific delays, due to distractibility and other ADHD symptoms. They also have a hard time finding the correct words and

<sup>16</sup> "Sensory differences - a guide for all audiences - National Autistic ...." 2 Sept. 2020, <https://www.autism.org.uk/advice-and-guidance/topics/sensory-differences/sensory-differences/all-audiences>. Accessed 5 Dec. 2021.

<sup>17</sup> "The Effects of ADHD on Communication - ADD Resource Center." 9 Sept. 2014, <https://www.addrc.org/effects-adhd-communication/>. Accessed 5 Dec. 2021.

<sup>18</sup> "Autism and Sensory Overload - Verywell Health." 1 Nov. 2021, <https://www.verywellhealth.com/autism-and-sensory-overload-259892>. Accessed 5 Dec. 2021.

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

putting their thoughts together in a discourse in a logical and orderly manner. Charlotte and Oliver both have ADHD, they were the only ones who used filler words when communicating, in fact Charlotte lasted 3 minutes more than Elijah in the interview because she got carried away and Oliver lasted 2 minutes more than Stella. (9) The type of personality (extrovert or introvert) does have loads in common with communication skills, I was able to observe that extroverts usually interact easier than introverted people. (10) Teens with social anxiety tend to avoid social gatherings, as Charlotte presented. (11) Teens with ASD often get more distracted when speaking, the duration of their interview lasted approximately twice as much as NT teens.

### *In-depth analysis:*

**“How hard is it for you to interact with strangers from 1-10?” 1 being very difficult and 10 very easy: The higher the number, the easier It is to communicate.**

Individuals with ASD struggle with social interaction skills such as forming and sustaining connections, reciprocating social contact, and communicating with others. For children with ASD, a lack of social skills may have long-term consequences, compromising their relatives' interactions, academic skills, self-worth, and autonomy. According to reports on social skills in ASD, these abilities are exceedingly difficult to learn, and educational goals should be centred on building social skills since they have lifetime ramifications. The questionnaire was able to deduce that both neurotypical students have the higher numbers, whilst the teens with ASD had answers between 6-3. Thus, autistic teens find it harder to interact with strangers.

**“Do you get irony or sarcasm, on a scale of 1-10?” 1 being very difficult and 10 very easy. The higher the number, the greater their ironic comprehension.** Autistic people (ASD) experience varying levels of difficulty with pragmatic components of language. Previous study has found that children with ASD understand metaphors, sarcastic comments, and other figurative language literally, and hence consistently mistake such patterns when asked what they mean. Both NT teens had answers between 10-9, meaning that they find it very easy to understand or apply sarcasm. Whereas teens with ASD answered with a 7, not the lowest or highest number, meaning that they do understand sarcasm but may struggle with it. Oliver (case 1) suggested that he has developed his ability to understand sarcasm over the course of the school year. Teens with ASD may struggle to understand irony or sarcasm and seek to improve this area, in comparison to neurotypical teenagers.

**“Do you find it easy to make new friends, on a scale of 1-10?” 1 being very hard and 10 very easy. The greater the number, the easier It is to make new friends.**

For autistic persons, social relationships can be perplexing. When attempting to form and maintain friendships, they could become quickly overwhelmed or dissatisfied. Making friends may be terrifying, puzzling, and anxiety-inducing for autistic children. There are a variety of reasons why persons with autism may find it difficult to form and keep friendships. Both groups (NT and ASD) have very varied answers. Both extroverts have the higher answers, whilst Charlotte, the only one with social anxiety, has a pretty low number. This proves that social anxiety makes it difficult for teens to make new friends and that an extroverted personality induces new open friendships.

**“How well can you read facial expressions on a scale of 1-10?” 1 being cannot read facial expressions and 10 reading them without problem. The greater the number, the easier that person can read facial expressions.**

Nonverbal communication requires the capacity to read facial emotions. Numerous studies have demonstrated that autistic persons frequently struggle to understand the facial expressions of neurotypical (non-autistic) individuals. Previously, these impairments have been portrayed as a feature

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

of autism that causes social issues. Indeed, two recent studies reveal that many neurotypical people struggle to read and comprehend autistic people's facial expressions and body movements. People with high-functioning autism have difficulty understanding others' intentions. Both neurotypical teens had answers within 9-8, whereas autistic teens had rather low responses. This deduces that teens with ASD find it difficult to read facial expressions and know people's intentions.

**“How much can the environment overwhelm you, on a scale of 1-10?” 1 being not affected and 10 extremely affected. The greater the number, the more they are affected by the environment.**

Many autistic children are hypersensitive to their surroundings, making it difficult for them all to filter out sensory input. This sensitivity can occasionally lead to over stimulation, which can upset the kid and create a tantrum. Over stimulation may make even apparently simple things difficult. The responses to this question are quite determining. Both teens with ASD responded with a numerical value of 9, showing that the environment clearly affects them, and it usually leads to a sensory overload. Whereas, neurotypical teens have the same numerical value of 3, indicating that the environment does not affect them in any way. Both answers prove that teenagers with ASD are highly influenced by the environment and more likely to suffer a sensory overload if overwhelmed.

**“On a scale from 1-10, would you rather hang out alone or go to a party with your friends?” 1 being hanging out alone and 10 with friends. The greater the number, the more social.**

Most females with ASD feel lonely since they don't appear to blend in with their peers, particularly other women in their life. In general, women are expected to follow a set of societal standards. However, this is tough to achieve if you have autism and have difficulties picking up on unwritten social rules. We can see that both females have the highest numbers whilst males have lower ones, regardless of their neurological differences.

**“On a scale of 1-10, how much do you enjoy social gatherings?” 1 being I don't enjoy them and 10 enjoying it to the fullest. The greater the number, the more they enjoy social gatherings.**

Often, these autistic children want to have friends and connect socially, but they sometimes struggle with how to establish and retain friends. Since social graces do not come easily to persons with autism, the underlying social norms must frequently be taught explicitly to them. We can notice that both neurotypical teens responded with the greatest value, given a 10, meaning that they truly enjoy social interaction. Stella had the lowest value, this may be due to the fact that she is an introvert and also has ASD. Oliver has a medium value, not the highest or lowest one; he has ASD, but his extroverted personality and ADHD diagnosis make him more socially open.

**“On a scale of 1-10, how many people tell you that what you say is impolite, even though you don't think so?” 1 being no people and 10 many. The greater the number, the more impolite that person may be perceived to be.**

Autism can lead an individual to miss various social cues, such as expressions and verbal cues, that are routinely employed when conversing. If a person with autism says anything that appears to be impolite or disrespectful, it is most often due to a lack of or inability to interpret usual social signs. Autistic persons must/struggle with masking their emotions. Both teens with ASD had high values, ranging between 10-8, meaning that sometimes they are considered as very impolite. Stella argued that “I must mask my feelings so that people don't see who I really am, my dark side”. Oliver argued that “I do not think I am impolite, I just get carried away, but I don't know why I am perceived as an impolite person”. Both neurotypical teens have rather low digits, Charlotte has a slightly greater response because she is considered as a direct person, however she is aware of her impoliteness, in



**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

contrast to Oliver or Stella. Teenagers with ASD are perceived more impolite as other NT teens, they feel the constant need to mask their emotions<sup>19</sup>.

This study proves that communication and social skills are difficult for people with autism. They may struggle to hold a conversation and may be oblivious to social cues. Some persons with autism do not speak at all, while others speak fluently. However, everyone will face difficulties making friends and communicating socially. People with autism may have a limited range of interests or engage in repetitive activities. They might be focused on a single subject, such as vehicles or a television show, or they can be associated with a specific object or activity. Changes in a person's routine or the way they do something may irritate someone with autism. Communication is more challenging for those subject to ADHD or social anxiety. As previously stated, pragmatic language comprises all social mores relating to spoken language and nonverbal communication. This part of communication is already harmed by core ADHD symptoms. For example, blurting out replies, interrupting, talking too much, and speaking too loudly all violate conventional communication rules. People with ADHD are also prone to making tangential comments in conversation and having difficulty organising their ideas on the fly. Even for people with excellent vocabularies and age-appropriate knowledge<sup>20</sup> These pragmatic challenges may obstruct social achievement. An extroverted personality will find it easier to communicate, whereas an introverted person is more likely to avoid social interaction. The amount of communication by an extrovert is high, but the quality is generally bad. Extroverts have a habit of talking a lot, and the listener has a hard time selecting what's most significant from the abundance of information offered<sup>21</sup>. Also, some extroverts have a strong need to "say" a lot of things, which makes it difficult for them to listen.

Difficulty in developing language skills as well as overall cognitive skills shows a considerable correlation with teenagers who are diagnosed with autism spectrum disorder (ASD), as my data supports.

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<sup>20</sup> "Autism (Autism Spectrum Disorder) - ASHA." <https://www.asha.org/public/speech/disorders/autism/>. Accessed 5 Dec. 2021.

<sup>21</sup> "Who's the Better Communicator? Introverts or Extroverts?." 27 Jul. 2020, <https://www.yourthoughtpartner.com/blog/whos-the-better-communicator-introverts-or-extroverts>. Accessed 5 Dec. 2021.

**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

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## Appendix:

ASD	Autism Spectrum Disorder
NT	Neurotypical
ADHD	Attention deficit hyperactivity disorder



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**CONTACT** Clara Garcia ✉ [09clarag@sis.gl](mailto:09clarag@sis.gl)

PTSD	Post-traumatic stress disorder
ASU	Accounting Standards Update (Financial Accounting Standards Board)
WHO	World Health Organization
SIS	Sotogrande International School
GI	Gastrointestinal