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Comparing the Social Skills of Male and Female Children with Autism Using *FaceSay*

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Author Note

We have no conflicts of interest to disclose.

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Abstract

This study examined the pre- and post-test performance on the Social Skills Improvement Scale (SSiS) Student Forms between groups of male and female children ($n=6$) with autism spectrum disorder (ASD) aged 6–13 years following 10 sessions of 15-minute engagements with the *FaceSay* computer program. Between the group of males with ASD and the group of females with ASD, there was no significant difference in the compared difference of scores for the Social Skills Scale between the male group ($M=6.3333$, $SD=28.72862$) and the female group ($M=4.3333$, $SD=6.80686$); $t(4)=-0.117$, $p=0.912$ following independent t-test analysis. Also, between these groups, there was no significant difference in the compared difference of scores for the Problem Behaviors Scale between the male group ($M=-3.3333$, $SD=6.11010$) and the female group ($M=-6.6667$, $SD=5.85947$); $t(4)=-0.682$, $p=0.533$. However, for this comparison of group performance on Problem Behavior Scales, the standardized effect size index, d , was found to be -0.557 , indicating a medium-to-large effect. The greater difference between pre- and post-test Problem Behavior Scales scores in the group of female children with ASD in conjunction with the medium-to-large effect indicated by the standardized effect size could suggest that future investigations with larger samples may yield more significant results. This study yields preliminary evidence suggesting that when males and females with ASD engage with a computer program designed to develop various social skills, no statistically significant difference in social skill improvements between male and female is present.

Keywords: autism, social skills, social skills improvement scales, sex differences

Comparing the Social Skills of Male and Female Children with Autism Using *FaceSay*

Utilizing 2020 findings from the Autism and Developmental Disabilities Monitoring (ADDM) Network, the Centers for Disease Control and Prevention (CDC) estimates that 1 in 36 8-year-old children in the United States is diagnosed with autism spectrum disorder (ASD) (Maenner et al., 2023). With such an abundant and diverse population, proven, effective assessments and treatments must be used. To better provide suitable interventions for individuals with ASD, it is crucial to understand the variance of the disorder—such as differences between males and females with ASD—and how this variance can affect intervention outcomes. As such, this study will assess potential differences in performance changes on the Social Skills Improvement System (SSiS) Rating Scale (Gresham & Elliot, 2008) between males and females before and after using the *FaceSay* program.

Literature Review

Autism Spectrum Disorder (ASD)

Although the characteristic symptomology of ASD has remained largely the same over the last half-century, ample in-depth research and study have led to a more detailed understanding of the disorder, leading to its classification as a spectrum disorder, varying among those with it (Lord et al., 2018). Currently, autism spectrum disorder (ASD) is a term describing a neurodevelopmental disorder consisting of social and communicative deficits, repetitive operations, and symptoms that impair functioning in school or the workplace (National Institute of Mental Health [NIMH], n.d.).

Research has revealed a plethora of risk factors for and potential causes of ASD, though there are still undiscovered causes and specifics for these aforementioned factors and causes. The American Speech-Language-Hearing Association (ASHA) describes a variety of potential causes

of ASD—including environmental and biological—and researchers concur that ASD is the result of genetic differences (ASHA, n.d. – a). Indeed, Bailey et al. (1995) concluded from a British twin study that genetics greatly influence ASD. According to Bourgeron (2016), “the genetic landscape of ASD is therefore shaped by a complex interplay between common and rare variants and is most likely different from one individual to another” (p. 301). Besides the diversity of causes and symptom severity, ASD is commonly accompanied by other difficulties or disorders. Lord et al. (2018) noted that for those with ASD, there are often other conditions present. Common examples include ADHD, anxiety, and increased aggression.

Males & Females with ASD

Previous research concerning sex differences between males and females with ASD has found evidence of phenotypical variance between the sexes. De Giambattista et al. (2021) found within their sample of 109 participants that, although both males and females exhibited similar deficits in communication, females with ASD were found to be significantly less vulnerable to or impacted by a multitude of social and communication developmental milestones and skills. Males more commonly had delayed speech acquisition, females were significantly better at behavioral adaptation across social contexts, and nonverbal communication problems were higher in the male sample (de Giambattista et al., 2021). These lesser impacts may be partly due to a coping mechanism dubbed “camouflaging,” the tendency to adapt to social situations by mimicking or learning accepted behaviors (de Giambattista et al., 2021). As Head, McGillivray, and Stokes (2014) note, gender has been shown to affect the development of social skills in the typically developing (TD) population. Therefore, differences in presentation between males and females with ASD due to gender, as with the TD population, are plausible.

Beyond social skills, evidence exists of other variations between males and females with ASD. In their research concerning performance across various domains of cognition among adults with autism spectrum conditions (ASC), Lai et al. (2012) found variation in performance among non-social domains. Additionally, utilizing diffusion tensor imaging (DTI), Lei et al. (2019) found significant changes in white matter integrity between females with ASD and TD females while finding no significant white matter alterations in the male sample.

Furthermore, there may exist methodological issues in research on ASD, namely the unequal samples of male and female populations with ASD. Loomes, Hull, and Mandy (2017) found the actual ratio of males to females with ASD in the general population to be closer to 2–3:1 than the commonly reported 4:1. De Giambattista et al. (2021) report that females are likely underdiagnosed due to male-centric phenotypes being the basis of development as well as tests lacking sensitivity. As such, characteristics of female ASD are often misconstrued or misunderstood, even by clinicians.

Further, De Giambattista et al. (2021) found that females with ASD had their first medical consultation significantly later than males with ASD, almost two years later in their total sample of 109 individuals with ASD. Within their sample, although both males and females exhibited similar deficits in communication, females with ASD were found to be significantly less vulnerable to or impacted by a multitude of social and communication developmental milestones and skills (De Giambattista et al., 2021). Males more commonly had delayed speech acquisition, females were significantly better at behavioral adaptation across social contexts, and nonverbal communication problems were higher in the male sample (De Giambattista et al., 2021).

Speech-Language Pathology & ASD

Research and studies about ASD have enabled speech-language pathologists (SLPs) to develop more effective services in diagnosis, treatment, and accommodations optimized for diverse patients (Lord et al., 2018). For example, when treating individuals with ASD who have speaking difficulties or are hard to understand, they may be assessed to see if they can use augmentative and alternative communication (AAC), providing other mediums for communication (ASHA, n.d. – a). Although there are no cures for ASD, early intervention is especially effective, and treatments have been found to be beneficial even into adulthood (ASHA, n.d. – a).

Beyond early intervention, SLPs regularly service clients with ASD. In the Spring of 2022, the American Speech-Language-Hearing Association (ASHA) conducted the 2022 Schools Survey to gather data on school-based SLPs. In the sample of 2,254 SLPs surveyed across types of school facilities, 93.7% reported regularly serving students with ASD (ASHA, 2022). Of this group of 93.7% of participants, ASHA (2022) found that these SLPs regularly served 11.4 students on average. This is a relatively large portion of the typical school-based SLP caseload, considering the median monthly caseload size of 48 clients for full-time clinical service providers (ASHA, 2022). Awareness of phenotypical differences can enable clinicians to better individualize services provided to clients with both typical and atypical presentations of ASD, an essential skill for future clinicians to develop due to the continuous rise of ASD diagnoses.

Indeed, previous research has found variance in client outcomes for various reasons. Analyzing eighteen group social skills intervention studies, Gates, Kang, and Lerner (2017) note variance in outcomes among participants based on comorbidities, age, gender, and medication use. Another study conducted by Olsson et al. (2016) reported social skill improvements and general treatment satisfaction from piloting the social skills group training KONTAKT program

in Sweden (as cited in Olsson et al., 2017, p. 585). However, they also found a disparity between the results of male and female respondents, suggesting that the intervention may be more effective for females than males (Olsson et al., 2017).

Intervention Strategies

Evidence-Based Practice (EBP). ASHA defines evidence-based practice (EBP) as “the integration of (a) clinical expertise, (b) current best evidence, and (c) client values to provide high-quality services reflecting the interests, values, needs, and choices of the individuals served” (ASHA, n.d. – b, entry 19). In assessing previous research on the matter, Greenwell and Walsh (2021) found concurrence among SLPs that EBP is necessary in the field, though there is a lack of uniform instruction of EBP and procedure(s) for clinical questions.

FaceSay™. Hopkins et al. (2011) define *FaceSay* as “a computer-based social skills training program for children with Autism Spectrum Disorders” (p. 1543). Hopkins et al. (2011) go on to describe *FaceSay*, noting the structured environment and variety of games to teach several social skills, including games such as “Amazing Gazing” and “Follow the Leader.” The results of their research providing *FaceSay* to children with low-functioning autism (LFA) and high-functioning autism (HFA) children are improvements in multiple social skills areas, including emotion recognition and social interaction (Hopkins et al., 2011). Another study evaluating *FaceSay* by Rice et al. (2015) found improvements in mentalization and facial recognition among participants, supporting the findings of Hopkins et al.

Methodology

Participants & Institutional Review Board (IRB)

Children’s Therapy T.E.A.M. and The Grace School provided written consent to conduct research on the premises. Researchers provided caregivers of applicable children with informed

consent forms requiring caregiver consent. Six children from the Children’s Therapy T.E.A.M. clinic aged 6–13 years were recruited and assigned to one of two groups with three children each. The first group contained male children with ASD, and the second group contained female children with ASD.

This Institutional Review Board (IRB) at the University approved this study prior to gathering any data. Research data is accessible only to other researchers working on this study, Kimberly Frazier, and Cynthia Watson. Data is stored on a password-protected hard drive. The results of this study will be submitted to the University of Arkansas as an Honors Thesis. All parents and children consented to participation in research. This research was conducted over the Spring semester of 2024.

Design & Instruments

The *FaceSay* program (Symbionica, n.d.) is designed to improve user social skills through various games centered on photorealistic character faces. One of these games is “Bandaid Clinic,” in which faces are presented with various fictitious ailments affecting segments of the face. During this game, the user is tasked to apply a “bandaid” to the correct portion of the on-screen face and is thanked for their help (Symbionica, n.d.). Another game called “Amazing Gazing” presents the user with a face surrounded by multiple objects, such as numbers or articles of clothing. During the game, the on-screen face will use its eyes to indicate what it wants by looking at an object, and the user must click/tap on the object indicated (Symbionica, n.d.).

The final game is called “Follow the Face,” a game involving two faces portrayed on-screen at the same time. The user is directed to act as a “referee” for a face-matching game, clicking the ‘yes’ button on-screen when both characters match in facial expression and the ‘no’

button when they do not match (Symbionica, n.d.). These games increase in difficulty and vary the artificial social context given to the user to encourage the generalization of the skills taught to various social situations (Symbionica, n.d.).

Both participant groups engaged with the *FaceSay* program for 10 15-minute sessions that occurred throughout March and April. Sessions were conducted with the assistance of a licensed SLP at The Grace School before, during, or after activities. Participants were evaluated using the SSiS (Gresham & Elliot, 2008) Rating Scales before and after these 10 sessions of engagement with the *FaceSay* program. The SSiS Student Form (Gresham & Elliot, 2008) is a standardized, norm-referenced screening tool completed by children and adolescents between the ages of eight and eighteen years of age. The SSiS Student Form offers a comprehensive assessment containing 75 items measuring Social Skills such as communication, empathy, and self-control, as well as Problem Behaviors including bullying and hyperactivity/inattention. For each test item, the student rates how true the test item is for them: *not true*, *little true*, *a lot true*, or *very true*. The SSiS Student Forms utilized for this study were developed for children aged 8–12 years.

Standard scores for both sections are calculated using raw scores from the respective section, the chronological age of the children or adolescents, and the female, male, or combined norm group. For the purposes of this study, only the female and male norm groups were utilized. Standard scores have a mean of 100 and a standard deviation of 15. Following assessment, scores between male and female participant group pre- and post-test scores were compared using independent t-testing. Gresham and Elliot (2008) report a high internal consistency with a median scale reliability coefficient of 0.92–0.94 and median subscale reliability of 0.78–0.79 for Student Forms for ages 8–12. The test-retest reliability of SSiS Student Forms scales is strong,

with a median scale correlation of 0.77, though the median subscale correlation is 0.68. Gresham and Elliot (2008) note that this may indicate less consistent student interpretations of test items.

Results

The independent t-testing between differences in pre- and post-test scale scores within the male and female group was conducted using IBM SPSS Statistics (Version 28). Between the group of males with ASD and the group of females with ASD, there was no significant difference in the compared difference of scores for the Social Skills Scale between the male group ($M=6.3333$, $SD=28.72862$) and the female group ($M=4.3333$, $SD=6.80686$); $t(4)=-0.117$, $p=0.912$. Also, between these groups, there was no significant difference in the compared difference of scores for the Problem Behaviors Scale between the male group ($M=-3.3333$, $SD=6.11010$) and the female group ($M=-6.6667$, $SD=5.85947$); $t(4)=-0.682$, $p=0.533$. However, for this Problem Behavior Scales group performance comparison, the standardized effect size index, d , was found to be -0.557 . This suggests a medium-to-large effect according to Cohen's (1992) guideline. The lack of statistical significance may be due to lower statistical power as a result of this study's small sample size ($n=6$).

Discussion

This study intended to investigate the presence of differences in social skills measurements between males and females with ASD after engagement with the *FaceSay* computer program. Contrary to our expectations, no significant differences in performance improvement in scale scores were present between males and females. Therefore, this study suggests that when males and females with ASD engage with a computer program designed to develop various social skills, no statistically significant difference in social skill improvements between males and females is present.

In addition, the greater difference between pre- and post-test Problem Behavior Scales scores in the group of female children with ASD in conjunction with the medium-to-large effect indicated by the standardized effect size could suggest that future investigations with larger samples may yield more significant results. The findings of this study are among the first to suggest that no significant differences in social skills performance improvement exist between groups of male and female children with ASD. Future research exploring social skills performance improvement variance between male and female children with ASD could identify differences in performance changes between males and females or limitations of current assessment or intervention materials.

Limitations

There are multiple limitations of this research study to note. First, the statistical power of this study is limited by its sample size ($n=6$). This limitation partially stems from the inability to recruit female children with ASD aged 6–13 years. Without more participants, the results of this study have limited generalizability. Further, participants within the sample also received educational services and interventions at a specialized school. Therefore, pre- and post-test changes cannot be entirely attributed to *FaceSay* engagements. Second, one female participant in the study was aged six years and seven months old. While this age lies within the range examined by this study, SSiS Student Forms do not have norms for ages 0–7. This may result in skewed statistical outcomes. Finally, the SSiS was originally published in 2008 and may utilize outdated sex-specific or age-based norms. Newer testing options such as the SSiS Social-Emotional Learning Edition (SSiS SEL) may improve the accuracy and, thus, generalizability of results. Additionally, direct tests of facial recognition such as the Benton Facial Recognition Test (Benton et al., 1983) may find a greater impact as a result of using *FaceSay*.

Conclusions

Explorations of sex-based differences in ASD presentation and treatment are ongoing with heterogeneous results. This study yields preliminary evidence suggesting that when males and females with ASD engage with a computer program designed to develop various social skills, no statistically significant difference in social skill improvements between males and females are present. Further, this study explores phenotypical and performance differences between male and female children with ASD. A greater understanding of social skills performance changes and how they may differ between various demographics with ASD is crucial to providing all clients with the most effective individualized services. Future investigations can further examine the pre- and post-test performance between groups divided by sex following engagement with programs such as *FaceSay*. Additionally, further research with different intervention options and varied assessments should be conducted in order to comprehend sex-based differences in children with ASD.

References

- American Speech-Language-Hearing Association. (n.d. – a). *Autism (autism spectrum disorder)*.
<https://www.asha.org/public/speech/disorders/autism/>
- American Speech-Language-Hearing Association. (n.d. – b). *Evidence-based practice glossary*.
<https://www.asha.org/research/ebp/evidence-based-practice-glossary/>
- American Speech-Language-Hearing Association. (2022). *2022 Schools Survey report: SLP caseload and workload characteristics*.
<https://www.asha.org/Research/memberdata/Schools-Survey/>
- Bailey, A., Le Couteur, A., Gottesman, I., Bolton, P., Simonoff, E., Yuzda, E., & Rutter, M. (1995). Autism as a strongly genetic disorder: Evidence from a British twin study. *Psychological Medicine*, 25(01), 63–77. <https://doi.org/10.1017/s0033291700028099>
- Benton, A. L., Sivan, A. B., Hamsher, K. D. S., Varney, N. R., & Spreen, O. (1983). Facial recognition: Stimulus and multiple-choice pictures. In A. L. Benton, A. B. Sivan, K. D. S. Hamsher, N. R. Varney, & O. Spreen (Eds.), *Contribution to neuropsychological assessment* (pp. 30–40). Oxford University Press.
- Bourgeron, T. (2016). Current knowledge on the genetics of autism and propositions for future research. *Comptes Rendus Biologies*, 339(7-8), 300–307.
<https://doi.org/10.1016/j.crvi.2016.05.004>
- Choque Olsson, N., Flygare, O., Coco, C., Görling, A., Råde, A., Chen, Q., Lindstedt, K., Berggren, S., Serlachius, E., Jonsson, U., Tammimies, K., Kjellin, L., & Bölte, S. (2017). Social skills training for children and adolescents with autism spectrum disorder: A randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(7), 585–592. <https://doi.org/10.1016/j.jaac.2017.05.001>

- de Giambattista, C., Ventura, P., Trerotoli, P., Margari, F., & Margari, L. (2021). Sex differences in autism spectrum disorder: focus on high functioning children and adolescents. *Frontiers in Psychiatry, 12*. <https://doi.org/10.3389/fpsy.2021.539835>
- Gates, J. A., Kang, E., & Lerner, M. D. (2017). Efficacy of group social skills interventions for youth with autism spectrum disorder: A systematic review and meta-analysis. *Clinical Psychology Review, 52*, 164–181. <https://doi.org/10.1016/j.cpr.2017.01.006>
- Greenwell, T., & Walsh, B. (2021). Evidence-based practice in speech-language pathology: Where are we now? *American Journal of Speech-Language Pathology, 30*(1), 186–198. https://doi.org/10.1044/2020_ajslp-20-00194
- Gresham, F. M., & Elliott, S. N. (2008). *Social Skills Improvement System: Rating Scales Manual*. NCS Pearson.
- Head, A. M., McGillivray, J. A., & Stokes, M. A. (2014). Gender differences in emotionality and sociability in children with autism spectrum disorders. *Molecular Autism, 5*(1), 1–9. <https://doi.org/10.1186/2040-2392-5-19>
- Hopkins, I. M., Gower, M. W., Perez, T. A., Smith, D. S., Amthor, F. R., Casey Wimsatt, F., & Biasini, F. J. (2011). Avatar assistant: Improving social skills in students with an ASD through a computer-based intervention. *Journal of Autism and Developmental Disorders, 41*(11), 1543–1555. <https://doi.org/10.1007/s10803-011-1179-z>
- Lai, M. C., Lombardo, M. V., Ruigrok, A. N. V., Chakrabarti, B., Wheelwright, S. J., Auyeung, B., Medical Research Council Autism Imaging Multicentre Study Consortium, & Baron-Cohen, S. (2012). Cognition in males and females with autism: Similarities and differences. *PLoS ONE 7*(10), e47198. <https://doi.org/10.1371/journal.pone.0047198>

- Lei, J., Lecarie, E., Jurayj, J., Boland, S., Sukhodolsky, D. G., Ventola, P., Pelphrey, K. A., & Jou, R. J. (2019). Altered neural connectivity in females, but not males with autism: Preliminary evidence for the female protective effect from a quality-controlled diffusion tensor imaging study. *Autism Research, 12*(10), 1472–1483.
<https://doi.org/10.1002/aur.2180>
- Loomes, R., Hull, L., & Mandy, W. P. L. (2017). What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry, 56*(6), 466–474.
<https://doi.org/10.1016/j.jaac.2017.03.013>
- Lord, C., Elsabbagh, M., Baird, G., & Veenstra-Vanderweele, J. (2018). Autism spectrum disorder. *The Lancet, 392*(10146), 508–520. [https://doi.org/10.1016/s0140-6736\(18\)31129-2](https://doi.org/10.1016/s0140-6736(18)31129-2)
- Maenner, M. J., Warren, Z., Williams, A. R., Amoakohene, E., Bakian, A. V., Bilder, D. A., Durkin, M. S., Fitzgerald, R. T., Furnier, S. M., Hughes, M. M., Ladd-Acosta, C. M., McArthur, D., Pas, E. T., Salinas, A., Vehorn, A., Williams, S., Esler, A., Grzybowski, A., Hall-Lande, J., ... Shaw, K. A. (2023). Prevalence and characteristics of autism spectrum disorder among children aged 8 years — Autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2020. *Morbidity and Mortality Weekly Report Surveillance Summaries, 72*(No. SS-2), 1–14.
<http://dx.doi.org/10.15585/mmwr.ss7202a1>
- National Institute of Mental Health. (n.d.). *Autism spectrum disorders*.
<https://www.nimh.nih.gov/health/topics/autism-spectrum-disorders-asd>

Rice, L. M., Wall, C. A., Fogel, A., & Shic, F. (2015). Computer-assisted face processing instruction improves emotion recognition, mentalizing, and social skills in students with ASD. *Journal of Autism and Developmental Disorders*, 45(7), 2176–2186.

<https://doi.org/10.1007/s10803-015-2380-2>

Symbionica. (n.d.) *FaceSay™ social skills software games*. <http://www.facesay.com/>