Privacy and Safety on Social Networking Sites: Autistic and Non-Autistic Teenagers' Attitudes and Behaviors

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Autistic teenagers may be more vulnerable to privacy and safety threats on social networking sites (SNS) than the general population. However, there are no studies comparing these users' privacy and safety concerns and protective strategies online with those reported by non-autistic teenagers. Furthermore, researchers have yet to identify possible explanations for autistic teenagers' increased risk of online harms. To address these research gaps, we conducted semi-structured interviews with 12 autistic and 16 non-autistic teenagers assessing their privacy- and safety-related attitudes and behaviors on SNS, and factors affecting them. We used videos demonstrating relevant SNS scenarios as prompts to engage participants in conversation. Through our thematic analyses, we found evidence that autistic teenagers may be more averse to taking risks on SNS than non-autistic teenagers. Yet, several personal, social, and SNS design factors may make autistic teenagers more vulnerable to cyberbullying and social exclusion online. We provide recommendations for making SNS safer for autistic teenagers. Our research highlights the need for more inclusive usable privacy and security research with this population.

CCS Concepts: • **Security and privacy** → **Social aspects of security and privacy**.

Additional Key Words and Phrases: privacy, autistic teens, user study, social media

1 INTRODUCTION

Social networking sites (SNS) play a crucial role in teenagers' social lives. Nearly all teenagers use these platforms to build and maintain relationships, express themselves, and explore their identity [9, 52, 86]. Although all teenagers can benefit from using SNS, these platforms may be especially useful for autistic[1]. teenagers. Autistic teenagers have the same desire for relationships as their non-autistic peers [31]. However, they often have difficulty bonding with others offline, due to personal and external barriers. In turn, autistic teenagers often feel socially isolated. When used safely and responsibly, SNS can enrich autistic teenagers' social lives, by offering them a comfortable and convenient space to meet people with similar experiences and interests [10, 17, 71]. Nevertheless, studies show that these users may be more vulnerable to online privacy and safety threats than the general population [17, 38, 42, 68, 93]. This issue may be due to differences in

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[1]We refer to this population as "autistic" instead of "people with autism" because most autistic people prefer this term [12, 40]

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autistic teenagers' privacy- and safety-related attitudes and behaviors on SNS compared to their non-autistic peers, or other factors that have been under-explored.

To date, there is limited research examining autistic teenagers' privacy- and safety-related attitudes and behaviors on SNS, especially from their own point-of-view. Most of the relevant literature highlights parents' or professionals' observations and concerns (e.g., [32, 38, 54]), without consulting autistic teenagers themselves. The lack of inclusive research in this area may be perpetuating misconceptions that autistic teenagers frequently engage in risky behaviors on SNS and cannot protect themselves online due to their disability. It may also be preventing progress in identifying and addressing external factors contributing to these users' negative online experiences. Moreover, researchers have yet to compare autistic and non-autistic teenagers' attitudes, strategies and barriers to protecting their privacy and safety on SNS. Yet, this insight is useful for developing solutions that meet both populations' privacy preferences and needs.

To fill these research gaps, we conducted the first study to examine autistic and non-autistic teenagers' privacy- and safety-related attitudes and behaviors on SNS, and to identify factors affecting their online privacy and safety. We conducted semi-structured interviews with autistic and non-autistic teenagers assessing their thoughts and experiences related to protecting themselves on SNS. We used videos demonstrating relevant SNS scenarios as prompts to engage participants in conversation. Our work provides the first evidence that both groups use similar strategies to protect their privacy and safety on SNS; however, autistic teenagers may be more averse to taking risks on SNS than non-autistic teenagers. Regardless, several personal, social, and SNS design factors may make autistic teenagers more vulnerable to cyberbullying and social exclusion online. We provide recommendations for making SNS safer and more inclusive for autistic teenagers.

2 RELATED WORK

2.1 Autism, Social Interaction and Safety

Traditionally, researchers and clinicians have defined autism as a neurodevelopmental disorder that is characterized by persistent difficulties with social communication and interaction, and restrictive and repetitive behaviors, interests, or activities [2]. However, in more recent years, there has been an important paradigm shift — known as the neurodiversity paradigm — that has redefined autism as an identity and disability that leads to both strengths and challenges [27, 39]. This definition directly opposes dominant deficit-framed theories of autism that were developed without attempting to understand autistic people's experiences from their own point-of-view [27, 39]. Instead of framing autism as a disorder, neurodiversity proponents describe it as a natural variation in human brain development occurring in 1 in 59 people that — much like all forms of diversity — has advantages for progress, innovation and sustainability in society [7, 35]. We support the neurodiversity definition of autism and use it as the basis for our analysis.

Although autistic people are highly diverse in their abilities, needs and preferences, they are all united by their markedly distinct approaches to social interaction and connection compared to non-autistic people. For instance, most autistic people often use mutual interests as a way to initiate conversations and form connections with others [76], whereas non-autistic people usually first engage in small talk before delving into personal topics [75]. Most autistic people naturally communicate literally and directly, whereas non-autistic people often use figurative language (e.g., sarcasm, metaphors) and regulate the expression of their true thoughts and emotions to attract others and avoid conflict [91]. Furthermore, autistic people tend to process both social (e.g., body language, facial expressions) and non-social (e.g., sensory inputs) information differently than non-autistic people, with approximately 30% of the population meeting the criteria for intellectual disability [89]. Therefore, autistic people benefit from alternative modes of communication and other

accessibility accommodations (e.g., extra time to process information) to avoid misunderstandings as well as to be comfortable and included in social contexts [14, 95].

Contrary to stereotypes, autistic people do want companionship and have desirable social skills, such as honesty, loyalty, dependability, and empathy, but may express these aspects in unconventional — and, therefore, under-recognized — ways [56, 67]. However, their ability to thrive in social contexts is disabled by lack of autism awareness, acceptance and inclusion in a world dominated by and built for non-autistic people [70]. Given that autistic people do not naturally conform to non-autistic social norms, they are at an increased risk of being bullied and socially excluded by the general population [19, 60]. Furthermore, because they often have difficulty interpreting non-autistic people's intentions and social cues, autistic people can be susceptible to other safety threats, such as deception and exploitation, without any guidance and first-hand experience with recognizing and responding to potentially unsafe social situations [90]. To protect themselves from social exclusion and safety threats, autistic people are pressured to expend a substantial amount of cognitive effort to hide their natural autistic traits when interacting with non-autistic people (in particular), often making social situations stressful and exhausting for them [34]. Likewise, non-autistic people often find it challenging to understand, interact with, and relate to autistic people — a phenomenon known as the double empathy problem [62].

Too often, autistic people decide that the barriers and safety concerns that they experience in social situations outweigh the benefits of socializing, and therefore choose to avoid interacting with strangers as much as possible [18]. In any case, the substantial loneliness and rejection that autistic people experience throughout their lifetime contributes to high rates of mental health concerns (e.g., social anxiety, depression and suicide) in this population [44].

2.2 Benefits and Risks of SNS Use

All teenagers can benefit from using SNS to promote their personal development and improve their social and emotional well-being, as long as they use these platforms safely and responsibly. Most teenagers use SNS to explore their interests, sexuality, and social status and to connect with others [1, 26, 66, 82, 83], which may lead to increased social support, sense of belonging, and self-esteem [1, 66]. Nevertheless, teenagers experience privacy and safety risks by actively using SNS. Many teenagers share an extensive amount of personal content online, some of which may be sensitive or controversial [92]. Their profile may jeopardize their future professional opportunities [1, 29, 83]. Additionally, teenagers occasionally receive unwanted attention from strangers online who may cause them harm [25, 83]. Some teenagers are bullied on SNS [5, 77], which often leads them to suffer from depression and social withdrawal [5, 77].

SNS can be especially useful for autistic teenagers. For many autistic people, the Internet is a more accessible avenue for communication and connection than the offline world [10]. The anonymous and asynchronous nature of online social interactions relieve autistic people from some of the main sources of stress that they experience in offline social interactions, such as reading body language and responding quickly to their conversation partners [10]. In turn, they have more control over their self-presentations, and therefore experience less pressure and anxiety when engaging with others than in the real world [10, 17, 71]. Research shows that autistic people who use SNS to build and maintain relationships report greater social satisfaction than those who do not [43], suggesting that these platforms can supplement these users' offline social well-being.

At the same time, autistic teenagers may be more vulnerable to certain social privacy and safety threats on SNS than non-autistic teenagers. Indeed, studies show that autistic people are disproportionately involved in cyberbullying as victims and perceived perpetrators — likely due to a mismatch between autistic people's social communication style and behaviors and those of non-autistic people — which can cause them severe psychological distress [17, 38, 42, 68, 93]. Those

with intellectual disability may be particularly vulnerable to financial and sexual exploitation online as a result of their agreeable and trusting nature [16, 21, 63] without education, training and experiential learning opportunities to cultivate their knowledge on how to recognize and respond to threats on SNS.

2.3   Privacy and Safety on SNS: Attitudes and Behaviors

Contrary to stereotypes, teenagers value their privacy and safety on SNS [78]. That said, some teenagers are more willing to trade them for the benefits of online self-disclosure than others. Soffer and Cohen [78] found four groups of teenagers' privacy attitudes on SNS, which we will return to later in this paper. Teenagers in group 1 have pessimistic attitudes towards self-disclosure on SNS. They think that it is not important to develop an authentic profile, and do not feel the need to share personal information online. Teenagers in group 2 place a high degree of importance on maintaining control over their personal information on SNS (e.g., through security and privacy tools). They believe that their privacy is more valuable than developing an authentic profile. Teenagers in group 3 think that it is important to have an authentic profile, while also taking measures to protect one's privacy. They share personal information on SNS, and use privacy and security tools to manage access to their content. Teenagers in group 4 have the most liberal privacy attitudes. They believe that it is very important to have an authentic profile, and share their personal information without using privacy and security tools. More than half of Soffer and Cohen's [78] participants belonged in Group 2 or 3, suggesting that teenagers are usually attentive to both the risks and benefits of SNS use, and attempt to strike the right balance based on their personal preferences. Teenagers use a variety of privacy-protective behaviors on SNS, including carefully managing the context (i.e., audience, platform) of their online self-disclosures and using privacy settings [37].

To date, there are no studies investigating autistic teenagers' attitudes and behaviors regarding privacy and safety on SNS from these users' own perspectives. All of the current research in this area has focused on parents' and professionals' reports about these users' online behaviors, who describe that autistic users are "naive" to online privacy and safety risks [38, 54] and demonstrate "impaired impulse control and judgment" [32] in response to complex online social situations. For instance, Macmillan et al. [54] conducted a survey study in which they aimed to investigate whether autistic "children" (ranging from 6 to 22 years of age) were more vulnerable to online safety threats than non-autistic children. They hypothesized that since autistic children are "naive" to threats, they would be at greater risk of online safety violations than non-autistic children, and use fewer strategies to protect themselves online. The researchers surveyed the parents to report their experiences on their children's behalf. Based on parents' reports, the researchers concluded that autistic children are more vulnerable to safety threats online than their non-autistic counterparts, and are less likely to engage in any strategies to protect their safety.

In contrast, researchers who interviewed autistic teenagers about their SNS use found that these users tend to be cautious about their privacy and safety on the Internet. For instance, Anderson and Philips [3] conducted a qualitative study exploring autistic teenagers' digital lives in general. While they did not investigate autistic teenagers' attitudes and behaviors related to privacy and safety on SNS in depth, they noted that most of their participants used privacy settings and rarely disclosed sensitive personal information (e.g., home address, health details, nude images) online.

Although it is possible that autistic teenagers may under-report their engagement in risky behaviors on SNS, there may be other reasons why their parents may have different views about their privacy and safety online that they do. For instance, some non-autistic parents and professionals may underestimate autistic users' competence to learn how to protect themselves due stigma towards this population [21]. To develop user-centered privacy tools to be used by autistic people, it is imperative to have an accurate understanding of their perceptions and experiences related

privacy and safety on SNS. This knowledge can only be gained by conducting inclusive research that prioritizes autistic users' own points-of-view.

2.4 Factors Affecting Privacy and Safety on SNS

Several interconnected factors affect teenagers' privacy on SNS. We provide on overview of some of the main factors highlighted in previous research.

2.4.1 Social Engagement. Social engagement has been defined as users' investment in establishing and maintaining social connections and participating in social activities [41]. Social engagement on SNS may take several forms, such as posts, comments, and reactions (e.g., "likes"). Teenagers vary widely in their level of social engagement on SNS. Research suggests that greater social engagement on SNS may increase teenagers' risk of encountering privacy and safety threats. For instance, Ang et al. [5] found that teenagers who frequently use SNS to communicate with others are more vulnerable to cyberbullying than less active users. Additionally, Leung [48] found that teenagers who use SNS excessively are more likely to be solicited for personal information by strangers online than those who regulate their use.

Autistic teenagers also vary widely in their level of social engagement on SNS, which may also impact their privacy and safety online. For instance, Kuo et al. [43] found that few of their autistic participants used computers for social communication (e.g., social networking, instant messaging), which may place them at low risk of social privacy threats (e.g., bullying). Nevertheless, the researchers also noted that some of their participants spent a relatively long time engaging in online social interactions, potentially because they rely on SNS to meet their social needs. Conceptually, it follows that these users may be at higher risk of privacy and safety threats on SNS than those who use these platforms less actively.

2.4.2 Social Anxiety. Social anxiety refers to fear of evaluation by others in social situations [46]. Socially anxious people tend to be cautious about disclosing personal details on SNS due to fear of evaluation [72], thus decreasing their social engagement and vulnerability to privacy violations. Yet, some socially anxious users rely online communication to compensate for their unsatisfying social life offline, which can lead to overuse [47, 79]. Many autistic teenagers are socially anxious due to bullying and exclusion that they experience offline [80]; this may have a positive or negative influence on their privacy and safety on SNS, depending on how the user chooses to integrate these platforms into their social lives.

2.4.3 Social influence and support. Caregivers play a crucial role in shaping teenagers' privacy attitudes and behaviors on SNS. In general, caregivers use two strategies to support teenagers' online privacy protection [5]: (1) active mediation, where parents discuss the risks and benefits of Internet use with the teenager, and teach them how to protect their privacy, and, (2) restrictive mediation, where parents use prohibitive measures (e.g., blocking websites) to limit the teenager's Internet use. Active mediation is the more effective method for preventing teenagers from jeopardizing their online privacy and safety [51, 92]. Nevertheless, caregivers of autistic teenagers typically use restrictive measures to control the user's access to technology (e.g., confiscating their devices, monitoring their online activities), with limited effectiveness [38].

Peers have an even greater influence on teenagers' privacy attitudes and behaviors on SNS than their caregivers. Teenagers often feel pressured by their peers to be constantly active on SNS [8, 11, 81], thus increasing their chances of experiencing privacy violations [5, 64]. However, peers may also have a positive influence on teenagers' privacy on SNS, as evidenced by the success of peer support programs embedded within online privacy education [85]. There is very little research providing insight into the role of peer influence and support on autistic teenagers' privacy

on SNS. However, some of the autistic teenagers in Anderson and Phillips' [4] study mentioned that they asked friends for advice about how to balance engagement in their offline and online lives.

Teachers also help teenagers learn to protect their privacy on SNS; however, the quality of support that teachers provide varies widely. For instance, Shin and Lwin [73] found that teachers are more proactive in instructing teenagers how to use the Internet safely than parents. In contrast, Van Gool et al.'s [85] findings suggest that teachers do not influence teenagers' self-disclosure behaviors online. Little is known about the role of teachers in shaping autistic teenagers' privacy attitudes and behaviors. However, Löfgren-Mårtenson et al.[53] investigated teachers' views on Internet use by youth with intellectual disability for romantic and sexual purposes. The researchers found that teachers were more aware of their students' online social and sexual activities than the students' parents. In many cases, the teachers were responsible for helping students to distinguish between safe and risky personal information disclosure during computer-mediated communications.

2.4.4   Experience with privacy violations. Previous experience with privacy violations has a positive influence on teenagers' attitudes and behaviors related to privacy and safety online [15, 22, 25]. Christofides et al. [25] found that teenagers who had a negative experience on Facebook were motivated to learn about and use privacy settings. Wasserman [88] argues that people with intellectual disabilities — including those who are autistic — can learn valuable lessons from overcoming privacy risks on the Internet, and should therefore be permitted to engage in positive risk-taking. However, caregivers often guard autistic youth from online privacy threats [20, 38], which can prevent them from developing the confidence and skills to protect their privacy on SNS on their own.

2.4.5   Accessibility of Privacy Settings. Most studies examining non-autistic teenagers' experiences with SNS do not emphasize difficulties with using the platforms. However, researchers have identified issues specifically with the privacy settings on SNS for teenage users. For example, most teenagers are aware of the "blocking" tool on SNS, but rarely use it out of fear of upsetting others [23]. Although researchers have yet to investigate the accessibility of privacy settings for autistic teenagers, previous studies show that mainstream SNS — in general — are not fully accessible for this population [6, 74]. Indeed, Bahiss et al.[6] found that some autistic teenagers can be overwhelmed by the amount of information displayed on SNS. Considering that privacy settings are hidden on most SNS, some autistic users may have difficulty finding these features on their account amid all of the other features and information on the platforms, which can prevent them from using these tools without support.

2.5   Research Gap

Despite increased attention on autistic users' privacy and safety online, to our knowledge, researchers have yet to investigate autistic teenagers' attitudes and behaviors towards privacy and safety on SNS from their own perspective. Additionally, there are no studies identifying personal and external factors that may be impacting their privacy and safety on SNS. Furthermore, little is known about how autistic teenagers' privacy- and safety-related attitudes and experiences on SNS compare with those of non-autistic teenagers. Therefore, the goal of our exploratory study is to answer the following research questions:

RQ1: What are autistic teenagers' attitudes towards their privacy and safety on SNS, and how do they protect themselves from threats?

RQ2: What are the main factors affecting autistic teenagers' privacy- and safety-related attitudes and behaviors on SNS?

RQ3: How do these attitudes, behaviors, and factors compare with those reported by non-autistic teenagers?

3 METHODOLOGY

We conducted scenario-based, semi-structured interviews with teenage autistic and non-autistic SNS users. In this section, we describe our participants, materials, procedure and data analysis approach.

3.1 Eligibility and Recruitment

Following ethics clearance, we recruited youth across Canada who were between 13 to 17 years in age; with or without Autism Spectrum Disorder [2]; used Twitter, Instagram, or Facebook (three of the most popular SNS for teenagers in North [4]); and were able participate in an English interview with or without support. Participants learned about our study through local autism organizations, social media, emailing lists and posters.

3.2 Participants

Table 1 presents participants' demographic characteristics.

3.2.1 Autistic. Twelve autistic teenagers (7 male, 4 female, 1 non-binary) participated in our research. Most were at least 15 years of age (M= 14.9, SD = 1.6), and preferred Instagram over Facebook or Twitter. Half used their preferred site every day, and had a public account. Most reported using a smartphone and/or laptop to go online. All had Internet access at home.

3.2.2 Non-autistic. Sixteen non-autistic teenagers (8 male, 8 female) completed our study. Most were 15 years of age or older (M = 14.7, SD = 1.3). Most preferred Instagram over the other SNS. Nearly all used their preferred site daily, and most had a private account. All used a smartphone to go online and had Internet access at home.

3.3 Scenarios

To maximize the clarity of our questions, we used scenarios as prompts for our discussions with participants. Autistic people benefit from visual stimuli and concrete examples to enhance their attention, comprehension, and learning [65]. To make our study as accessible as possible, we presented the scenarios as 13- to 20-second videos on the interviewer's laptop (see the Interview Guide in the Appendix). We created comparable videos for the three SNS involved. Although our scenarios and questions were mainly focused on Twitter, Facebook and Instagram, we encouraged participants to also discuss their experiences with other platforms that they use.

   At the beginning of the interview, we introduced participants to the main scenario of the study: a female user of their preferred SNS is looking for advice about how to protect her privacy online. It is crucial to note that we only used the scenarios to introduce the topic of discussion. For each scenario, we almost immediately moved from asking for participants' privacy advice to discussing *their own* attitudes and experiences. Therefore, the specific qualities of the scenarios (e.g., the character's gender) had a negligible effect on our data. We presented a total of five scenarios featuring the same character to assess participants' thoughts, reactions and experiences with common social privacy risks:

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[2]We did not require the autistic teenagers to have a formal diagnosis of Autism Spectrum Disorder to be eligible to participate in our study. Formal diagnosis is difficult for many autistic people to obtain, due to several barriers, such as cost, gender and racial bias, as well as stigma and misconceptions about autism perpetuated by health professionals [49, 50]. Therefore, self-diagnosis should be considered valid when recruiting participants for autism research.

Table 1. Summary of participant demographics, reported as counts

	Non-Autistic (n=16)	Autistic (n=12)
Gender		
Female	8	4
Male	8	7
Non-binary	0	1
Age in years		
13	3	2
14	5	1
15	3	6
16	3	2
17	2	1
Preferred SNS		
Instagram	14	8
Facebook	0	3
Twitter	2	1
Frequency of SNS use		
Every day	11	6
A few times per week	1	4
Once per week	0	1
Less than once per week	0	1
SNS Profile Privacy Setting		
Public	5	6
Private	9	5
Private & Public	2	1
Device used to go online		
Smartphone	16	9
Tablet	1	3
Laptop	4	9
Desktop computer	3	5
Gaming system	1	1
Access to Internet at home		
Yes	16	12
No	0	0

Scenario 1 **_General self-disclosure:_** The character announces that she got a new puppy. She asks with whom she should share the picture. This scenario served as a prompt for questions assessing participants' attitudes towards disclosing personal content on SNS — specifically, who they wanted to see their content and their privacy concerns.

Scenario 2 **_Self-disclosing to strangers:_** The character explains that someone she does not know started following her account. She asks for advice about what she should do in this situation. The aim was to understand participants' views on allowing strangers to see their content on SNS. We also wanted to assess participants' interest in interacting with strangers and making friends online.

Scenario 3 *Non-consensual disclosure by others:* The character says that her friend posted an embarrassing photo of her online. She wants to know what she should do in this situation. The aim was to examine participants' strategies for dealing with non-consensual disclosure on SNS and cyberbullying.

Scenario 4 *Using privacy settings:* The character explains that she does not know how to set her account to private; she asks participants if they know how to do it. The goal was to assess the accessibility of the private account settings on SNS. To do this, we provided participants who completed the study in-person access to the character's account and asked them to make it private. We took observational notes of difficulties they encountered. We also prompted them to describe their experience accomplishing this task, and asked for feedback on how to make the privacy settings more accessible.

Scenario 5 *Other privacy protection strategies:* The aim of this scenario was to provide participants the opportunity to discuss other strategies that they use to protect their privacy on SNS. In the video, the character asks if there is anything else that they do to keep their personal information safe. We probed participants to discuss who taught them how to protect their privacy and safety on SNS, what strategies they used to do so (e.g., formal instruction, direct assistance), and whether they were satisfied with the support they received.

3.4 Procedure

Interested participants contacted the lead researcher to schedule the semi-structured interview. The interviews took place in a public library (n = 16), private office space on campus (n = 7), or via Skype (n = 5)[3]. At the beginning of each session, participants' parents read and signed an informed consent form, and participants provided verbal assent to complete the interview and to be audio-recorded. All participants had the option to have a parent accompany them or remain nearby during the sessions. We included this option to ensure participants' comfort and to make our interviews as accessible as possible for those who may sometimes have difficulty with communication. None of the participants required communication support; however, one autistic and two non-autistic participants chose to have a parent nearby. During the sessions, participants watched the scenario videos for their preferred SNS and answered relevant questions in conversation with the researcher. Afterwards, they were debriefed and compensated with $30 for their time. The sessions ranged from 20 to 60 minutes.

3.5 Data Analysis

All of the audio recordings were transcribed verbatim and imported into Atlas.ti [4] software for analysis. The lead researcher — who is autistic, has degrees in psychology and human-computer interaction, and experience conducting research with neurodivergent people — conducted a thematic analysis on autistic and non-autistic participants' transcripts separately. Thematic analysis is a "theoretically flexible" [13] approach that is appropriate for exploratory research. The lead researcher reviewed the transcripts and applied descriptive codes. Then, similar codes were grouped into themes and sub-themes. When examining participants' privacy attitudes, the lead researcher used Soffer and Cohen's [78] classification as a theoretical framework (see Section 2.3) to guide their analyses; we examined features (e.g., use of privacy settings, expressed privacy and safety concerns, online engagement) and patterns in each participants' responses to categorize them into one of the four Groups.

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[3]Data collection occurred prior to the COVID-19 pandemic.
[4]https://atlasti.com/

To assess the reliability of the coding structure, a second coder (non-autistic, undergraduate research assistant) analyzed 20% of the transcripts (see the Appendix for examples of our coding for inter-rater reliability). We found good reliability in that the two raters applied 72% of the same codes to the transcripts. The main reason for the disparity was that the lead researcher frequently applied more codes than the secondary coder, possibly due to their greater familiarity with the data and research topic. The lead researcher noted and reflected on the differences in how the second coder interpreted the transcripts. When they agreed with the second coder's interpretation, they changed the coding accordingly. Ultimately, approximately 12 hours of audio-recordings were manually transcribed, and 1334 individual quotations were coded.

Our decision to use a qualitative data collection approach offered us several methodological advantages over traditional surveys for conducting research on our topic and with our populations of interest: (1) qualitative research is ideal for exploring under-studied phenomena [57]; (2) autistic teenagers with intellectual disability may have difficulty reading written text, which would have been a disadvantage if we used surveys; and, (3) unlike surveys, semi-structured interviews offer the flexibility of rephrasing questions that may be unclear, thus improving the accuracy of participants' responses. At the same time, there are limitations to our approach. In particular, group differences are difficult to establish in qualitative research.

To ensure that we present our data as objectively as possible, in the results section, we report our findings for the autistic and non-autistic groups separately for each sub-theme without making direct comparisons; the only exception is the privacy and safety behaviors theme, where we present both groups' findings together due to the strong overlap between the samples. Note that when we report direct quotations from participants, we identify them by their group (A = autistic, NA = non-autistic) and participant number (e.g., A4, NA2). Additionally, in line with standard practice in qualitative research [33, 69], we do not include the number of participants who reported each experience or perspective (except for privacy preferences, where participants were classified into Groups); the semi-structured format of our interviews means that topics were explored to varying degrees with each participant, and therefore, counts do not adequately reflect the prevalence nor importance of a finding. In the discussion section, we highlight the most salient similarities and differences that we observed between the groups to answer RQ3.

4 RESULTS

In this section, we present the findings of our thematic analyses of the autistic and non-autistic participants' transcripts. We begin by describing our findings related to both groups' attitudes and behaviors related to privacy and safety on SNS. Afterwards, we report the factors affecting participants' online privacy and safety that emerged from our data. A summary of our findings is presented in Table 3.

When reading this section, it is important to keep in mind that we are only summarizing trends in our data from the small sample of autistic and non-autistic teenagers who participated in our study. In line with standard practice in qualitative research [59], we use phrases like "some", "most", or "a few" to give an indication of how commonly mentioned each reported attitude, behavior, and factor was among our group of participants; however, they are not intended to be generalized claims about their prevalence beyond our specific sample. Our qualitative findings provide a basis for designing future quantitative research with a large enough sample for which tests of significance could be done to confirm our findings.

Table 2. Number of participants per group according to Soffer and Cohen's classification [78]

	Non-Autistic (n=16)	Autistic (n=12)
Group 1 - no need for online disclosure	1	4
Group 2 - value privacy over authentic profile	4	5
Group 3 - balance authentic profile and privacy	8	2
Group 4 - value authentic profile and sharing	3	1

4.1 Attitudes towards Privacy and Safety

Privacy and safety attitudes refer to participants' general preferences related to sharing personal information on SNS — based on Soffer and Cohen's [78] classification (see Section 2.3 for summary) — and their concerns.

4.1.1 Preferences.

Non-autistic. Half (n = 8) of non-autistic participants belonged in Group 3 in Soffer and Cohen's [78] classification of teenagers' privacy preferences (see Table 2 for summary); these participants were comfortable posting personal information on SNS, but only because their profile was private. For example, one participant was not concerned about sharing photos of themselves due to privacy settings. When asked if there is anyone who they would not like to see their photos, the participant replied: *"Well, random people. But out of the people that are following me, no"* (NA13). Participants like this one placed equal importance on privacy and developing an authentic profile.

Four non-autistic participants belonged in Group 2; they used SNS to post photos related to their hobbies, interests and experiences, but were uncomfortable publicly posting personally identifying content (e.g., photos of themselves, full name) online. For instance, one participant explained that they did not post photos of themselves on SNS because they *"always found it a little weird"* (NA14). They also did not disclose any other personally identifying information on their private account, but enjoyed sharing funny memes and showcasing their hobbies (e.g., guitar playing) on SNS.

Three non-autistic participants belonged in Group 4: they were very liberal in their self-disclosure on SNS. These participants openly disclosed personally identifying information on their public profile. For instance, one participant was comfortable with anyone seeing their profile; they did not feel the need to take any measures to restrict access to their content unless triggered to do so: *"Personally, my account is public, so I don't really mind who sees it. But if I see something sketchy, I would block the account or erase the comment or whatever"* (NA1). This participant and others in Group 4 prioritized authentic self-disclosure over privacy protection.

Only one non-autistic participant belonged in Group 1: they described themself to be a *"ghost"* (NA15) on Instagram, who only used the platform to talk to their friends through direct messages and view other users' posts.

Autistic. Five autistic participants belonged in Group 2 of Soffer and Cohen's [78] classification. These participants occasionally posted on SNS, but exclusively about their talents, hobbies and interests. For example, one autistic participant used Instagram to showcase their artwork; however, they did not include their name or other personally identifying information on their profile, because they did not want their classmates and other people they do not trust to know that the artwork was theirs: *"Let's just say, I wouldn't want people in my class or a lot of other people that I don't know [to see my profile]"* (A5).

Four autistic participants belonged in Group 1: they almost never posted content on SNS, and mainly used the platforms to view and provide feedback on other users' posts: *"I browse, I give a like, I comment. Done"* (A9).

Two autistic participants who belonged in Group 3 tried to balance both privacy and self-disclosure on SNS. For example, one autistic participant had two Instagram profiles: a public profile to showcase their photography, and a private profile to share personal photos.

Only one autistic participant belonged in Group 4; they were fairly open on SNS, mainly because they relied on the Internet to stay in contact with their long-distance friends: *"I'm pretty open, 'cause I want people to know about things [going on with me]. I change schools a lot, so I like being in touch with my friends"* (A4).

4.1.2 Concerns.

Non-autistic. Most non-autistic participants downplayed the privacy and safety risks of online social networking. Although all non-autistic participants were aware that there may be predators on SNS, most doubted that these strangers would target them. For instance, one explained that they do not disclose their full name on Instagram, because *"then [strangers] can Google me and then they can figure out where I live and then they'd stalk me"* (NA13). However, they immediately clarified that they do not think anyone would actually stalk them: *"That's probably not going to happen"* (NA13). Moreover, none of the non-autistic participants were concerned that peers may threaten their privacy on SNS. They trusted their friends to protect their privacy and to abide by their implicit or explicit disclosure preferences. For instance, one explained: *"My friends know that I don't like to show my face on Instagram, so they don't usually put it on"* (NA10). Also, none of the non-autistic participants expressed concerns about being bullied on SNS, partly because they felt confident that they can restrict access to their profile to people they know and trust: *"I'm friends with the people I follow. The people who dislike me don't follow me"* (NA11).

Autistic. Nearly all autistic participants mentioned extreme privacy and safety threats that could be related to posting on SNS (e.g., robbery, kidnapping, stalking, murder). In a few cases, participants described some extreme threats as highly unlikely to occur, but still important to consider when deciding what is safe to post online. For instance, one said that it is unsafe for teenagers to include the name of their school on their Instagram profile, because *"it could end horribly [...] it could end up in a school shooting, if worse comes to worst"* (A8). When asked about the likelihood of this threat, they replied: *"Slim to none. But it can still happen [...] It's something to be aware of"* (A8).

Nevertheless, many autistic participants discussed threats on SNS with genuine fear of being targeted. For instance, one autistic participant said that they do not post their location or photos of themself online, because they are afraid of being recognized and kidnapped: *"Strangers see similar faces. They see them on the streets, 'oh look! You're from Facebook' and you could get kidnapped or something. That's what I'm afraid of"* (A2). Similarly, another autistic participant worried about being robbed if they disclose their location on SNS: *"There are some bad people on the Internet. They can go over to your house and rob you by finding out your location"* (A11). A few autistic participants were also afraid of being catfished or of their account being hacked. Furthermore, some were concerned about being bullied on SNS, particularly by their offline peers. For example, one autistic participant explained that they were being bullied at school: *"Some of the people at school do make fun of me [...] I've heard from my friend saying that people have been saying stuff about me"* (A11). Although they never experienced any bullying on SNS, they worried that their offline bullies may be laughing at the content on their public profile behind their back: *"It's kind of uncomfortable, because they can be making fun of me"* (A11). Nevertheless, none of the autistic participants were concerned about their privacy being threatened by their close friends.

4.2 Privacy and Safety Behaviors

Both autistic and non-autistic participants used the same strategies to protect their privacy and safety on SNS. To minimize redundancy, we will describe both groups together. The most common strategies that both autistic and non-autistic participants reported were: (1) deciding who to trust, (2) managing access, (3) negotiating consent, and (4) filtering out personal information.

4.2.1 Deciding who to trust. One of the greatest challenges that both autistic and non-autistic participants faced with protecting their privacy on SNS was deciding who outside of their offline friend group they can trust online. Both groups described strategies that they use to detect possible online predators. Some participants said that they checked their followers' profiles for suspicious or inappropriate content. In these cases, both autistic and non-autistic participants relied on complex informal heuristics (e.g., gut instincts) to decide if they can trust the stranger. For instance, one non-autistic participant allowed two unknown accounts to follow them because they approved of the content posted on their profiles: *"One was a platform for feminism, so I was okay with that. And there's another one that just shows pictures around the world, so I didn't think of anything much of it"* (NA6). Similarly, one autistic participant screened their followers' accounts for sexual content: *"I looked at their Instagrams to see if they're okay or if I should block them or something. If I see something that's too sexual, like bathing suit pics [...] I'm like 'no' "* (A4).

Some autistic and non-autistic participants were comfortable with allowing anyone to follow their account, as long as they did not give them a "*bad vibe*" or do anything overtly creepy, such as liking or commenting on too much of their content and sending them unsolicited direct messages:

> NA7: *If the communication is kind of out of nowhere and it's very forward and abrupt, I don't want that. Obviously, everyone has ghost followers that don't really interact with your page. So, if I had someone who was following me like that, and then all of a sudden they decided to try to talk to me, I would be kind of weirded out. Like, you never "liked" any of my pictures or anything like that. So, I would be weirded out.*

> A4: *I just have a gut feeling sometimes — when you like see someone and you're just like "that person gives me a bad vibe and I don't like them".*

Meanwhile, other participants decided that the safest option is to distrust anyone they do not know on SNS:

> NA3: *I think Instagram is a platform where you should share your everyday things — somewhere you can document it. Sharing that with someone who you don't know at all, it's not really important and it's not really safe.*

> A12: *I just don't really like talking with people I don't know personally. And it's just easier if I have friends who I actually know, instead of online friends where they can be anybody.*

4.2.2 Managing access. Autistic and non-autistic participants used several strategies to manage access to the content on their online profiles:

(1) **Privacy settings:** Both groups used privacy settings (e.g., private account, report, block) as a main line of defense against privacy violations on SNS. As shown in Table 1, half of autistic participants and over half of non-autistic participants reported that they set at least one of their accounts on their preferred SNS to "private" to prevent people they do not know from accessing their personal content. A few participants in each group also previously blocked or removed followers and reported inappropriate content on SNS. Furthermore, one autistic participant said that they used the mute option on chatting platforms (e.g., Discord): *"You can have your setting as 'Don't talk to me unless you're my friend' or send a friend request and all of that. I have it for a few servers"* (A4).

(2) ***Multiple accounts:*** A few participants in each group reported having both a public and private account on their preferred SNS. These participants posted different content on each of their accounts in order to carefully curate their private and public personas. For instance, one non-autistic participant had a public account to advertise their photography, and a private account for their own entertainment: *"My non-private account [is] just for like if I want to post really nice pictures. And my private account is just for stupid posts that I find funny, or my friends would find funny"* (NA16).

(3) ***Multiple platforms:*** Several participants in each group mentioned using different SNS to connect with different audiences as well as to maintain strict boundaries between their public and private lives. For example, one non-autistic participant used Facebook to stay in touch with their family, and other SNS to interact with their friends: *"It's kind of like Instagram and Snapchat for my friends, [and] Facebook is for my relatives"* (NA1). An autistic participant used the same strategy: *"Facebook is just for keeping in touch with family. That's all Facebook is to me"* (A4).

(4) ***Disappearing content feature:*** Participants in both groups mentioned that they sometimes used the disappearing photos/videos feature on SNS to post content that they did not want on their profile indefinitely. For example, one autistic participant used Instagram Stories to share photos of themselves that they did not feel comfortable posting on their profile: *"If I am going to post my own photo, I normally do it on my Story, because it would just be quick"* (A1).

4.2.3 Negotiating consent. Both groups discussed negotiating consent with their friends in relation to posting photos on SNS. Participants had a mutual understanding with their friends about what personal content should and should not be posted of each other online:

NA7: *All my friends, we know we're not gonna post embarrassing pictures of each other online, 'cause that's not cool.*

A5: *Most of [my friends] are like me and they don't like having their picture taken. We're all kind of introverts.*

Participants trusted that their friends would not post a photo of them against their consent. If their friends were to post a photo of them that they did not want online, participants in both groups said that they would be comfortable asking their friends to remove it:

NA2: *If my friends [post an embarrassing picture of me], I'd just ask them not to do it 'cause they'll understand that I don't want it on there. And they'll just take it down.*

A2: *I would put, "please take it down, It's kind of rude and embarrassing. Thank you".*

4.2.4 Filtering out personal information. Both groups protected their privacy on SNS by limiting the type and amount of personal information on their profile. Most autistic and some non-autistic participants were particularly cautious about posting photos of themselves or their friends online:

NA10: *There's no pictures of my face or my friends.*

A10: *I don't know who I can trust [...] So, I just don't post pictures of myself.*

Most participants were also wary about disclosing their location, address, full name, age, and contact information on their profile.

4.3 Factors Affecting Privacy- and Safety-Related Attitudes and Behaviors

We identified several personal, social, and SNS design factors influencing autistic and non-autistic participants' privacy and safety on SNS.

4.3.1 Personal Factors. Three main personal factors influenced participants' privacy and safety on SNS: (1) social engagement, (2) social anxiety, and (3) experience with privacy violations.

Non-autistic: Social Engagement.   Most non-autistic participants used SNS frequently and actively to connect with others, describing these platforms as useful communication tools: *"it's a good source to communicate with your friends"* (NA10). When asked what they do on SNS, almost all said that they used their account to send direct messages to their friends as well as to view, "like", share, and comment on other users' posts: *"I look through the things on my timeline and if I see anything funny or that's relatable to me and my friends, I'll send it to them"* (NA7). Most non-autistic participants also posted a wide variety of photos on their profile, including pictures of themselves, friends, family, pets and memories.

A few non-autistic participants reported having online acquaintances or friends who they met through Twitter or Instagram. One of these participants only talked to their online acquaintances about one common interest: *"We'd just talk about memes"* (NA16). They did not consider these users to be their real friends, because they did not know much about them personally: *"I don't know if we have anything else in common except memes"* (NA16). Other participants were comfortable discussing their personal life with people they met on SNS: *"[We talk about] pretty much anything [...] Like, school and stuff. And things that are going on"* (NA5). They considered these users to be their real friends, even though they never met them in person.

Autistic: Social Engagement.   In general, autistic participants preferred to use SNS to stay up-to-date with their friends and interests, rather than share their own content and build their social network: *"I'll go on just to see what my friends have posted and stuff"* (A10). Many autistic participants occasionally used the direct messaging feature to make plans with friends, work on group school projects, or privately share interesting posts. Nevertheless, most admitted that they did not maintain an active presence on SNS, especially in public disclosure contexts. Indeed, over half of autistic participants said that they very rarely posted on their profile; as one reported: *"Usually, I don't post much on Instagram. I just check it once in a while"* (A9). Although many were content with being relatively '*"invisible"* on SNS, some felt pressured to be more active on these platforms than they personally preferred to meet (what they perceived to be) their friends' and other followers' expectations. For instance, one autistic participant believed that they did not post enough on Instagram, which they primarily used to connect with the online art community: '*I don't post as often as I should"* (A5). Similarly, another participant was concerned about the social pressure that may come from gaining more followers on Instagram:

> A4: *I don't want more followers [...] But at the same time, I want more followers. It's like Instagram is trying to trick you into staying on Instagram. It's like the more followers you have, the more people you want to, like, live up to. It's like "oh, they're following me. That means I have to post more" and stuff like that. It's just weird.*

None of the autistic participants had online friends or acquaintances who they met through Instagram, Twitter, or Facebook. However, half of participants mentioned that they interacted with people they do not know on Discord — a chat platform originally designed for video game players, but is used for other special interest communities as well. As one participant explained: *"Discord is just a place where you get more stuff in common. You get to meet people you have stuff in common with"* (A4). Most of the autistic participants who used Discord almost exclusively talked to other users about common interests, and considered these users to be acquaintances rather than friends: *"I'm not necessarily friends with them. I just join in on conversations"* (A12). However, one had an online friend who they connected with on a personal level: *"I think the only person I've ever been most open with is my [online] bestie. [He's] the only person I trust in an online forum, because he's chill. He's very chill"* (A4). That said, this participant was generally hesitant to discuss their personal life with people they do not know online, unless they first chatted with them about common interests for several months and did not get a *"bad vibe"*:

A4: *There's a wall. You can't pass the wall. Like, people are like "yo, when's your birthday?". And I'm like "you hit the wall" [...] It's just like every information to me is private. So, unless I know them for like over 6 months, I open up with them a bit — like, a bit* (A4).

When asked why they had difficulty opening up to strangers on SNS, the participant described being hurt by users who they trusted in the past, and did not want to take the risk of that happening again: *"I know I trusted a lot of people that I've blocked or erased forever in my life. I tried trusting them again — regrets! The biggest regrets of my life! I've deleted them from my life"* (A4).

Non-autistic: Social anxiety.   Non-autistic participants reported few signs of social anxiety on SNS. None mentioned being too shy to talk to users they do not know. Also, none expressed strong concerns about being judged for the content posted by or about them online. For instance, many said that their friends sometimes posted embarrassing photos of them on SNS as a joke. Although the participants were a bit self-conscious about their appearance in these photos, they were not uncomfortable enough to ask their friends to remove the posts: *"If it's a funny picture, I know my friends are just doing it to be a good laugh. And I have a good sense of humor about it"* (NA3).

Autistic: Social anxiety.   Most autistic participants reported signs of social anxiety on SNS, which deterred them from actively using the platforms. For example, more than half did not want any photos of themselves on their profile, because they were insecure about their appearance:

A1: *I am self-aware of my own appearance and basically how judgmental the rest of the world could be.*

A11: *I don't really let people take pictures of me [...] 'cause people can be rude.*

One autistic participant described an incident where they deleted all of the photos of themself on their profile, because they were experiencing self-esteem issues: *"I once just deleted every picture that had my face in it or body, 'cause I was just having a bad self-esteem moment and so I was like, 'delete, delete, delete, delete'"* (A4). Furthermore, several admitted that they were too shy to talk to people they do not know on SNS: *"I'm pretty shy when talking to people online. But, like, my friends I'm fine. But other than that, I don't usually"* (A5).

Non-autistic: Experience with privacy violations.   Fewer than half of non-autistic participants reported that they previously experienced privacy violations on SNS. The most common type of privacy violation that this group reported was unsolicited contact by strangers. A few non-autistic participants previously received unsolicited romantic/sexual direct messages or spam from people they do not know on SNS. For example, one female non-autistic participant received unwanted romantic messages from older men on Instagram: *"I've had older guys who are like in their 20s or 30s try and almost make marriage proposals to me. And so, I'm like, yeah, no. This is not happening"* (NA7). Nevertheless, very few non-autistic participants reported that they were harassed or involved in cyberbullying on SNS. Indeed, only one non-autistic participant mentioned previously being involved in online conflicts: *"There have been people — like, I comment on someone else's post and then got into a fight with them online because they don't know the full story or they're making up things"* (NA7).

Autistic: Experience with privacy violations.   Fewer than half of autistic participants reported experiencing privacy violations on SNS. That said, involvement in cyberbullying, both as victims and unintentional perpetrators, was relatively common in this group. A few autistic participants described being bullied by people they do not know on SNS. One explained that they had to block some users on Instagram who were harassing them on another SNS: *"There's a lot of people who harass [me] from other social media who have found [my Instagram profile]. I'm like, 'stay away! I'm blocking you. Go away'"* (A4). One said they occasionally received *"rude"* comments on their posts.

Another mentioned that they did not talk to people they do not know on Instagram and had set their profile to private, due to a negative experience interacting with strangers on another SNS platform several years ago.

Also, a few participants described situations where they experienced conflicts on SNS, because others misinterpreted their posts as intentionally rude or malicious. For instance, one autistic participant described an incident when they were asked to remove a post that others labelled as offensive but that the participant intended to be harmless:

> A1: *When I posted a picture of my brother's room, I was like, "why doesn't he clean up"? I wanted to hear everyone else's opinion. And then my mom was like, "that's inappropriate. Do not post that". So, I simply deleted the post. No one has ever seen it since.*

Similarly, another autistic participant was offended by one of their friends' posts on Instagram, which they may have interpreted more literally than intended: *"We went to a soccer tournament over the summer and then my friend posted a picture of the medal. He was like, 'hey, I won this yesterday'. I was like, 'hey, don't forget about me! I was there too' "* (A10).

Additionally, two autistic participants received unsolicited sexual messages from strangers on SNS. For instance, one participant frequently received inappropriate comments and messages from strangers on Facebook, even though they had a private account:

> A2: *See, if someone finds your picture a nice picture, maybe something wrong could happen with it. Maybe bad comments [...] Inappropriate [comments], from random people.*
> Interviewer: *Has this happened to you before?*
> A2: *A lot.*

Similarly, another participant said that they received unsolicited nude photos from people they do not know on Instagram, which made them uncomfortable: *"Like, nudes — I immediately block, report, done. Go away"* (A4).

4.3.2 Social Factors. Two main social factors affected participants' privacy- and safety-related attitudes and behaviors on SNS: (1) support and (2) influence.

Non-autistic: Support. Non-autistic participants received support from teachers, family members and friends to learn how to protect their privacy and safety on SNS. Many specified that the recommendations they received mainly related to filtering out sensitive personal information. In particular, most non-autistic participants said that they were advised not to share personally identifying information, such as their full name, address, and location, to protect their physical safety. Some also noted that their parents and teachers told them to consider the potential impact of their digital footprints on their future opportunities before posting on SNS. Additionally, most non-autistic participants indicated that their parents and teachers advised them to be cautious about whom they communicate with on SNS. Specifically, most were told not to talk to strangers online, especially those who seemed untrustworthy: *"My mom told me, 'don't talk to anybody that you don't know, and don't talk to anyone that's, you know, like... I guess weird'"* (NA7). Moreover, some said that they primarily learned about preventing cyberbullying in school.

When asked who taught them about privacy settings on SNS, a few non-autistic participants said that they learned about the tools and how to use them from their friends or parents: *"I think one of my friends taught me how to [set my account to private]. When I first got Instagram, they recommended that I make my account private so that others can't see what I post"* (NA10). Almost all of these participants received verbal instructions about how to adjust their privacy settings in their preferred way: *"I knew that you can make your account private, but I really didn't know at the beginning [how to do it]. [My friend] taught me that you just go here, click on that, and then you can*

make your account private" (NA9). One non-autistic participant said that someone else had set their account to private for them.

In general, non-autistic participants seemed neither satisfied nor dissatisfied with the support they received to learn about how to protect their privacy and safety on SNS, particularly from their parents and teachers. When asked if they are interested in learning more about online privacy and safety, almost all of them felt like they already knew enough about the topic: *"I'm happy with what I know now"* (NA16).

Autistic: Support. Autistic participants received support from their family members, friends, teachers, and healthcare professionals (e.g., speech pathologist) to protect their privacy and safety on SNS. Most of the advice they received about online privacy focused on preventing cyberbullying, filtering out sensitive personal information, and not interacting with strangers. When discussing their experiences with learning about online privacy and safety, many autistic participants seemed dissatisfied with the quality and quantity of education offered to them. Several felt like their parents' and teachers' recommendations were restrictive — like a checklist of behaviors to avoid:

> A1: *[My teachers] just sort of said, "don't share inappropriate photos", "don't talk to people you don't know", "don't agree to meet up with people", [...] "you can't do this", "you can't do that", "you can't talk to these kinds of people", "don't respond to these kinds of emails".*

Some also described their school's curriculum about online privacy and safety as overly repetitive and boring. For instance, one autistic participant reported:

> A4: *Schools have so many assemblies about [online privacy]. They have a yearly assembly. At my old school, I saw it all the time and then I was just there like, "I already memorized the whole script. Can you leave me alone?".*

Nevertheless, the participant took the advice seriously, as did the other participants in this group:

> A4: *Teachers are just like, "don't do this, don't do that", and I'm like "okay". And it's like engraved in your brain and whenever you're gonna do that, you're like, "uh, should I?". Your brain's like, "excuse me. The adults told you watch out".*

Additionally, most autistic participants said that they received support from others in their inner circle to learn about privacy settings on SNS. For instance, one said that their sister helped them to understand the private account option on Instagram: *"Well, when I'm trying to follow people [...] I've seen that you can't see their pictures. And so, I asked my sister about that and she said that means their account is private"* (A11).

Although some were able to find and use the privacy settings on their own after they became aware of them, others required assistance to do so. Some received verbal instructions: *"I didn't know where to find [the private account option]. All of my friends were like, 'it's right here'"* (A1). However, many received more active assistance. Indeed, a few autistic participants indicated that their friends or parents tried to show them how to adjust their privacy settings by taking hold of their device and doing the steps for them: *"My friends, they just snagged the phone and they're like, 'this is what you do'"* (A4). A couple of participants said that their lack of autonomy in those moments led to temporary distress. One explained that their phone served as an important tool to help them manage some of their challenges related to being autistic: *"It helps with my autism, my phone [...] It's like, being able to call my mom if I'm having an attack or something. And also music helps calm me down"* (A4). Therefore, they felt anxious when they did not have direct access to their device while their friends were changing their privacy settings for them.

Furthermore, some autistic participants also relied on their friends to help teach them about features on SNS that could be used in cybercrimes, like catfishing. For instance, one autistic

participant mentioned that they were completely unaware of the voice changer feature on Discord until their friends brought it to their attention:

> A4: *My [online] friend, he used to use a voice changer and [...] he'd start talking to me in that voice at the beginning [...] I was [on Discord] for like a month, so I didn't like catch on properly. But all my other friends were like, "yo, you know this kid's like 13, right?". I'm like "oh, he sounds like he's 16. This is so weird".*

This situation taught them not to take unknown users' online persona at face value.

Non-autistic: Influence. Non-autistic participants' privacy attitudes and behaviors on SNS were strongly influenced by those around them — especially their friends and classmates. All of them believed that their friends had a positive influence on their privacy and safety on SNS. Several said that they learned about the privacy and safety risks of SNS use and how to respond to them based on their friends' and classmates' experiences. For example, one female participant said that she became more aware of the risk of sexual solicitation on SNS by observing her friends' reactions to these situations: *"I have a lot of friends who get pictures from random guys. So, you hear what they do, and consider if it happens to me, what do I have to do? Then you kind of just learn from there"* (NA3). Also, a few non-autistic participants followed their friends' lead in setting their profile to private: *"I asked [my friends], 'why is [your profile] privated'? And they were like, 'just to protect it, I guess'. I was like, 'might as well do that too myself'"* (NA2).

Very few non-autistic participants mentioned that their parents heavily influenced their SNS use, by limiting the amount of time that they could spend on the platforms. As one reported: *"When I'm done my homework, [my mom would] let me have like 5 minutes of free time. So, I just go on my Instagram to chat with my friends"* (NA9).

Autistic: Influence. Autistic participants' family members and friends played a major role in shaping their attitudes and behaviors related to privacy and safety on SNS. Their parents seemed to have the greatest influence on their online privacy and safety. Several took measures to protect themselves on SNS primarily to minimize their parents' concerns. For example, when asked why they have a private profile, one autistic participant explained: *"My mom just feels more comfortable with me having a private account"* (A8). Additionally, some mentioned that their parents enforced time limits on their SNS use, which prevented them from using these platforms excessively. Conversely, a few said that their parents tried to promote their use of SNS, despite their disinterest in some platforms. For instance, one explained that they do not enjoy using Facebook, but their mom encouraged them to use the site to connect with family.

A few autistic participants also mentioned ways that their friends and classmates influenced their privacy and safety on SNS. One reported that they observed a lot of cyberbullying within their peer group. This prompted them to protect themself on SNS by not posting anything that may cause them to be targeted. Another participant became motivated to learn more about the blocking feature on Instagram to help one of their friends:

> A10: *One of my friends got blocked. They were in an argument with their friend, and one of their friends blocked them. They thought it was a glitch, and I was like, "no, I'm pretty sure that means they blocked you". Then I looked it up, and yeah [I was right].*

4.3.3 SNS Design Factors. Both groups' privacy- and safety-related attitudes and behaviors were affected by the accessibility of the privacy settings and the usability of SNS in general.

Non-autistic: Accessibility of Privacy Settings. Overall, non-autistic teenagers did not mention any substantial issues learning to use the privacy settings on SNS, describing them as easy to use: *"It is just kind of an obvious interface"* (NA5). Once they became aware of the options, almost

all non-autistic participants were able to find and use the tools on their own or with minimal instruction. When asked to demonstrate or explain how to use the private account feature during the interview sessions, none had issues doing so, even if they personally had a public account.

Nevertheless, non-autistic participants were hesitant to use privacy settings on SNS — namely, the reporting and blocking features — because they found these tools aggressive. For instance, all of them said that if their friend posted an embarrassing photo of them online, they would just ask their friend to remove it instead of reporting the post, because they would not want to upset them. As one explained: *"You're not gonna report [the photo] unless you've already told your friend that you don't want it there. No one would really kill a friendship over an Instagram post"* (NA11).

Additionally, non-autistic Instagram users had difficulty knowing whether their friends' accounts were private or public because this information is not displayed on users' profiles. They needed to rely on their memory to know their friends' privacy settings, which did not always lead to accurate beliefs — especially given that their friends may have changed their privacy settings over time. For instance, one non-autistic participant tried to show the interviewer how a private account appears to users who are not following it by navigating to a friend's profile that they believed was private, based on their memory of sending a request to follow the account. They were surprised to discover that their friend's account was not private after all:

> NA8: *If we go to, let's just say (searches friend's account) ... I think it's private... No, it's public. What the f*ck? That's weird... I'm trying to find one that was private...(searches another friend's account) Damn it! You keep it public too? Who do I know who has a private account? I don't really know. I don't really remember off the top of my head.*

Furthermore, some non-autistic participants thought that the "report" tool was ineffective. For instance, one said that they tried reporting hate speech on Twitter, but the post was not removed. Based on their experience, they concluded that "*the report button doesn't really do much*" (NA4).

Autistic: Accessibility of Privacy Settings. Autistic participants had mixed experiences and opinions regarding the usability of the privacy settings on SNS. When asked to demonstrate or explain how to set an SNS account to private during the interview sessions, only a couple of autistic participants were unable to do so, possibly due to accessibility issues with the tools. While some participants had no difficulty whatsoever accomplishing this task, others described the process as *"complicated"*. Most notably, some had trouble finding the private account button, because it was hidden among many other options in the settings tab. As one explained: *"There were tons of settings [...] What is this maze?!"* (A1). Many coped by searching for keywords (e.g., "privacy") on the screen: *"You just go through your settings and then you'll find it. Use keywords. Like [when I see] 'privacy', I'm like 'yeah, that's gotta be private your account'"* (A4). This approach did not work for one autistic Twitter user, because the private account option on their preferred SNS ("Protect Your Tweets") did not contain the keywords they expected: *"I glossed over [the 'Protect Your Tweets' option] because I really didn't understand what it meant until I read the subtext on it"* (A12). The participant advised Twitter to change the labelling of the privacy setting to be more explicit: *" I think they should probably rename [the option] to something like 'make your tweets private' [...] I think that they should make it more obvious"* (A12). Autistic Instagram users also struggled to remember whether their friends' profiles were public or private: *"Once you start following [other users], you don't remember that it's locked"* (A1).

Most autistic participants also disliked using the reporting and blocking features on SNS. One autistic participant who reported a photo on Instagram described the privacy setting as unresponsive: *"I check once in a while, 'is [the photo] gone yet?'. And if it's not, I report it again until it disappears"* (A4). Furthermore, nearly all autistic participants were hesitant to use the blocking or reporting features, because they did not want to upset or cause conflict with others. As one explained:

> A10: *If you just report it right away, [other users] might get mad at you. Like, "why'd you report my photo?". I don't know if it tells the person that you reported their photo, 'cause I haven't done it. But they might get mad at you and say "why'd you report it? You could have just talked to me. You could have just asked me to take it down". Like, you could have avoided them getting mad at you by just asking them.*

Non-autistic: General Usability. None of the non-autistic participants reported any substantial complaints about the usability of SNS in general, suggesting that the design of these platforms did not prevent their participation in online social networking. Several described SNS as "*easy*" to use, and they were all able to navigate through the platforms. Also, many praised SNS for being a good source of news and entertainment: *"It's got a lot of stuff, for like stuff that I like on it"*(NA13). More notably, non-autistic participants emphasized the usefulness of SNS to contact their friends: *"If I want to hang out with someone, Instagram is just that platform you could easily talk to them"* (NA3). Although it is possible that non-autistic participants may occasionally have difficulties using SNS due to glitches or interface updates, none of the participants discussed these usability issues, suggesting that these may not be major deterrents to their use of the platforms.

Autistic: General Usability: Autistic participants provided both positive and negative feedback regarding the usability of SNS in general, which impacted their use of — and, in turn, their privacy on — these platforms. Most autistic participants appreciated SNS for enabling them to stay up-to-date with their interests and stay connected with their friends:

> A8: *I just kind of look at other people's stuff. It's really fun.*

> A1: *[My friend] had moved away and I was never going to see them again. So, I make sure to follow them.*

A few were also drawn to SNS for other features, such as video chat and filters:

> A2: *Face chat is actually interesting.*

> A4: *The face filters are pretty cute! I think it's just funny to see cute videos, like people voice changing. I just like it. It just makes me laugh.*

At the same time, several autistic participants said that they struggled to use certain features on SNS. For instance, one autistic participant had difficulty learning how to use Facebook Messenger on their own: *"I'm still trying to learn how to use Messenger. It's hard. It's new"* (A2). Another autistic participant forgot how to play games on Facebook: *"I used to play games on there. And then I forgot how to play games so I stopped doing that"* (A7). One criticized Twitter for being too text-based and therefore mentally exhausting to use: *"Twitter is a mess! It's just a mess of words, and you're just like "no thank you"* (A4). They also mentioned that frequent interface updates made it challenging for them to continue using the platform after taking an extended break:

> A4: *[Twitter is] one of the most complicated sites [...] It just updates and it changes a lot. I was off it for like a month and then I just see it again and I'm like "oh god! Everything changed! Even the screen layout and all that". And I was like "ugh!!".*

Table 3. Summary of findings: privacy and safety attitudes, behaviors, and factors

Theme	Non-autistic	Autistic
Attitudes	• Half tried to balance privacy protection and self-disclosure. • Most downplayed privacy and safety risks.	• Most valued privacy protection over self-disclosure • Many expressed genuine concern about privacy and safety risks.
Behaviors	• Use four main strategies: (1) deciding who to trust, (2) managing access, (3) negotiating content, (4) filtering out personal information	• Use four main strategies: (1)deciding who to trust, (2) managing access, (3) negotiating content, (4) filtering out personal information
Personal Factors *Social Engagement*	• Almost all used SNS actively. • Some had acquaintances or friends who they met on SNS. Most of these participants talked to their online friends about their personal life as well as their shared interests.	• Most used SNS passively. • Some felt pressured to be more active on SNS than they personally preferred. • Many talked to people they do not know on a chat platform, almost exclusively about shared interests.
Social Anxiety	• A few expressed some self-consciousness about their physical appearance in photos on SNS. • None reported being too shy to initiate contact with strangers on SNS.	• Most showed fear of negative evaluation (e.g., self-consciousness about their physical appearance, concerns about being judged/bullied based on their content). • Some mentioned being too shy to initiate contact with strangers on SNS.
Experience with Privacy Violations	• Most commonly reported privacy violation was unsolicited contact by strangers.	• Most commonly reported privacy violation was cyberbullying, often due to misunderstandings by/with non-autistic people.
Social Factors *Support*	• Received support from teachers, family members and friends to protect their privacy. • Advice focused on filtering out sensitive personal information, being mindful of their digital footprints, not interacting with strangers, and preventing cyberbullying. • Some received verbal instructions to adjust privacy settings. • Neither satisfied nor dissatisfied with the support they received.	• Received support from family members, friends, teachers, and healthcare professionals to protect their privacy. • Advice focused on preventing cyberbullying, filtering out sensitive personal information, and not interacting with strangers. • Described formal online privacy education as repetitive and boring, and privacy recommendations as restrictive. • Many reported that others adjusted their privacy settings for them. For some, this lack of autonomy caused distress.
Influence	• For most, friends and classmates had the strongest influence on their privacy and safety on SNS. • Learned about online privacy and safety risks and how to respond to them by observing their friends' and classmates' experiences. • Followed their friends' lead in using privacy settings.	• For most, parents had the strongest influence on their privacy and safety on SNS. • Took measures to protect themselves to minimize their parents' concerns. • Parents enforced time limits on their SNS use. • Learned about online privacy and safety risks by observing their friends' experiences and being involved in situations.
SNS Design Factors *Accessibility of Privacy Settings*	• Described privacy settings as intuitive/easy to use. • Described some privacy settings (i.e., blocking, reporting) as harsh and ineffective. • Instagram users struggled to remember their friends' privacy settings.	• Some found privacy settings as easy to use; others described them as "complicated". • Described some privacy settings (i.e., blocking, reporting) as harsh and ineffective. • Instagram users struggled to remember their friends' privacy settings.
General Usability	• Described SNS as useful and easy to use.	• Described SNS as useful, but sometimes difficult to use.

5   DISCUSSION

In this study, we examined autistic teenagers' attitudes and behaviors related to privacy and safety on SNS (*RQ1*), and identified factors affecting their online privacy and safety (*RQ2*). We also compared autistic and non-autistic users' privacy- and safety-related attitudes and behaviors on SNS, as well as the factors affecting them (*RQ3*). Through our scenario-based, semi-structured interviews and thematic analyses, we found that the autistic teenagers in our sample were conscientious about their privacy and safety on SNS and employed many strategies (deciding who to trust, managing access, negotiating consent, filtering out personal information) to mitigate risks (*RQ1*). Their privacy- and safety-related attitudes and behaviors were affected by several *personal* (social engagement, social anxiety, experience with privacy violations) , *social* (support, influence), and *SNS design* (accessibility of privacy settings, general usability) factors (*RQ2*).

In this section, we discuss our findings for *RQ3*, while describing the relevance of our findings to the broader literature on teenagers' online privacy and safety on SNS, cognitive accessibility and on inclusive research. We remind the reader that further research is required to confirm any generalizations to the broader population.

5.1   Autistic Users' Vulnerability to Online Risks: Exposing Misconceptions through Inclusive Research

With the increasing ubiquity of online social networking, there are growing concerns regarding autistic people's vulnerability to privacy and safety threats — especially cyberbullying and sexual solicitation — on SNS [32, 38, 42, 93]. Previous studies examining parents' and professionals' perspectives on this issue have described autistic people as extremely "naive" to online risks [32, 38, 54]. However, the findings of our study contradict these assumptions. Indeed, the autistic teenagers in our study were equally aware of privacy and safety threats on SNS as the non-autistic teenagers. This finding suggests that autistic users are likely capable of developing online privacy and safety literacy, if offered support and hands-on learning opportunities to practice their skills.

Furthermore, parents and professionals have speculated that autistic users are more inclined to engage in risky behaviors on SNS (e.g., talking to strangers, sharing personal information) than non-autistic users [32, 38]. However, we found that this may not necessarily be the case. While the majority of the autistic teenagers in our study prioritized their privacy and safety over self-disclosure on SNS, most of the non-autistic teenagers were willing to take risks to achieve a balance between these competing values. Although several of the autistic teenagers in our study chatted with strangers on Discord, almost all of them exclusively talked about common interests and refrained from sharing sensitive personal information. Most of the non-autistic teenagers in our sample, on the other hand, were open to sharing details about their personal lives with their online friends. These findings call to question over-generalized claims about autistic users' "impaired impulse control and judgement" [32] related to their ability to safely engage with others online compared to their non-autistic peers.

Overall, our study sheds light on the importance of inclusive research to prevent misconceptions related to autistic users' needs, abilities and preferences with regards to privacy and safety on SNS. Autism research has a long history of conducting research about autistic people without seeking to understand the perspectives of autistic people themselves [28, 30]. Not only is this practice discriminatory, but it also has perpetuated stereotypes about autistic people [24], such as the belief that they are incapable of sound decision-making and that their "impairments" are the primary (or sole) source of their challenges. These misconceptions are likely in part due to the double empathy problem: non-autistic people/researchers do not accurately understand and appreciate autistic people's thoughts, intentions and behaviors, just as autistic people struggle to understand those of

non-autistic people [62]. The tradition of excluding autistic people's perspectives is still an issue in human-computer interaction research on autistic users' online privacy and safety.

Given that the field of human-computer interaction is dedicated to user-centered research and design, it is imperative that researchers and practitioners in this area hold themselves accountable in ensuring that their practices are as inclusive and empowering for their target demographic as possible. A strength of this study is that it we used a neurodiversity perspective to guide our data analyses and ensure that the reporting is culturally respectful. Non-autistic researchers aiming to do research about autistic users should collaborate with members of this population throughout the entire research process to ensure that the study is accessible and that their interpretations of the data accurately reflects autistic people's perspectives and experiences [24, 28, 30].

5.2 Disparities in the Benefits and Risks of SNS Use

Based on our data, autistic and non-autistic teenagers most likely experience disparities in the benefits and risks of online social networking. In line with previous research [55, 61], most autistic teenagers in our study did not use the three SNS involved in this study (i.e., Twitter, Instagram, Facebook) for social connection as much as non-autistic teenagers. Almost all of our autistic participants used these SNS more conservatively than most of our non-autistic participants, rarely posting personal content or actively trying to make new friends on these platforms. In turn, it appears that many autistic teenagers are not taking advantage of the SNS involved in this study for expanding their social network as much as non-autistic teenagers. Nevertheless, it would be incorrect to claim that autistic teenagers do not benefit from SNS at all. Most of the autistic teenagers in our study described these platforms as useful for indulging in their interests, and staying in touch with their friends and family, especially those who are long-distance. Furthermore, several of our autistic participants benefited from chatting platforms (i.e., Discord) to meet people with similar interests, suggesting that SNS designed to facilitate these types of connections can promote autistic users' social engagement online. Therefore, there is incentive to make SNS more usable for this population.

Considering that most of the autistic teenagers in our study used SNS less actively than their non-autistic peers, it follows that they may be safer from many *privacy* threats on these platforms. For the autistic teenagers who rarely post content and do not interact with strangers on SNS, this was the case. However, those who are more active on SNS (including chatting platforms, like Discord) are often at increased risk of *safety* threats. Consistent with previous research [17, 42, 68], we found evidence that cyberbullying was more of an issue for autistic teenagers in our sample than the non-autistic teenagers, despite the fact that most of the autistic teenagers were more concerned and cautious about their privacy and safety on SNS. This finding suggests that external factors — in particular, misunderstanding and discrimination, especially by non-autistic users — may have more of an impact over autistic teenagers' vulnerability to cyberbullying and social exclusion than their cognitive disability.

5.3 Explaining the Disparities

Based on our data, there are several factors contributing the disparities we observed in our sample. Offline, autistic teenagers often experience bullying due to their peers' lack of understanding and acceptance of their differences [19]. In turn, many autistic teenagers isolate and conceal their authentic selves to stay safe [34]. The social anxiety that most autistic teenagers develop over time due to harassment and discrimination make it difficult for them to open up and trust others who do not belong to their vetted inner-circle [34]. Our findings suggest that autistic teenagers may encounter similar issues on SNS. Although some of the autistic teenagers in our sample wanted to connect with others and build relationships on SNS, they did not feel comfortable doing so due

to their completely valid fears of negative evaluation or rejection. Those who had the motivation and confidence to try to make friends online appeared to be at higher risk of being misunderstood and mistreated by other users than the non-autistic teenagers in our study, probably because most members of the general population do not understand and accept differences in their social behaviors and communication style. As a result, autistic teenagers seem to be at a disadvantage in terms of developing safe and satisfying social life online compared to non-autistic teenagers.

Autistic teenagers' social engagement online appears to be further influenced by design elements of SNS that increase their sense of pressure in social situations. SNS are designed to cater to non-autistic users' social values, such as increasing social capital and receiving attention. Users' success in living up to these standards is represented through visible metrics (e.g., number of followers, "likes") embedded within the sites' design that make it easy to compare users' likeability, credibility and influence. Although these features may be appealing to the general population, they were described as added stress for the autistic teenagers in our study, who already experienced excessive social pressure offline. Some of the privacy settings on SNS — namely, report and block — were unappealing to both autistic and non-autistic teenagers in our sample, because using them may cause conflict with their peers. In turn, several of our autistic and non-autistic participants described feeling discouraged from reporting instances of cyberbullying or other threats on SNS, which may have undermined their online safety.

Although our study did not examine parents' perspectives and experiences, previous research shows that parents are usually highly concerned about their autistic teenager's safety online and often rely on restrictive mediation practices to shield them from harm [38]. These parents' safety concerns and protective strategies likely impact their autistic teenagers' online social participation in two main ways. Firstly, these parents may describe extreme privacy and safety threats to their autistic teenager, who may then take their warnings seriously and follow the strict risk mitigation rules that their parents (and teachers) promote while using SNS. Secondly, parents' restrictive mediation practices may prevent autistic teenagers from developing strategies to deal with threats on SNS on their own. This point echoes Wasserman's [88] argument that people with intellectual disability (which include some autistic users) can benefit from having hands-on experience with overcoming online privacy risks; therefore, these users should be provided opportunities to engage in positive risk-taking on SNS.

It is important to keep in mind that the autistic participants in our study only represent members of this population who are permitted to use SNS. It is not a coincidence that most of our autistic participants were older teenagers (i.e., 15 years or above); this is consistent with research indicating that autistic people tend to start using the Internet at an older age than non-autistic people [55], probably in part due to restrictive parental mediation. Researchers could examine how to decrease the disparities in online social participation within the autistic population, as well as address the differences in online social networking outcomes between autistic and non-autistic youth.

5.4 Inter-relatedness of Accessibility, Privacy and Autonomy

Another key finding in our research relates to the inter-relatedness of cognitive accessibility, online privacy, and autonomy. Cognitive accessibility refers to "the extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of cognitive characteristics and capabilities to achieve a specified goal in a specified context of use" [36]. Based on our findings, SNS have notable cognitive accessibility issues with their designs. Overall, our autistic participants had somewhat more difficulty using features on SNS (including privacy settings) than the non-autistic teenagers, suggesting that these platforms are not designed to accommodate neurodiversity. Consequently, some of autistic teenagers in our sample required more support to use SNS than non-autistic teenagers. These autistic teenagers' low autonomy

Table 4. Summary of proposed future research for addressing factors affecting autistic teenagers' privacy and safety on SNS

Factor	Future Research
Personal Factors	• Design and evaluate **sentiment nudges** to improve communication and help facilitate mutual understanding between autistic and non-autistic users. • Develop **social skills and anti-discrimination training programs** that teach non-autistic teenagers how to interact with their autistic peers, and promote the inclusion of people from all marginalized groups both online and offline. • Examine the effect of **minimizing social evaluation elements on SNS** (e.g., number of "likes", followers) on autistic teenagers' online social networking experiences.
Social Factors	• Design and evaluate **collaborative tools facilitating parent-teenager communication about privacy protection on SNS** that prioritize autistic teenagers' wants and needs. • Design and evaluate **educational interactive e-books and games** in collaboration with autistic teenagers, to make learning about online privacy and safety more interesting and balanced for them.
SNS Design Factors	• **Improve the accessibility of mainstream SNS**: conduct formal evaluations of their cognitive accessibility, and offer recommendations for making them more accommodating to neurodivergent users. • **Redesign privacy settings in consultation with autistic teenagers**, to ensure that they align with these users' needs and priorities.

sometimes caused them to experience distress, such as when they had devices taken away from them while others changed their privacy settings. These findings highlight the importance of improving the accessibility of SNS for autistic users.

5.5 Future Research

Substantial work is needed to improve the privacy, safety and inclusion of autistic teenagers on SNS. We offer the following suggestions to address the factors affecting these users' privacy and safety on SNS identified in our study (see Table 4). Although these suggestions are mainly focused on improving autistic teenagers' privacy and safety, they may be useful for improving non-autistic teenagers' online experiences too.

5.5.1 Addressing Personal Factors.

Sentiment nudges. In our data, we found instances of conflict between autistic and non-autistic users, sometimes due to different interpretations of the meaning and intentions of posts. To minimize autistic teenagers' risk on SNS, it could be useful to develop tools to improve communication and

mutual understanding between autistic and non-autistic users. One possible solution is to adapt, test and implement Wang et al.'s [87] sentiment nudge — a privacy tool that predicts others' emotional reactions to posts, and dissuades users from sharing regretful content. This type of tool could provide information and feedback about the intended tone (e.g., emotion, sarcasm) and meaning of posts and messages, which can help to minimize conflict based on misunderstanding between autistic and non-autistic users. It can also provide insight into the similarities and differences in communication of people with different neurotypes.

Social skills and anti-discrimination training. Another potential method of reducing autistic teenagers' concerns and risk of cyberbullying is to offer social skills training to both them and (especially) their non-autistic peers that is targeted towards encouraging kindness and compassion both offline and online. To date, most social skills training programs are designed to make autistic people conform to non-autistic social norms. There needs to be much more efforts to also develop programs teaching non-autistic people how to interact with autistic people. Schools should provide mandatory programs that promote anti-discrimination and inclusion of all historically marginalized groups, including autistic people, in both online and offline social contexts. These programs should be developed in collaboration with people who have lived experience as members of marginalized groups to ensure that the information provided is accurate and culturally respectful.

Minimize social evaluation on SNS. As demonstrated by our findings, many autistic teenagers experience a lot of social anxiety and pressure on SNS. Therefore, there should be efforts to minimize their discomfort in online social contexts. One solution is to reduce the amount of publicly visible social evaluation elements (e.g., number of "likes", followers, comments, views) on these platforms' interface. Instagram has experimented with hiding the number of "likes" that users receive on posts [45] to reduce the emphasis on social comparison on the site. This concept can be extended to other evaluation elements and on other platforms as well. Researchers could investigate the impact of removing evaluation elements on autistic teenagers' online social networking experiences.

5.5.2 Addressing Social Factors.

Collaborative tools to facilitate parent-teenager communication about privacy protection on SNS. . Although most of the autistic participants in our study were able to protect their privacy and safety on SNS on their own, some autistic teenagers — especially those with intellectual disability — may require more support to be safe from online threats. Regardless, all autistic teenagers should have the same right to autonomy as everyone else. Just and Berg [38] proposed a solution that balances autistic users' need for support and autonomy — that is, collaborative tools that can facilitate communication between autistic users and their parents regarding privacy protection on SNS. Our findings suggest that there may be value in developing and implementing this solution, as long as it is designed in close collaboration with autistic teenagers and prioritizes their wants and needs.

Educational interactive e-books and games. Several of the autistic teenagers in our study described the online privacy and safety education that they received as boring and repetitive. Although this did not appear to have a strong effect on their knowledge, it may still be worth making these programs to be more fun to ensure their attention and engagement with the material. Researchers have examined the potential for picture-rich educational tools, such as interactive e-books and serious games, in teaching non-autistic children about online privacy with promising results[58, 94]. Similar educational resources may reduce the pressure on parents and teachers to educate autistic teenagers about online privacy and safety, and ensure that the material promotes a balanced view of the benefits and risks of self-disclosure on SNS. These resources should be designed in collaboration

with autistic teenagers to ensure that the design and content is accessible, relevant, and engaging to them.

5.5.3 Addressing Social Networking Site Design Factors.

Improve the accessibility of mainstream SNS. SNS are not sufficiently accessible for autistic teenagers. For example, the labels of privacy settings on SNS are not consistent across platforms, and the interfaces of SNS update frequently. These accessibility issues can be problematic for other segments of the general population (e.g., novice users); therefore, identifying and addressing these design issues would not only benefit autistic users, but everyone. Some researchers believe that the solution to these accessibility issues is to develop specialized SNS for neurodivergent people (e.g., [84]). Although specialized SNS can be useful, their development should not replace efforts to make mainstream SNS more accommodating to neurodiversity. Researchers should conduct formal evaluations of the cognitive accessibility of SNS, and provide recommendations to make these platforms easier to use for autistic teenagers.

Redesign privacy settings in consultation with autistic teenagers. In addition to having notable accessibility issues, the block and report privacy settings on SNS go against both autistic and non-autistic teenagers' priority to avoid conflict with others. This is problematic for autistic teenagers in particular, given that some rely on these types of tools to defend themselves from cyberbullies. Researchers should explore possible alternatives to these privacy settings that are designed with input from autistic teenagers.

We recognize that several of our proposed solutions on the surface do not align with SNS companies' priorities. For instance, SNS companies may not perceive any incentive to make it easier for users to set their profile to private, because their business model relies on users sharing and posting as much as possible. Similarly, posts that cause conflict and controversy drive engagement on SNS and, in turn, increase companies' profits; therefore, SNS companies may not view it in their best interest to develop tools to foster empathy and compassion among users. However, this mindset creates a false dichotomy between users' and SNS companies' needs, when they are actually intertwined. As our findings suggest, many users from marginalized groups do not feel comfortable sharing personal content on these platforms or engaging with others, because they are not safe to be their authentic selves online and do not have the appropriate tools to protect themselves from potential harms. By making their platforms inaccessible and unsafe for marginalized groups, SNS companies are missing out on large segments of the global population who may be interested in being active users on these platforms, if it were not for these issues. Inclusive, transdiciplinary research and action is needed to change the culture and business model of SNS to enable and promote user engagement based on inclusion, accessibility, and safety.

5.6 Limitations

This study has limitations. The main limitation of our study relates to our sample. Our study included only a small sample of autistic and non-autistic teenagers. Although our sample size is adequate for exploratory research, future studies should recruit larger sample to gain more generalizable insight into autistic and non-autistic teenagers' online privacy and safety.

We chose not to ask participants for sensitive background information (e.g., race, ethnicity, sexual orientation, other disabilities) to prioritize their comfort. At the same time, we recognize that our participants' background characteristics likely had an influence on their privacy- and safety-related experiences on SNS. For instance, it is possible that some of the autistic teenagers in our study had an intellectual or learning disability, which may account more for their difficulties with using

privacy settings on SNS without support than their autism. We strongly encourage researchers to explore the role of intersectionality on autistic teenagers' privacy and safety on SNS.

Moreover, we acknowledge that our findings are not fully representative of the population, in that our autistic sample only included teenagers who were able to engage in a spoken conversation without requiring support. It is possible that autistic teenagers who are non-speaking and/or have greater support needs may have different perspectives and experiences with protecting their privacy and safety on SNS than those who were able to participate in our interviews. To improve upon the inclusiveness of study and the generalizability of our findings, researchers investigating this topic could offer a wider variety of communication options (e.g., written interviews, through instant messaging or email) to make their study accessible for more members of this population.

Furthermore, we acknowledge limitations in our study's design. Our semi-structured interviews were guided by a few scenarios representing a limited set of social privacy and safety risks on SNS. Additionally, our scenarios focused on only three SNS platforms. Although we encouraged participants to discuss their experiences on other platforms as well, most of their responses were tied to three SNS that we chose to investigate. Future studies could extend our research by examining autistic and non-autistic teenagers' privacy attitudes and behaviors in response to a wider range of online threats and platforms.

6 CONCLUSION

Previous research highlight parents' and professionals' concerns about autistic teenagers' online privacy and safety, due to these users' perceived naivete [32, 38, 54]; however, researchers had yet to examine autistic teenagers' experiences with protecting themselves online from their own point-of-view. Through our interviews, we gained insight into our autistic participants' privacy- and safety-related attitudes and behaviors on SNS, and identified factors affecting their online protection. We also compared our autistic teenagers' privacy- and safety-related attitudes and behaviors, and factors affecting them, with those reported by non-autistic teenagers. Contrary to previous assumptions, we found that the autistic teenagers in our study were not naive to privacy and safety threats on SNS, and took several measures to protect themselves on these platforms. Yet, despite their efforts, many still were at increased risk of cyberbullying and social exclusion. Our research highlights the need to develop solutions that can foster greater acceptance and inclusion of autistic teenagers, so that these users can have safe and satisfying social lives online. Furthermore, our study demonstrates the importance of empowering autistic users to share their own perspectives through inclusive HCI research, because they are the experts in their own experiences.

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PRIOR PUBLICATION POLICY STATEMENT

This manuscript is not currently submitted elsewhere. The research was conducted for the first author's Master's thesis; the thesis is publicly available online, but has not been published in any peer-reviewed venues (i.e., journals, conference proceedings). This study has not been presented at any peer-reviewed conferences.

APPENDIX

I.   Interview Guide

<div align="center">

Introduction and Assent

</div>

Hi, my name is Jessica. I am a student at Carleton University. Today, we are going to talk about privacy on [SNS]. During the session, we will look at a [SNS] user's profile and watch some video messages describing different online social situations. I will ask you to give some advice about what the person should do in each situation. I will also ask you about your own experiences using [SNS].

Today's session will take about 30 minutes to complete. I will record your voice so that I remember your comments. If you don't want me to record your voice, please let me know.

The information you will share with me will be safely locked up. No one will hear what you said except for me and my supervisor. Just remember, I am not testing you—I just want to hear your thoughts and opinions.

You have the choice to do this study or not; it is entirely up to you. You can say okay now and change your mind later. All you have to do is tell me that you want to stop. It really is okay to say stop.

To thank you for your help, I will give you $30 cash. You can keep the money even if you decide to stop the study.

Do you have any questions? Remember that you can ask questions at any time.

Do you agree to participate in this study?

Do you agree to be audio-recorded?

<div align="center">

Scenarios

</div>

Okay, great! So, here is the scenario for this part of the session: An [SNS] user named Allie is looking for advice about how to protect her privacy on the site. This is her account. Allie has left a few video messages with her questions for us to watch and discuss.

This part of the session will go as follows: I will play the video messages one at a time, asking you a few questions after each one. Feel free to look through Allie's profile or others' if that would help you to answer the question.

Understand?

Great! Here is the first scenario:

Scenario 1 (Dog Photo)

Video description: The video shows the character's screen, as she scrolls through her uploaded photos. She opens up a photo of her with her face cropped out holding a puppy. While this is happening on screen, she excitedly says:

> "Oh my gosh! Guess what? My parents just got me a new puppy: see?! I'm so excited! I really want to share this news. Who should I share this with?
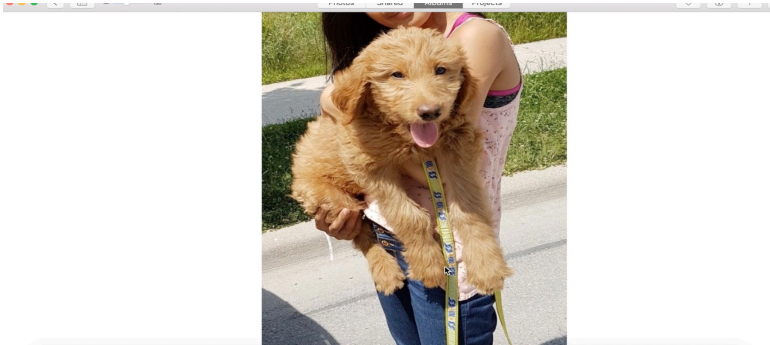

1) Who should she share the picture with?
2) Should she share the picture on [SNS]? (Would you?)
3) Do you post pictures of yourself on [SNS]?
    a. If *yes*:
        • Who do you want to see your pictures?
        • Is there anyone you would <u>not</u> like to see your pictures?
            o If *yes*: Do you do anything to make sure that they can't see your pictures?
                a. If *yes*: What do you do?
    b. If *no*:
        • Why not?
        • Do you post any other kinds of pictures on [SNS]? If so, what kinds of pictures do you post?
4) Apart from pictures, is there anything else that you share on [SNS]?
5) Do you share personal identifying information on [SNS]? (e.g., real name, email address, location/ city)

Scenario 2 (Stranger)

Video description: The video shows the character's SNS profile. She clicks on her notifications to show the viewer that someone she does not know has started following her. She then clicks on the unknown user's profile, which has some inspirational quotes, nature and music-related photos posted on there. While this is happening, she says:

> "Hi again! So, I just got this notification on my [SNS] feed. It says that someone named Josh Forrester is now following me. I've never met this guy before in real life. I took a look at his profile page. It looks like we have a lot in common, but I don't know if I should let him follow me. What should I do?"
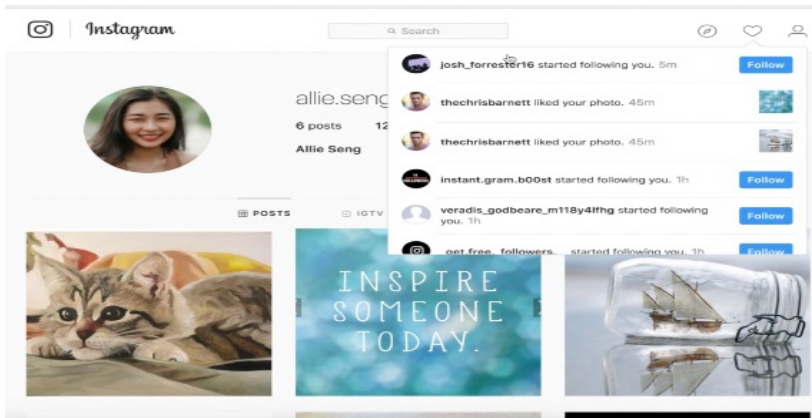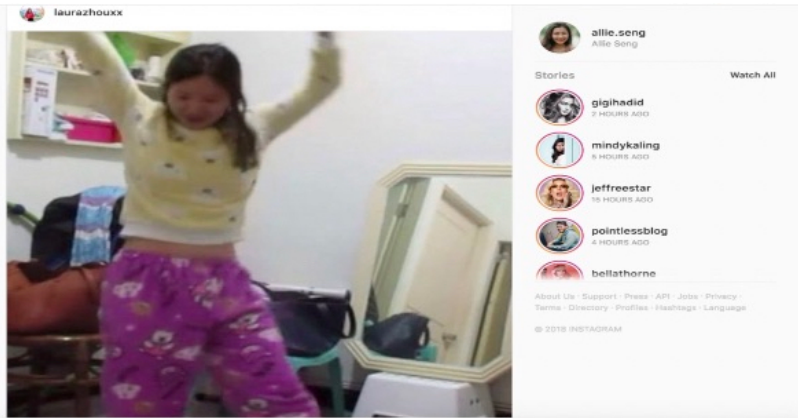

1) What should Allie do? Is that what you would do in this situation? (If *no*: What would you do?)

2) Does it matter that she doesn't know the person in real life? Why or why not?

3) Do you have any followers on [SNS] who you do not know in real life?

    a. If *yes*:

            • Do you consider them to be your friends? Why or why not?

                o Do you have online friends on other SNS?

            • Do you talk to them, through comments or direct messages?

                o If *yes*:

                      • What kinds of things do you talk about?

                      • Is there anything you avoid talking about with your online friends?

    b. If *no*: Why not?

Scenario 3 (Embarrassing Photo)

Video description: The video shows the character's screen as she scrolls through her SNS feed. She finds the picture that she's looking for, which is of her dancing in her pajamas. While this is happening, she says:

> "Hey! So, I was scrolling through my feed and noticed that my friend posted a very embarrassing picture of me. I don't want this picture of me online, but I don't know what to do. What do you think I should do?


1) What should Allie do? Is that what you would do? (If *no*: What would you do?)

2) What difference does it make if others see the picture? (Would you care if that happened to you?)

3) Are there any pictures of you on [SNS] that you wish were not online?

    a. If *yes*:

- Who posted them?
- Why are they still online?
- Is there anything that you can do to take the pictures off of the site?

<u>**Scenario 4 (Private Account)**</u>

Video description: The video shows the character's screen, as she clicks back and forth a couple of times between her feed and her profile. While this is happening, she says:

"Hi again! So, my friend told me that there's a way to make my account private, so that only my friends can see my posts. I don't know how to set my account to private. Do you?"
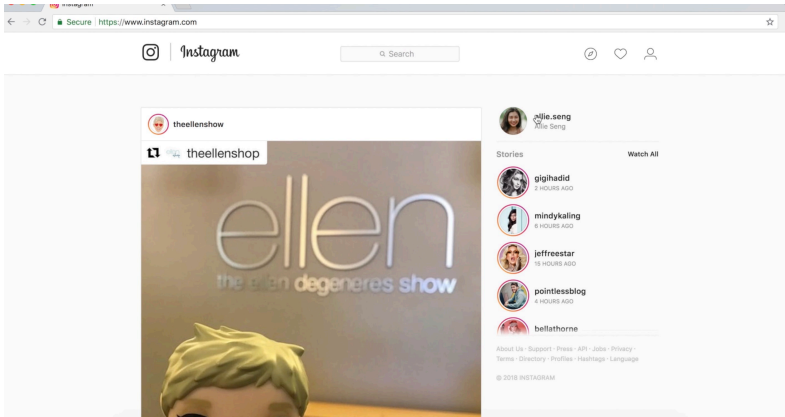

1) Do you know how to make her account private?

    a. If *yes*:

- Can you show me how to do it?

- Who taught you how to do that?

2) Is your [SNS] profile set to private? (If *no*: Why not?)

Scenario 5 (Other)

Video description: The video just shows the character's profile. She says:

"Hey! Thanks for all of your help. Here's my last question: So, I'm trying to figure out how to set up my profile so that only the right people can see my information. Is there anything else that you do to keep your information safe?"
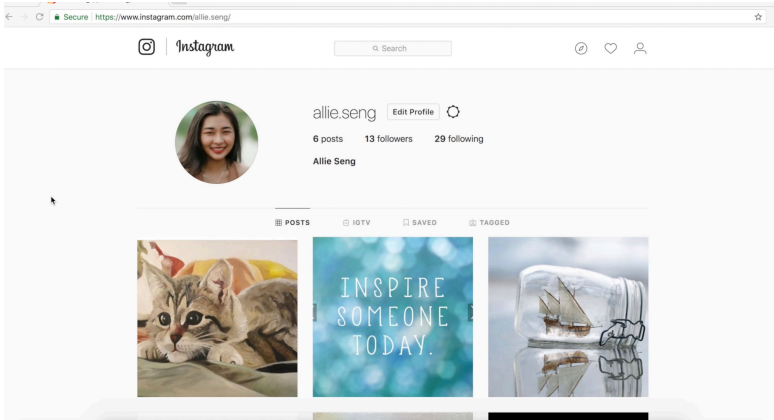
1) Is there anything else that you do to keep your information safe?

2) Who taught you about online privacy? What kinds of things did they teach you?

   - What does "online privacy" mean to you?

3) Do you wish that you knew more about online privacy, or are you happy with how much you know?

Post-Scenario Interview

Social Media Use

1) When do you use [SNS]? (How often do you use it?)

2) What do you do on [SNS], apart from posting stuff?

3) Does anyone help you to use [SNS]?

    a.   If *yes*:

- Who?

- What do they help you to do?

4) Apart from [SNS], what social networking sites do you use?

Demographic Questions

1) What is your age?

2) Are you a boy, a girl or non-binary?

3) What devices do you use to go online?

4) Do you have Internet at home? (If *no*: Where do you access the Internet?)

Debriefing Script

Thank you very much for participating! The goal of this research was to better understand how teenagers, like you, protect their privacy on social networking sites. Your thoughts, comments and opinions are very valuable to my research.

At the beginning of the study, I made it seem like the profile that we were looking at together belongs to a real person. In reality, the profile was created for the purpose of our study. I needed the scenarios to be as realistic as possible for you. Is it okay if we still keep your answers to our questions?

Before we wrap up, do you have any questions for me?

II.   Example Coding for Inter-Rater Reliability

Quote	Codes		
	Lead Researcher	**Second Coder**	**Final**
Interviewer: So, who taught you how to set the account to private? NA2: Uh, all of my friends actually. Interviewer: Your friends. Okay. Did you ask them? Like, how did that situation play out? NA2: Uh, so I asked them what their Instagram was. And, I was like, "why is it privated"? And, like, they were like, "just to protect it, I guess". I was like, "might as well do that too myself". Interviewer: Okay. So, they showed you how to put it on private? NA2: I actually just went into settings and then you can probably figure out from there, right?	SNS DESIGN: Privacy settings, SOCIAL: Support, SOCIAL: Influence	SOCIAL: Influence	SNS DESIGN: Privacy settings, SOCIAL: Influence
NA4: I would report it, but usually the report button doesn't really do much.	BEHAVIOR: Managing access, SNS DESIGN: Privacy settings	BEHAVIOR: Managing Access	BEHAVIOR: Managing access, SNS DESIGN: Privacy settings
Interviewer: Okay. Is your sister's account private or public? A11: She has a public one. Interviewer: Okay. Were you ever interested in having your account private? Or did you always feel like it was really inconvenient? A11: It seemed inconvenient to have it like that. Interviewer: Did anyone try to teach you to make your account private? A11: No.	SNS DESIGN: Privacy settings, SOCIAL: Support, SOCIAL: Influence	SNS DESIGN: Privacy settings, SOCIAL: Support	SNS DESIGN: Privacy settings, SOCIAL: Support, SOCIAL: Influence

Quote	Codes		
	Lead Researcher	**Second Coder**	**Final**
Scenario 3 (Embarrassing Photo) Interviewer: What should Allie do? A2: Just comment like, "can you put it down, please? Because it's kind of embarrassing me. So, it's kinda rude to... May you please put it down." Like, type it in the comments, so she can know what you're saying. Interviewer: Is that what you would do in this situation? A2: Yeah. If somebody put an embarrassing thing of all time, yes. I would put, "please take it down. It's kind of rude and embarrassing. Thank you". Interviewer: Did you ever have to do that? A2: One or two times. Interviewer: Did they take it down? A2: Yeah.	BEHAVIOR: Negotiate consent, SNS DESIGN: Privacy settings, PERSONAL: Previous experience with privacy violations	BEHAVIOR: Negotiate consent	BEHAVIOR: Negotiate consent, PERSONAL: Previous experience with privacy violations