

Background

- **Autism Spectrum Disorder (ASD)** is a neurodevelopmental disorder that is characterized by having persistent deficits in social interactions, as well as social communication impairments with restricted, repetitive behaviors (CDC, 2019).
- Past researchers have found that another characteristic of individuals with ASD tends to be **higher rates of aggression** compared to other developmental disabilities; one research study found that 68% of individuals with ASD in a sample of 1,380 children had a history of directed aggression (aggression towards themselves or others) (Fitzpatrick, Srivorakiat, Wink et al., 2016).
- **Social awareness** is defined as an individual's ability to cognitively understand reactions to different social situations and effectively modify these reactions to achieve beneficial social communication. Past research has found a strong correlation between high social responsiveness and low aggression, but this has not been widely studied in a population with ASD (Henry, Farrell, Albert et al., 2011).
- **The aim of this study is to:**
 - Examine the relationship between social awareness (as operationalized by the SRS social awareness subscale) and aggressive behaviors (as assessed by the PDDBI aggressiveness scale).
 - Examine if there is a difference in those with high versus low social awareness (defined by the clinical cutoff) and aggressive behavior scores.
 - Examine if social awareness relates to the types of aggression in individuals with ASD --self-directed vs. towards others.
- **We hypothesize that:**
 - We will see a negative correlation between the rate of aggression and social awareness, and expect that children with ASD who score lower in social awareness will score higher in aggression.
 - Children with ASD who have lower social awareness will also demonstrate more aggression directed towards others than self-directed aggression.

Methods

Participants:

391 children, aged 6-11 years participated in the Autism Biomarkers Consortium for Clinical Trials (ABC-CT) study across five sites. All participants met the Autism diagnostic criteria on the ADOS-2, a child-clinician interaction that measures a child's social-communication skills and repetitive behaviors, and had nonverbal IQ > 70.

	N	Means	SD
Males	291	-	-
Females	100	-	-
ASD	272	-	-
TD	119	-	-
Verbal IQ	-	102.01	20.59
Non-Verbal IQ	-	101.89	17.44
ADOS	-	5.79	3.20
DSM-5	-	12.90	9.43
Awareness (t)	-	62.70	16.34
Self Aggression (raw)	-	1.04	2.30
Others Aggression (raw)	-	1.83	2.64

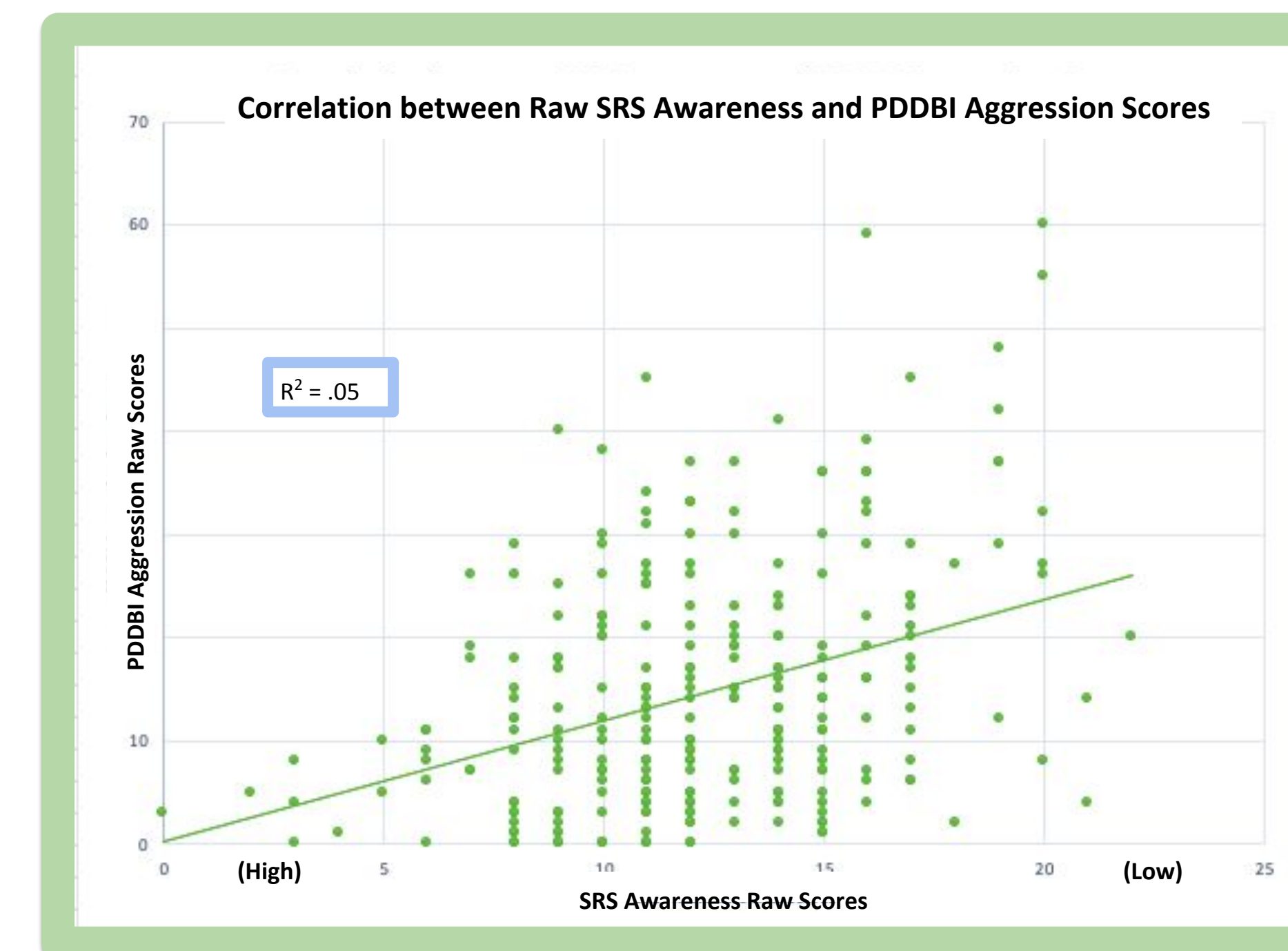
Measures:

- Autism (ASD) severity determined through ADOS-2, a structured and standardized assessment of elicited behaviors typical of individuals with ASD. The ADOS-2 is scored by a clinician, and produces a severity score on a scale from 1-10.
 - Low severity: < 5
 - Moderate severity: 5-7
 - High severity: > 7
- Social Responsiveness Scale or SRS-2 (Constantino et al., 2012) is a 65-item parent survey concerning autism-related social impairments, with subscales such as social cognition, social motivation, social communication, autistic mannerisms, and social awareness. This research study considered the social awareness subscale for all statistical tests and results.
 - Low social awareness: t-score higher than 60
 - High social awareness: t-score lower than 60
- Pervasive Developmental Disorder Behavior Inventory or PDDBI (Cohen et al., 2003) is a rating scale filled out by a parent to assess adaptive and maladaptive behaviors for various developmental disorders. This research study considered the aggressiveness (AGG) ratings.
 - Self-directed aggression (R-89 to R-92): Hits self, bangs head on smooth surfaces, bites self, and scratches self
 - Aggression towards others (R-101 to R-104): Hits/kicks, scratches/pulls hair, bites, and throws objects at others
 - Scale: 0-Does not (show behavior), 1-Rarely, 2-Sometimes, 3-Usually

Results

Aim 1: Is there a relationship between social awareness and aggressive behaviors in children with ASD?

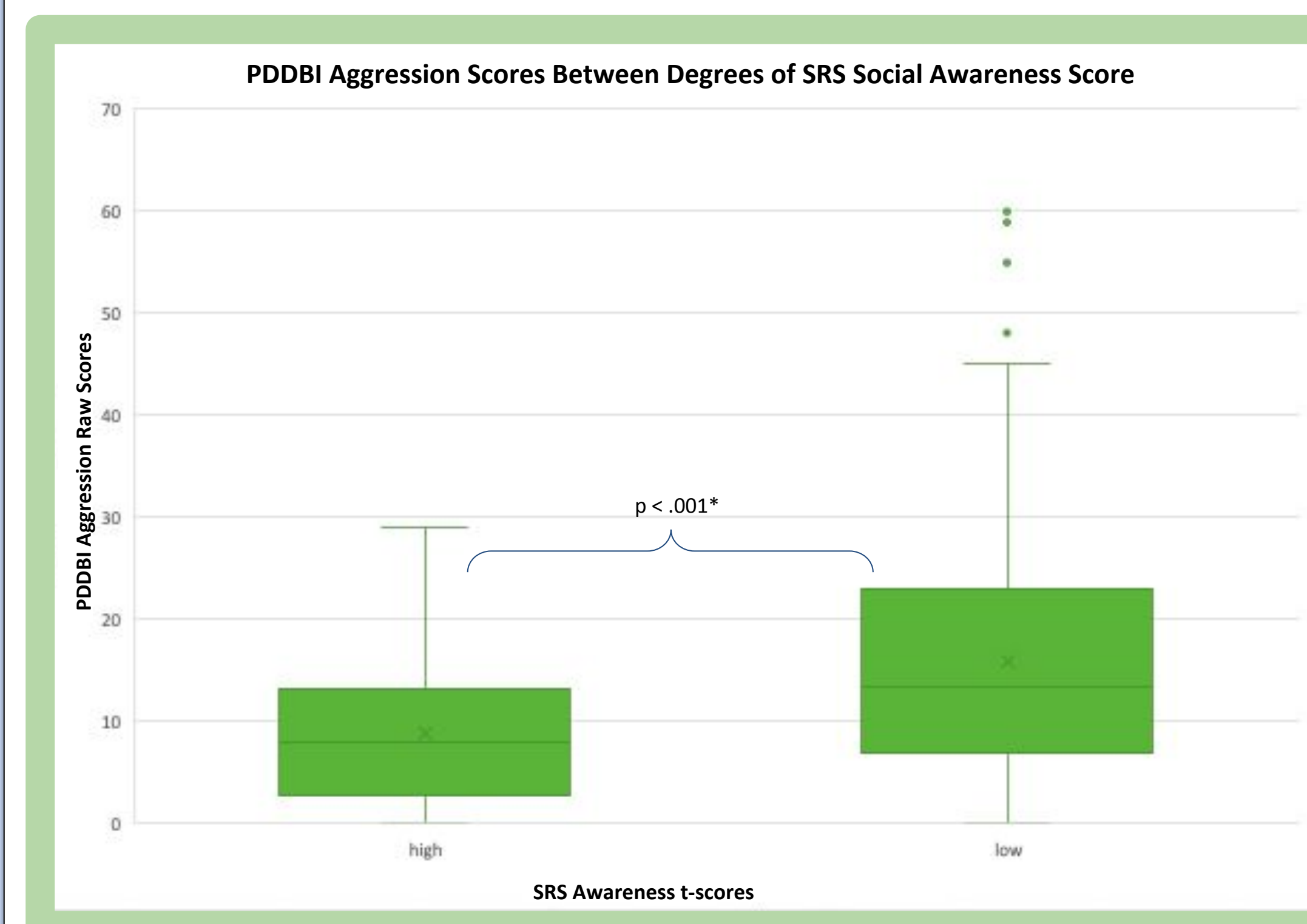
Correlations were run to understand the relationship between SRS social awareness raw scores and PDDBI aggression raw scores for participants with ASD.



There was a significant correlation between SRS social awareness scores and PDDBI aggression raw scores ($r=.230$, $p<.001$). This correlation indicates that as **impairments in social awareness increase**, overall **aggressive behaviors tend to increase** for children diagnosed with ASD. Children with stronger social awareness tend to show fewer aggressive behaviors.

Aim 2: Is there is a difference in those with high versus low social awareness skills and aggressive behavior scores?

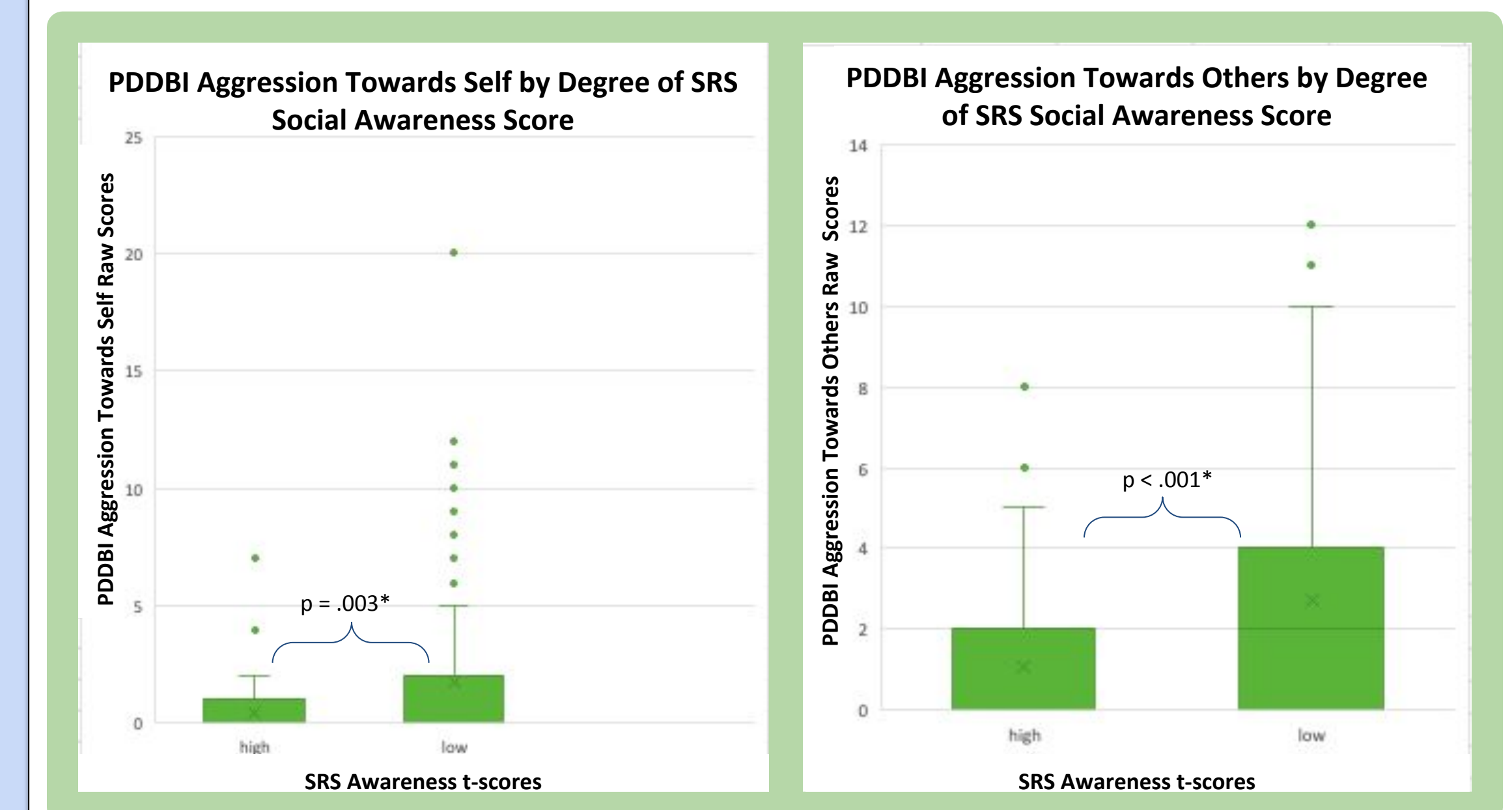
A one-way analysis of variance was implemented between SRS awareness t-scores (defined as low and high by clinical cut off) and PDDBI aggression raw scores.



There was a significant main effect of high versus low SRS social awareness t-scores on PDDBI aggression raw scores [$F(1,270) = 16.71$, $p < .001$], which indicates **higher aggressive behavior** in individuals with **low social awareness skills**. Children diagnosed with ASD who have higher social awareness skills (as defined by the clinical cutoff of a SRS awareness t-score lower than 60) tend to demonstrate lower scores of aggression.

Aim 3: Does social awareness relate to the types of aggression in individuals with ASD -- self directed vs. directed towards others?

A one-way analysis of variance was implemented between SRS awareness t-scores and PDDBI types of aggression: self-directed and directed towards others.



There was a significant main effect of low versus high SRS awareness t-scores and PDDBI aggression towards self scores [$F(1,270) = 9.00$, $p=0.003$], which indicates that children diagnosed with ASD who demonstrate **lower social awareness** tend to demonstrate **higher levels of aggression towards self**. There was also a significant main effect of low versus high SRS awareness t-scores and PDDBI aggression directed towards others scores [$F(1,270) = 13.99$, $p<0.001$], which indicates that individuals with **low social awareness** also exhibit **higher levels of aggression towards others**.

Discussion

- There was a significant negative correlation found between the rate of aggression and social awareness for children diagnosed with ASD. Children with lower social awareness skills also exhibited increased levels of aggressive behaviors compared to those with higher social awareness. When social awareness was compared to types of aggression, there was a significant main effect found between both self aggression and aggression directed towards others, indicating that individuals with lower social awareness display higher levels of both types of aggression.
 - Overall, these findings helped to support the first hypothesis that was initially made. These results suggest that social awareness does have a strong negative association with aggression for children diagnosed with ASD.
- Aggression directed towards others showed a stronger main effect compared to self directed aggression. However, the difference in significance between the two aggression types was extremely slight and high vs. low social awareness demonstrated a strong main effect on both aggression towards others and self aggression. A follow-up test needs to be conducted to determine significance.
 - This result helped to support the second hypothesis somewhat, however we were unable to determine if there is a significant difference between the two types of aggression and instead found that both types of aggression are heavily affected by degree of social awareness.
- One confounding variable to this study could be the uneven sample groups. We had many more males than female and more individuals with low SRS awareness skills. Future work on this correlation could utilize more even group sizes and standards.
- Further research should strive to understand how language development plays a role on aggression. Some children with ASD may be unable to exhibit high social awareness primarily because of communication barriers, such as verbal vs. non-verbal. These factors could play a large role in this study.
- Overall, these findings provide ASD families with a better understanding about aggression in this population and inform that social skill interventions may be useful for children displaying aggressive behaviors.