Partner Perceptions of Conversations with Individuals with Autism Spectrum Disorder

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Abstract

Pragmatic difficulties resulting in problems with reciprocal conversation are widely studied in individuals with autism spectrum disorder (ASD). There is some consensus on the conversation differences between individuals with autism compared to neurotypical groups and groups with other developmental delays. There is little information on whether conversation partners (neurotypical or with ASD) of individuals with ASD find these differences problematic. The results indicate that behaviors reported to be the most problematic were not necessarily behaviors commonly addressed in research. Further, some conversational capacities that have received less research focus were perceived as more problematic. Although conversation partners who had ASD themselves reported the frequency of behaviors similarly to the neurotypical group, they did not find the behaviors as problematic.

Partner Perceptions of Conversations with Individuals with Autism Spectrum Disorder

One of the key diagnostic criteria for autism spectrum disorder (ASD) is difficulty in the use of language and communication for social purposes (American Psychiatric Association, 2013; World Health Organisation, 2018). Many individuals with ASD have semantic language skills comparable to their typically developing (TD) peers but they often demonstrate difficulties in pragmatic language which impact their ability to engage in reciprocal conversations and social interactions (Eigsti, de Marchena, Schuh, & Kelley, 2011; Volden, 2017).

Although many interventions for people with ASD include or specifically target social skills, many adults with ASD continue to experience difficulties with making social contacts. These individuals also have limited friendships and reciprocal relationships (Howlin, Moss, Savage, & Rutter, 2013). An inability to sustain meaningful conversations is likely to have an impact on friendship formation. Bauminger et al. (2008) compared the friendship interactions of ASD and typically developing children and found that the children with ASD demonstrated fewer friendship related behaviors measured by lower ratings of conversational flow. Koning and Magill-Evans (2001) compared the general social and language abilities of boys with Asperger syndrome with vocabulary and age matched peers. They found that the boys with Asperger syndrome had almost no friends and posited that this may be a confluence of lack of opportunity due to poor social and language skills. A further concern is the impact a social communication impairment might have on acquiring and maintaining employment (Cummings, 2017; Howlin & Moss, 2012). Given that communication skills are generally considered valuable by employers, a deficit in this area may have an impact on obtaining employment through the regular interview process where reciprocal conversation is necessary to make a good impression (Berney, 2004). Once employment is secured, effective

professional and social communication is required to maintain employment and progress in a work environment (Baldwin, Costley, & Warren, 2014; Hillier et al., 2007).

Messages conveyed during social exchanges are affected by more than the words spoken. Body language, gestures, eye gaze and speech patterns contribute meaning during social interactions (Beattie & Shovelton, 1999; Peppé, Cleland, Gibbon, O'Hare, & Castilla, 2011; Roach, 2000). People with ASD have also been described as having difficulties with prosody when speaking, that is, they are observed to speak in a monotone, have unusual pitch, volume, rate of speech, or unusual stress patterns (McCann & Peppe, 2003; Shriberg, Paul, McSweeny, Klin, & Cohen, 2001). They may perseverate on certain topics during conversation (de Villiers, Fine, Ginsberg, Vaccarella, & Szatmari, 2007; Rehfeldt & Chambers, 2003) and have difficulties with making eye contact (Paul, Orlovski, Marcinko, & Volkmar, 2009).

The rules of conversation are difficult to define but it is clear when they are broken. Fluent social communicators manage to abide by these "rules" and structure speech according to the situation (Grice, 1975; Pridham, 2013). The appropriateness of an exchange can relay social information beyond the words spoken. For example, speaking out of turn may imply rudeness and repeatedly returning to a topic may indicate a lack of interest in the conversation partner's topic. There have also been suggestions that deficits in theory of mind may underpin the difficulties in social communication experienced by individuals with ASD (Baron-Cohen, 1988; Tager-Flusberg & Anderson, 1991). De Rosnay and Hughes (2006) reviewed the literature on the quality of social interactions and the development of social cognition in people with ASD and proposed that social interactions may influence the development of theory of mind and vice versa. Difficulties inferring the mental state or predicting responses of a conversation partner may have an impact on social interactions (Hughes & Leekam, 2004).

Another area of difficulty lies in presupposition, where language has to be tailored to the context and the conversation partner (Pridham, 2013). For example, speaking to a friend about a shared event requires less provision of background information than speaking to a stranger about an event of which they are unaware. Carter et al. (2014) posited that the skills needed to interact successfully with adults are likely to be different to skills needed for interactions with adolescent peers. Hence any skills acquired during childhood with an adult partner may not be transferred to peers nor remain relevant as an individual matures. Adolescents with ASD are likely to communicate with adults who provide a supportive or assistive role whereas connections with peers are likely based on common interests and associations thus the nature of the contact is different. There is evidence that some individuals with autism seek social interactions but the outcomes of attempts at interactions can be different. They tend to fare better in structured and predictable situations with familiar people, in particular, with familiar adults (Lord & Magill, 1989). Sasson et al. (2017) found that the substance or content of social speech was not what presented a problem for neurotypical (NT) peers, rather it was the auditory and visual cues that lead to an unwillingness to interact with individuals with ASD.

De Villiers et al. (2007) attempted to rate conversational impairment of individuals with ASD by analyzing recorded conversations of 46 participants with autism or Asperger syndrome and found nine characteristics of the conversation of people with ASD. These included wooden or monotonous speech, abrupt topic shifts, low rates of initiations and short responses, topic perseveration, proffering of information that is not commensurate with what is required, repetitions or self-corrections, echolalic or self-stimming noises and an inability to stay on topic. They also found that generally there was little or no correlation between these dimensions and IQ or language measures.

Sng, Carter, and Stephenson (2018) reviewed studies addressing the pragmatic differences between people with ASD and other groups and identified patterns of difference and similarity. There was limited consistent evidence of difference between groups of people with ASD and TD group regarding resistance to topic shifts, allowing and accepting a conversational turn, detecting and attempting to repair misunderstandings, using humor, and dominating a conversation. Groups with ASD tended to have difficulty maintaining a topic, provided less novel information, made more abrupt topic changes, perseverated and offered more bizarre comments than groups who were TD or had intellectual disabilities. Sng et al. (2018) also noted that studies comparing differences in language or communication profiles between people with ASD and TD peers were usually conducted under artificial clinical or experimental conditions. Social difficulties have also been reported by caregivers. Knott, Dunlop, and Mackay (2006) reported data from 19 parents of children with ASD and overall parents rated their child's ability to have a conversation with peers as a concern. Specifically, the ability to initiate, maintain the interaction, choose appropriate topics and moderate their tone of voice were identified as areas that needed intervention.

There is substantial academic research examining the features of conversational exchange of individuals with ASD. Comparisons have been made with peers who are TD and peers with disabilities and there is some consensus among researchers on the conversational differences of people with autism. Nevertheless, there has been relatively limited examination of the perspective of the conversational partner of a person with ASD. It is possible that the extent to which partners perceive conversationally related behavior as problematic may be critical to successful social participation. In addition, given the identified differences in conversational capacities, it is possible that neurotypical conversational partners and those with ASD may perceive barriers to conversational communication differently. The primary aim of the research reported here was to use an online survey to investigate the perceptions of

conversational partners with or without ASD about the frequency of social communicative impairments that have been identified in academic research and the extent to which these impairments are perceived as problematic.

Method

Ethical Approval

Approval to conduct the research was provided by the University Human Research Ethics Committee (approval no: 5201700488). All participants in this research provided informed consent.

Survey Development

The development of the survey was informed by the literature review of Sng et al. (2018) comparing the conversational attributes of individuals with ASD vs. other disabilities and ASD vs. neurotypical peers. The statements included in the survey described conversation-related behaviors that might be problematic for communication partners when interacting with persons with ASD (e.g., "The person interrupts me inappropriately when I am speaking."). The initial version of the survey included 27 statements that related to greetings, initiations or terminations *(n* = 4), interrupting *(n* = 1), repairing *(n* = 2), staying on topic *(n* = 5), presupposition *(n* = 1), syntax (*n* = 1), paralinguistics such as eye contact and maintaining appropriate physical distance (*n* = 3), echolalia (*n* = 1), whether the load of the conversation was equitable (*n* = 3), coherent retell of events (*n* = 1) and other pragmatic issues such as understanding of humor, appropriateness of comments and the ability to express emotions (*n* = 7).

After the pilot survey was developed, a clinical psychologist and five special educators who had extensive experience working with individuals with ASD were invited to complete, provide feedback and validate the survey. Based on their feedback, the wording of one statement was clarified and two new statements were added to the survey. The first related to

asking conversation partners questions they already knew answers to (i.e., “Asks questions when knows answer”) and the second related to clarifying emotions (i.e., “Can’t explain emotions”). These two statements were incorporated in the final version of the survey bringing the total number of statements in the final survey to 29. A summary of the statements in the survey is included in Table 1 including a short title for each. For brevity, we will refer to the short titles for each statement hereafter.

(Insert Table 1 about here)

Instrument

The survey was designed to evaluate conversation partner’s perspective on social conversations with a person with ASD, so respondents were requested to have a specific person with autism in mind when completing the survey. Responses to questions in the first part of the survey provided demographic data. Two eligibility questions were included addressing whether the person with ASD had a confirmed ASD diagnosis and if he/she spoke in sentences of four or more words. In addition, a question addressed the age range of the person with ASD (5-8 years, 9-12 years, 13-19 years, 19-24 years and above 25 years).

The ethics approval given for this project stipulated that only people who were 16 years of age and above would be eligible to participate and this was clearly stated on the “Who can participate” section of the consent form and information on the first page of the survey. The section on participant eligibility stated that individuals who had an autism diagnosis themselves and who engaged in regular conversations with others with ASD were invited to complete the survey.

Information was also gathered on the respondent including if they had a diagnosis of ASD, their age range (under 16 years, 16-20 years, 21-30 years or above 30 years), relationship to the person with ASD (parent, sibling, partner, other relative, friend, other) and how frequently they have conversations (several times a day, once a day, 3-4 times a week,

once a week, once a month or less than once a month). Participants were not asked to report on their gender.

The survey statements were each rated on a 3-point scale indicating: a) how frequently the behavior occurred (i.e., *often, sometimes* and *never*); and b) how problematic the statement was when talking to the person with autism (i.e., *major problem*, *somewhat of a problem* and *not a problem*).

Distribution

The survey was advertised via autism organizations, social media and autism community groups in English speaking countries. The first author contacted 33 autism specific associations in Australia, New Zealand, Canada, the USA, the UK and Ireland to request advertising and distribution of the online survey. Participants were also encouraged to share the link to the survey. Participation in the survey was voluntary and completion of the survey indicated consent for use of the information provided. The survey was hosted on the Qualtrics platform and the option to "prevent ballot stuffing" was selected to avoid participants taking the survey more than once. The survey was open for a period of 9 months.

Data Analysis

This study was primarily exploratory but several *a priori* questions were established prior to data analysis to allow inferential evaluation. These were (a) is there a factor structure to the class of behaviors that are most problematic? (b) is there an association between perceptions of how often a behavior occurs and perceptions of how problematic it is? In addition, a substantial number of respondents to the survey reported having ASD themselves so the following question was posed prior to analysis of the response data: (c) is there a difference between the perceptions of ASD and NT respondents with regard to frequency and problem ratings?

After the survey closed, the data were downloaded, and edited to include only the responses from participants that met our participant criteria. Any responses from individuals younger than 16 years of age were eliminated as per the conditions of the approval. Responses that referred to a person with ASD aged below 5 years who did not speak in full sentences or have a confirmed ASD diagnosis were also eliminated in accordance to our criteria.

For responses related to frequency a value of 1 was given to a response of *rarely or never*, 2 for *sometimes* and 3 for *often*. For responses related to problem, *not a problem* was given a score of 1, *somewhat of a problem* was 2 and *major problem* was 3. Given the number of items in the survey, the data were initially examined using an exploratory factor analysis. The goal of this analysis was primarily for the creation of scores on resulting constructs for subsequent analysis, to avoid analyzing scores on all original items. A Principal Components Factor Analysis was therefore conducted in Stata version 15.

Mode, median, mean and standard deviation were calculated for each statement for both frequency and degree of problem. Independent t-tests were conducted on the mean values for frequency and problem comparing NT and respondents with ASD. The relationship between frequency and problem means was calculated with a Pearson's correlation coefficient.

Results

For clarity in reporting, "respondents" or "survey respondents" refer to the people who completed the survey. In the sections where we report on differences between NT and ASD respondents we indicate if the respondent also had an ASD diagnosis. The individual each respondent had in mind when completing the survey will be referred to as "the individual with ASD".

A total of 511 partial and complete surveys were recorded (195 incomplete responses and 316 complete responses). Of the incomplete responses, 147 did not respond beyond the first section requesting demographic information and nine responded to all the questions but failed to click “submit” to complete the survey. Fifty-eight completed responses did not meet the participation criteria. For instance, when asked whether the person had an ASD diagnosis or could speak in sentences of four words or more, they responded "no". These responses were excluded. The total number of responses included for analysis was 258.

Demographic information provided by respondents is presented in Table 2. The majority of the respondents answered questions with an individual with ASD aged 25 years and above in mind (n = 94) and most of the survey respondents were parents *(*n = 119). Respondents were mainly adults aged 30 and above (n = 198). Only 8 respondents were aged between 16 and 20 years. A number of respondents indicated that they had an ASD diagnosis themselves (n = 67). Over 74% of the survey respondents for the 25 years and above age group were friends or partners of the person with ASD, whereas respondents for younger persons with ASD were usually parents. Most of the respondents were from Australia and New Zealand (39%), the remainder were from North America (35%), UK and Ireland (19%) and other parts of Europe and South America (7%).

(Insert Table 2 about here)

Principal Components Analysis

The Principal Components analysis was run using polychoric correlations between individual items, due to the ordinal nature of the responses. Although seven components had eigenvalues above 1.0, a parallel analysis suggested four components be retained, which matched the point of inflection on the Scree plot. Together, these four components accounted for 56.85% of the total variance, with eigenvalues of 9.25, 3.74, 1.93 and 1.56. The

eigenvalue of the first component not retained was 1.24. As the components were expected to be related to each other, oblimin rotation was used.

The analysis did not yield interpretable results. Table 3 below gives loadings with Kaiser normalization for each variable and each component, as well as communalities for each variable. Loadings above 0.4 are indicated in bold.

(Insert Table 3 about here)

A large number of cross-loadings are evident. The extent of cross-loadings is even greater if the frequently used criterion of .32 is used (Tabachnick & Fidell, 2013). In addition to the problems associated with interpreting cross-loadings, even if only the largest loading is used to interpret each component, it is clear that three of the four components have no obvious conceptual coherence. The third component appeared to be the most coherent with all four variables related to maintaining, shifting or perseverating on a topic but two variables were cross-loaded in the first component and other variables loaded in the second and fourth components. Apart from variables related to topic perseveration the first component included variables related to conversational balance, repair, paralinguistics, and other pragmatics. A similar mix of unrelated variables are loaded in the second (topic preservation, conversational balance, echolalia, emotions, repair, and pronoun confusion) and fourth components (topic preservation, initiations, paralinguistics, and presupposition).

Frequency and Problem Data

Data on the median, mode, mean, and standard deviation for the frequency and problem of each statement in the survey are included in Table 4. The statements with the highest frequency were “3 – Starts conversation abruptly” (mean = 2.58, mode = 3) and “11 – Assumes prior knowledge (mean = 2.37, mode = 3). Other behaviors that were reported to occur frequently were “23 – Becomes side-tracked” (mean = 2.31, mode = 2) and “9 – Inappropriate eye gaze” (mean = 2.27, mode = 2), “18 – Can’t explain emotions” (mean =

2.26, mode = 3), and “19 – Difficulties with narrative” (mean = 2.16, mode = 3). Six statements were reported to “rarely or never” occur (mode = 1). These referred to “1 – Repeats phrases”, “7 – Inappropriate formality”, “8 – Inappropriate proximity to partner”, “13 – Talks less than partner”, “20 – Mixes up pronouns”, and “29 – Asks questions when knows answer”.

Overall the scores for problem were relatively low. None of the statements returned mean or mode values greater than 2. The statements with higher problem means related to difficulties in verbalizing feelings during a conversation. The statement “18 – Can’t explain emotions” returned a mean of 1.90 (mode = 2) and “17 – Can’t express emotions” had a problem mean of 1.86 (mode = 2). Other behaviors that were also reported as most problematic included “11 – Assumes prior knowledge”, (mean = 1.84, mode = 2), “19 – Difficulties with narrative” (mean = 1.78, mode = 2) and “4 – Interrupts speaker inappropriately” (mean = 1.76, mode = 2), “21 – Keeps talking when conversation end indicated” (mean = 1.71, mode = 2), and “15 – Doesn’t recognize misunderstandings” (mean = 1.71, mode = 2. None of the statements had a mode of 3 to indicate a *major problem*. The majority of the statements were reported as being *not a problem* with a problem mode of 1 *(n* = 21).

(Insert Table 4 about here)

Relationship Between Frequency and Problem

The Pearson correlation coefficient for the frequency and problem means for each statement was 0.44, indicating a moderate correlation overall. Individually each of the mean frequency scores was higher than the corresponding mean problem scores although there were some variations in the size of the difference. The difference in frequency and problem means ranged from 1.2 (“3 – Starts conversation abruptly”) to 0.22 (“28 – Inappropriate conversation termination”). Note that these are relative differences. Figure 1 shows the

difference in the frequency and problem means. Statements are ranked from largest difference to smallest difference between means.

Behaviors relating to beginning a conversation ("2 – Doesn't greet" and "3 – Starts conversation abruptly") and the lack of eye contact ("9 – Inappropriate eye contact") had much larger differences between their respective frequency and problem means (i.e., these statements were rated as occurring frequently but were not reported as being particularly problematic). On the other hand, there was a relatively small difference between the problem means and frequency mean of some of the behaviors that were reported as highly problematic. For example, "17 – Can't express emotions" and "18 – Can't explain emotions" were rated as both frequent and problematic behaviors (frequency mode = 3, problem mode = 2) with a difference in frequency and problem means of 0.26 and 0.36 respectively.

Seven statements were ranked in the top third for both frequency and problem means ("18 – Can't explain emotions", "17 – Can't express emotions", "11 – Assumes prior knowledge", "19 – Difficulties with narrative", "4 – Interrupts speaker inappropriately", "26 – Keeps revisiting previous topics", and "23 – Becomes side-tracked") and six ("7 – Inappropriate formality", "1 – Repeats phrases", "20 – Mixes up pronouns", "8 – Inappropriate proximity to partner", "29 – Asks questions when knows answer", and "6 – Inappropriate on-topic comments") were ranked in the bottom third. "3 – Starts a conversation abruptly" and "9 – Inappropriate eye contact" ranked first and fourth respectively for frequency (i.e., reported to occur frequently) but were amongst the lowest ranked behaviors for problem.

(Insert Figure 1 about here)

Neurotypical vs Respondents with Autism Spectrum Disorder

The mean frequency values for each statement for NT and ASD respondents are presented in Figure 2. Although it is conventional to display non-time series data in a bar

graph, we have chosen to present the data in a line graph as this provides a clearer visual representation of the information. As the Principal Components Analysis resulted in largely uninterpretable components, it was decided to create mean scores across all items for each participant. Ideally, such a technique would follow a PCA which resulted in one overarching component. In the absence of a coherent PCA result, Cronbach's alpha was calculated for each of the frequency and problems items separately. For frequency statements, Cronbach's alpha = .89, and for problem statements, Cronbach's alpha = .95. These very high alpha values, seemingly inconsistent with the poor PCA results, are perhaps an artifact of the large number of items in each scale; Cronbach's alpha is inflated in cases where scales have many individual items. Given these alpha values however, it was decided that the most appropriate method for subsequent analysis was to calculate mean frequency and problems scores for each participant across all frequency and problems items separately.

(Insert Figure 2 about here)

An independent t-test comparing the mean frequency of all statements for each participant showed that there was a statistically significant difference in mean values for NT respondents (M = 2.06, SD = 0.37) and respondents with ASD (M = 1.95, SD= 0.31), $t(256)$ = 0.31, p = 0.031. A Cohen's d effect size of 0.31 is regarded as a small effect size.

With regard to frequency data for specific statements, for eight behaviors/statements, the respondents with ASD reported higher frequencies than NT respondents. These behaviors related to the use of formal or "big" words during casual conversation ("7 – Inappropriate formality"), the lack of eye contact ("9 – Inappropriate eye contact"), unusual facial expressions and speech patterns ("10 – Inappropriate prosody or facial expression), the person with ASD talking more than the respondent ("14 – Talks more than partner"), behaviors relating to staying on topic, and providing too much detail ("23 – Becomes sidetracked", "24 – Provides too much detail", "25 – Sudden topic changes"). For the

remaining 21 statements, NT individuals reported behaviors occurred more frequently than individuals with ASD.

Corresponding data for problem data are presented in Figure 3. The results for both groups tended to follow a similar pattern but conversation partners with ASD reported 28 out of 29 statements as being less problematic than NT conversation partners. The only exception was to the statement "8 – Inappropriate proximity to partner" (-0.04). The two statements that showed the biggest difference in perception between NT and ASD conversation partners were "18 – Can't explain emotions" with a difference in the mean of 0.43 and a statement on topic shift, "26 – Keep revisiting topics" with a difference of 0.41. An independent *t*-test revealed that NT respondents (M = 1.60, SD=0.40) reported these behaviors as more problematic than respondents with ASD (M = 1.36, SD = 0.34), $t(256) = 4.39$, $p = 0.00002$. The Cohen's d effect size of 0.62 indicates a moderate effect.

(Insert Figure 3 about here)

Discussion

Individuals with ASD are reported to have pragmatic difficulties such as initiating conversation, repairing misunderstandings, perseverating on topics, and making topically irrelevant comments (Kissine, 2012; Loveland, Landry, Hughes, & Hall, 1988; Volden, 2017) and there is extensive research on social skills interventions that seek to remediate or ameliorate these difficulties (Breit-Smith & Murray, 2009; Dotson, Leaf, Sheldon, & Sherman, 2010; Koegel, Park, & Koegel, 2014; Nuernberger, Ringdahl, Vargo, Crumpecker, & Gunnarsson, 2013) but there is little information on the extent to which these behaviors pose a barrier for the conversation partner. It is important to bear in mind that research on conversation is often conducted in structured and artificial contexts (Sng et al., 2018). Thus, differences that are identified in these contexts may not be present or be an impediment to social engagement in natural contexts. The results from the survey offer insight into the

perceived frequency of conversational behaviors as well as the extent to which these behaviors are perceived as problematic for partners. In addition, examination is provided on the relationship between the frequency and problem of the behaviors surveyed and the difference between the perceptions of NT respondents and respondents with ASD.

Principal Component Analysis

Although our analysis returned four components the factors within the components were not interpretable. Several variables were cross loaded between components and the variables within components did not appear to be coherent. It is not possible to determine the exact reason behind this lack of conceptual coherence to the components. Although it may be an artefact of the restricted range on which participants could respond to each item, it may equally be that the items do not in fact group together in any clear conceptual way. Future research should consider re-examining these items with a larger range of response options.

Frequency and Problem

Only five behaviors were reported to occur *often* (mode = 3), "3 – Starts conversation abruptly", "11 – Assumes prior knowledge", "18 – Can't explain emotions", and "19 – Difficulties with narrative". These behaviors have been widely reported as features of conversational behavior of people with ASD (Adams, Green, Gilchrist, & Cox, 2002; de Villiers et al., 2007; Kelly, O'Malley, & Antonijevic, 2018), therefore the high frequency of these behaviors is not unexpected but it is surprising that behaviors such as "9 – inappropriate eye contact" (Eales, 1993; Nadig, Lee, Singh, Bosshart, & Ozonoff, 2010), "1 – repeats phrases" (Paul et al., 1987; Roberts et al., 2007) and behaviors relating to topic preservation ("22 – Does not volunteer information", "24 – Provides too much detail", "26 – Keeps revisiting topics" & "27 – Perseverates on topics") (Adams et al., 2002; Bauminger-Zviely, Karin, Kimhi, & Agam-Ben-Artzi, 2014; Nadig et al., 2010) were not identified as occurring

often given that the statements/behaviors included in the survey were based on behaviors that have been of interest in the research literature.

The mean and mode for problem of behaviors were two or lower, which indicates that respondents did not perceive individual behaviors as major problems. Behaviors that were rated as most problematic pertained mainly to difficulties with verbalizing emotions ("17 – Can't express emotions" and "18 – Can't explain emotions"). These behaviors were not addressed extensively in the available research within the context of conversation skills (see Sng et al. 2018). In fact, statement "18 – Can't explain emotions" was suggested by a respondent after the pilot test of the survey.

Ziatas, Durkin, and Pratt (2003) studied how often students with autism referred to their own and others' mental states (including emotional states) and they concluded that individuals with autism referred to mental states much less than a group with speech language impairment or Asperger syndrome. They hypothesized that this was due to difficulties with identifying their own internal emotions and identifying the emotional state of others. Other researchers have suggested that although individuals with ASD can identify simple emotions, they have difficulties explaining emotions (Bauminger, 2002; Loveland et al., 1997). Given that emotions can be subtle and context dependent, it is probable that this inability to identify emotions can be troublesome to a conversation partner. Given that issues surrounding expression and explaining emotions were rated highly both in frequency and problem by conversational partners, further investigation would seem to be warranted.

Relationship Between Frequency and Problem

There was a low to moderate correlation between the frequency and problem means ($r = 0.44$) suggesting that behaviors that were reported to occur frequently were somewhat more likely to be perceived as being problematic. Nevertheless, some behaviors that were frequently examined in research were not reported to occur frequently in conversation and the

behaviors that were reported to occur frequently were not necessarily perceived as problematic by partners. For instance, lack of eye contact and the reversal of pronouns have been examined extensively in literature (Baltaxe & D'Angiola, 1996; Hobson, Lee, & Hobson, 2010; Paul et al., 2009) but these characteristics were not rated highly as problems by conversation partners. The issue of abrupt initiation of a conversation ("3 – Starts conversation abruptly") has also been discussed extensively in relation to the pragmatic difficulties of people with ASD (Adams et al., 2002; Bambara et al., 2018; Hughes et al., 2013) but though reported to occur frequently (mode = 3), it was not rated as particularly problematic (mode = 1) by conversation partners.

In sum, the present study indicates that researchers might consider the perspectives of partners when developing interventions to address conversational skills in persons with ASD. Issues that are identified as occurring frequently in research on conversational capacities of individuals with ASD might not necessarily be perceived as particularly problematic for partners. Further, issues that are problematic for partners may be underexamined in the existing research. Regardless, further and more detailed research of the perceptions of partners should be considered.

NT vs ASD Respondents

Researchers have written about the difficulties or differences in the pragmatic communication of people with ASD and there is a growing body of research on personal perceptions of people with ASD which indicates that social interactions are self-identified as areas of difficulty (Kelly et al., 2018; Sperry & Mesibov, 2005). Compared to NT respondents, respondents with ASD reported that eight behaviors occurred more frequently but there was no substantial difference in the frequency means of these behaviors. However, the mean frequency for three statements were much lower than the means reported by NT respondents. These were "12 – Respondent keeps conversation going", "13 – Talks less than

partner" and "16 – Can't repair misunderstanding", which suggest that when talking to others who also have ASD, respondents with ASD may not have considered that they had to keep the conversation going as much as NT respondents, and they did not consider there were as many instances of misunderstanding during conversation.

There was a clear difference in the way the two groups rated statements with regard to problem. Respondents with ASD reported that most behaviors were less problematic than NT respondents and the differences were statistically significant with a moderate (d = 0.62) effect size. Respondents with ASD appeared to acknowledge that the behaviors surveyed do occur during social conversation in much the same way as NT respondents but, as a group, they do not report these behaviors as problematic as their NT counterparts. The statements that had the largest difference between NT and ASD respondents were "18 – Can't explain emotions", "26 – Keep revisiting topics", and "Can't express emotions". When conversing with a person with ASD, NT respondents found the difficulties with expressing and explaining emotions more problematic than ASD respondents. Given evidence that individuals with ASD find it more difficult to identify complex emotions than their NT peers (Losh & Capps, 2006; Mazza et al., 2014) and have delayed development or deficit in theory of mind (Baron-Cohen, 1989), it is possible that these factors may have contributed to the lower perception of problem by conversation partners with ASD.

Only one statement, "8 – Inappropriate proximity to partner", was reported as more problematic for respondents with ASD. There is evidence that individuals with ASD prefer a larger interpersonal space and find personal space violations more confronting than TD peers even when the other person is familiar to them (Gessaroli, Santelli, di Pellegrino, & Frassinetti, 2013). Furthermore, research by Candini et al. (2017) found that people with autism prefer a larger personal distance when they are approached by another person but this distance is reduced when they are approaching another person. They posit that this may be

due to the unpredictability of the approaching person but it could also refer to the issues with theory of mind where they are not able to be self-reflective and realize that although they find a particular behavior bothersome, they do not understand that it may also be bothersome to the other party.

Limitations and Future Research

The inherent nature of the open online survey meant data on the return rate of the survey cannot be calculated. A number of respondents attempted but did not complete the survey (n = 195) for unknown reasons. Given that 75% of the incomplete responses were terminated immediately after completing the demographics section, it is possible these respondents either did not have the required information or found the format of the questions difficult. In the present study most of the respondents with ASD were "friends" or "partners" and completed the survey with an individual with autism aged 25 and over in mind. Further research is suggested to see if data obtained longitudinally from a more uniform cohort of respondents replicates the findings of the present survey.

Access to the survey was open to the public but restricted to avoid multiple responses from one person by the selection of "prevent ballot box stuffing" option. This measure does not preclude respondents clearing cookies on their device or using multiple devices to make repeated attempts. We know that ASD has a genetic component (Bailey et al., 1995; Sandin et al., 2017) so it is possible that there may be more than one individual with ASD within a household. This restriction may have prevented respondents from completing the survey with different individuals with ASD in mind and also for more than one person in the same household to provide their perceptions of a person with ASD.

It is possible that the people who responded to this survey have a close relationship to the person with ASD and as such are more tolerant or accepting of their behavior. To this end, their responses may not be indicative of the perception of the general public so the

results from this survey should be interpreted with this in mind. The results gathered in this survey were also limited to respondents who have confirmed knowledge of a diagnosis of autism in the person they were reporting on. Therefore it is possible that the responses of how problematic a behavior was perceived to be is affected by this knowledge. Matthews, Ly, and Goldberg (2015) found evidence that people view idiosyncratic behavior more positively when they are aware of the person's diagnosis so it is possible that people who do not have knowledge of a diagnosis may find the behaviors more problematic.

We only surveyed respondents who were 16 years and above as ethics approval was only obtained to survey people above this age. This meant that we did not obtain any data for "friends" for persons with ASD in the younger age groups. It may be of interest to survey younger people and capture information relating to the friends of individuals younger than 16 years of age.

The survey was presented in English and invitations to participate were primarily distributed in English speaking countries. Further research into partner perceptions could be extended to collect cultural and language data or distributed in non-English speaking countries to investigate if differences exist based on geographical location, language or culture.

Gender differences between respondents and participants have not been taken into consideration in this study. Our demographic data did not include the gender of the respondent or participant and possible differences in response related to respondent or person with ASD gender were not addressed. Given that neurotypical females are more likely to engage in narrative conversation (Merrill, Gallo, & Fivush, 2015), provide affective feedback and discuss sensitive topics (Holmes & Stubbe, 1997) and females with ASD do differ from their male counterparts in social behavior (Dean, Harwood, & Kasari, 2017; Lai, Lombardo,

Auyeung, Chakrabarti, & Baron-Cohen, 2015), research into whether there are gender differences in perceptions would be worthwhile.

We did not ask respondents to provide information on the severity of the ASD. The criteria for participation asked respondents to have a person with ASD who speaks in sentences of 4 or more words in mind when answering the survey questions. This necessarily means the responses received refer to a wide range of individuals with ASD. Without further information about the autism diagnosis it is not possible to determine how this might affect perceptions.

Conclusion

Existing research on conversation tends to identify how people with ASD depart from the socially typical ways of communicating but does not usually provide information on how problematic these differences are for partners in everyday contexts. The results of this survey indicate that some behaviors that occur frequently and are often the focus of research, such as inappropriate eye contact and starting a conversation abruptly, are not necessarily particularly problematic for the conversation partner. Further, some conversational capacities, in particular the expression of emotions, that have received less research attention were perceived as more problematic. Respondents with ASD reported the frequency of behaviors at roughly the same rates as their NT peers but, as a group, they found nearly all behaviors surveyed less problematic. In developing interventions to address conversational skills in individuals with ASD, there is a case for taking into consideration partner perceptions.

Table 1

Statement number, title and full survey statement

Number	Short Title	Full statement	Source
1	Repeats phrases	The person repeats what I say back to me or repeats phrases heard before (e.g., TV programs, echolalia, advertising jingles).	Eales (1993); Nadig et al. (2010)
2	Doesn't greet	The person does not start a conversation with a greeting when this is appropriate (e.g., without saying hello first).	Eales (1993)
3	Starts conversation abruptly	The person starts a conversation abruptly without appropriate small talk.	Adams et al. (2002)
4	Interrupts speaker inappropriately	The person interrupts me inappropriately when I am speaking.	Paul et al. (2009)
5	Misunderstands humor	The person misunderstands when something I say is meant to be humorous.	Bang, Burns, and Nadig (2013)
6	Inappropriate on-topic comments	The person asks questions or makes comments that are on topic but are inappropriate (e.g., about medical conditions or intimate or personal details).	Capps, Kehres, and Sigman (1998)
7	Inappropriate formality	The person talks formally or uses unusual or "big" words during casual conversation.	Paul and Wilson (2009)
8	Inappropriate proximity to partner	When the person talks to me he/she positions him/herself too close or too far from me.	Bauminger-Zviely et al. (2014)
9	Inappropriate eye contact	The person doesn't make eye contact or look at me when talking.	Bauminger-Zviely et al. (2014); Nadig et al. (2010)
10	Inappropriate prosody or facial expression	The person talks too fast, too slow or with an unusual tone of voice or doesn't show any facial expressions or smile when talking to me.	Bauminger-Zviely et al. (2014)

Number	Short Title	Full statement	Source
11	Assumes prior knowledge	The person assumes I know what he/she is talking about even when I don't.	Bauminger-Zviely et al. (2014)
12	Doesn’t keep conversation going	The person does not respond so I have to ask lots of questions to keep the conversation going.	Capps et al. (1998)
13	Talks less than partner	The person talks much less than me when we are having a conversation i.e. one-word answers or doesn't elaborate on information.	Nadig et al. (2010); Ziatas et al. (2003)
14	Talks more than partner	The person talks a lot more than me when we have a conversation.	Nadig et al. (2010); Ziatas et al. (2003)
15	Doesn’t recognise misunderstandings	The person doesn't recognise when I don't understand what he/she is talking about.	Volden (2004)
16	Doesn’t repair	When I tell the person I don't understand, she/he can't explain what she/he means in a different way.	Volden (2004)
17	Can’t express emotions	The person can't tell me how he/she is feeling.	Bang et al. (2013)
18	Can’t explain emotions	The person can't tell me why they are feeling the way they feel.	Pilot test
19	Difficulties with narrative	When the person tells me something that has happened she/he is vague, leaves out important information or often tells the story in a confusing order (e.g., tells the middle before the beginning).	Bang et al. (2013); Bauminger-Zviely et al. (2014)
20	Mixes up pronouns	The person mixes up words like he/she, I/you, my/your when talking.	Baltaxe, Russell, D'Angiola, and Simmons (1995)
21	Keeps talking when conversation end indicated	The person keeps talking even when I indicate I want the conversation to end.	Bauminger-Zviely et al. (2014)

Number	Short Title	Full statement	Source
22	Does not volunteer information	The person does not volunteer any information relevant to what we are talking about.	Tager-Flusberg and Anderson (1991)
23	Becomes side-tracked	The person gets side-tracked when we are talking and starts telling me about other things.	Nadig et al. (2010)
24	Provides too much detail	The person provides too much detail during a conversation.	Nadig et al. (2010)
25	Sudden topic changes	The person suddenly changes the topic when we are talking.	Bauminger-Zviely et al. (2014)
26	Keeps revisiting previous topics	The person keeps returning to the same topic even after we have already talked about it and moved on to a different topic in the current conversation.	Bauminger-Zviely et al. (2014)
27	Perseverates on topics	The person keeps bringing up the same topic every time we have a conversation.	Bauminger-Zviely et al. (2014); Paul et al. (2009)
28	Inappropriate conversation termination	The person stops a conversation inappropriately (e.g., walks away when I am still talking).	Eales (1993); Jones and Schwartz (2009)
29	Asks questions when knows answer	The person asks questions that they already know the answer to.	Pilot test

Table 2

Details of respondents and the person with ASD

Age of person with ASD	Total no of respondents (respondents with ASD)
5-8 years	20 (1)
9-12 years	41 (5)
13-18 years	56 (8)
19-24 years	47 (8)
25 years and above	94 (45)
Age of respondent	
16-20 years	8 (4)
21-30 years	52 (24)
30 years and above	198 (39)
Relationship of respondent to person with ASD	
Parent	119 (12)
Partner	47 (15)
Friend	45 (28)
Other relative	17 (3)
Educator	13 (3)
Sibling	11 (5)
Other (e.g., therapist, doctor)	6 (1)
Regularity of contact with the person with ASD	
Several times a day	167 (24)
Once a day	20 (10)
3-4 times a week	35 (35)
Once a week	26 (12)
Once a month	8 (5)
Less than once a month	2 (0)

Table 3

Rotated component loadings for each item on each component and communalities for each item

		Component				
No.	Statement	1	2	3	4	Comm-unality
1	Repeats phrases	.097	**.461**	.374	-.290	.479
2	Doesn't greet	.355	.243	-.283	**.540**	.558
3	Starts conversation abruptly	.282	.214	-.067	**.528**	.468
4	Interrupts speaker inappropriately	**.702**	.034	.034	.008	.526
5	Misunderstands humor	**.555**	.216	-.256	.007	.401
6	Inappropriate on-topic comments	**.461**	.134	.302	-.039	.447
7	Inappropriate formality	-.028	-.177	.321	**.563**	.474
8	Inappropriate proximity to partner	**.461**	.165	.135	.091	.370
9	Inappropriate eye contact	-.191	.265	.257	**.557**	.446
10	Inappropriate prosody or facial expression	.233	.307	.132	**.415**	.452
11	Assumes prior knowledge	**.663**	.172	.057	.077	.589
12	Doesn't keep conversation going	-.024	**.777**	-.009	.170	.627
13	Talks less than partner	-.217	**.924**	-.071	.109	.791
14	Talks more than partner	**.677**	**-.675**	.149	.150	.745
15	Doesn't recognise misunderstandings	**.596**	.316	-.116	-.004	.539
16	Doesn't repair	**.466**	**.492**	-.137	-.203	.592
17	Can't express emotions	.203	**.573**	.005	.209	.505
18	Can't explain emotions	.272	**.600**	.029	.078	.559
19	Difficulties with narrative	.292	**.547**	.194	-.145	.571
20	Mixes up pronouns	.250	**.516**	.212	-.309	.553
21	Keeps talking when conversation end indicated	**.823**	-.218	.187	.039	.747
22	Does not volunteer information	.065	**.755**	.084	.087	.637
23	Becomes side-tracked	.024	-.037	**.816**	.115	.710
24	Provides too much detail	**.480**	-.340	.320	.369	.626
25	Sudden topic changes	-.024	.204	**.800**	.109	.722

26	Keeps revisiting previous topics	**.571**	-.116	**.453**	-.057	.645
27	Perseverates on topics	**.451**	.093	**.423**	.025	.546
28	Inappropriate conversation termination	.243	**.617**	.125	.106	.602
29	Asks questions when knows answer	.393	.326	.227	**-.420**	.563

Table 4

Median, mode, mean, and standard deviation for survey statements.

	Statement	Frequency				Problem			
		Median	**Mode**	***M***	***SD***	**Median**	**Mode**	***M***	***SD***
1	Repeats phrases	2	1	1.67	0.73	1	1	1.19	0.45
2	Doesn't greet	2	2	2.1	0.78	1	1	1.28	0.47
3	Starts conversation abruptly	3	3	2.58	0.61	1	1	1.38	0.54
4	Interrupts speaker inappropriately	2	2	2.14	0.73	2	2	1.76	0.64
5	Misunderstands humor	2	2	2.11	0.69	1	1	1.52	0.62
6	Inappropriate on-topic comments	2	2	1.79	0.71	1	1	1.44	0.59
7	Inappropriate formality	2	1	1.96	0.82	1	1	1.15	0.40
8	Inappropriate proximity to partner	2	1	1.73	0.74	1	1	1.34	0.53
9	Inappropriate eye contact	2	2	2.27	0.70	1	1	1.27	0.50
10	Inappropriate prosody or facial expression	2	2	2.11	0.78	1	1	1.41	0.66
11	Assumes prior knowledge	2	3	2.37	0.65	2	2	1.84	0.68
12	Doesn't keep conversation going	2	2	1.95	0.77	1	1	1.63	0.71
13	Talks less than partner	2	1	1.77	0.78	1	1	1.49	0.64
14	Talks more than partner	2	2	1.99	0.72	1	1	1.48	0.63
15	Doesn't recognise misunderstandings	2	2	2.10	0.7	2	2	1.70	0.66

	Statement	Frequency				Problem			
		Median	**Mode**	***M***	***SD***	**Median**	**Mode**	***M***	***SD***
16	Doesn't repair	2	2	1.99	0.78	2	1	1.70	0.73
17	Can't express emotions	2	2	2.12	0.72	2	2	1.86	0.74
18	Can't explain emotions	2	3	2.26	0.73	2	2	1.90	0.73
19	Difficulties with narrative	2	3	2.16	0.77	2	2	1.78	0.71
20	Mixes up pronouns	1	1	1.44	0.70	1	1	1.21	0.49
21	Keeps talking when conversation end indicated	2	2	2.04	0.76	2	2	1.71	0.68
22	Does not volunteer information	2	2	1.75	0.69	1	1	1.48	0.62
23	Becomes side-tracked	2	2	2.31	0.68	2	1	1.64	0.66
24	Provides too much detail	2	2	2.03	0.73	1	1	1.54	0.63
25	Sudden topic changes	2	2	2.1	0.68	1	1	1.57	0.63
26	Keeps revisiting topics	2	2	2.18	0.73	2	1	1.66	0.68
27	Perseverates on topics	2	2	2.05	0.76	1	1	1.61	0.69
28	Inappropriate conversation termination	2	2	1.86	0.73	2	1	1.64	0.68
29	Asks questions when knows answer	2	1	1.86	0.80	1	1	1.43	0.62

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (XXXX University Human Research Ethics Committee, approval no: 5201700488) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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