Impact of Camouflaging on Rates of Depression and Anxiety in Children with and without ASD

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Background

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by social communicative and behavioral impairments (APA 2013).

- Some individuals with ASD attempt to conceal their social impairments in a coping strategy known as camouflaging (Mandy 2019).
- Camouflaging includes:
  - Masking by suppressing instinctive autistic behaviors
  - Compensating by memorizing and following social-communication norms
  - Assimilating by conforming to fit with others in social contexts
- Rates of camouflaging are higher in females than in males with ASD and may contribute to the lower rates of ASD diagnoses in females (Hull et al., 2020).
- While camouflaging may help individuals with ASD navigate social situations, qualitative reports of camouflaging in individuals with ASD indicate social exhaustion and high levels of stress, anxiety, and suicidal tendencies (Hull et al., 2017).

This study asked the following questions and hypothesized :
1. Is there a correlation between camouflaging severity and anxiety/depression severity for ASD and typically developing (TD) populations?
   - Hypothesis: Camouflaging correlates positively with anxiety and depression severity for both ASD and TD participants.
2. Is autism severity or camouflaging a better predictor for anxiety and depression?
   - Hypothesis: Camouflaging is a stronger indicator than autism severity for anxiety/depression severity.
3. Are there sex differences in correlations between camouflaging and mental health when controlling for autism severity?
   - Hypothesis: Female participants will have a stronger correlation between camouflaging and anxiety/depression than male participants will have

Methods

Participants and Measures

30 participants with a confirmed diagnosis of ASD (18 males, 12 females) and 41 participants with typical development (TD) (17 males, 23 females) ages 15 to 23 (M=19.3, SD=2.16) with IQ in the average to above average range were included in this study.
For questions 1 and 2, the participants were separated only by ASD diagnosis, and for question 3, the participants were only separated by sex.

Table 1: Details on the three measures used in this study.

| Area of Interest	Measure	Details
Autism Severity	Social Responsiveness Scale, Second Edition (SRS-2; Constantino, 2012	A parent questionnaire that identifies social impairment associated with ASD and quantifies its severity.
Camouflaging	Camouflaging Autistic Traits Questionnaire (CAT-Q; Hull et al., 2019)	A self-report measure of social camouflaging behaviors. 3 subscores for masking, compensation, and assimilation are reported.
Mental Health	Adult Self Report/Youth Self Report (ASR/YSR)	A self-report questionnaire for adults (ASR, ages 18–59) or adolescents (YSR, ages 11-17) for identifying co-morbid mental health symptoms. For this study, only the anxiety and depression syndrome subscores were used.

Table 2: Participants separated by sex and ASD diagnosis.

Group	N	Camouflaging Total Score	Anxiety Score	Depression Score	Age in Years
ASD Males	18	M = 97.61 SD = 24.205	M = 61.61 SD = 9.017	M = 62.50 SD = 9.709	M = 19.11 SD = 2.131
ASD Females	12	M = 108.58 SD = 29.181	M = 62.00 SD = 10.963	M = 65.50 SD = 16.184	M = 19.47 SD = 2.566
TD Males	17	M = 75.47 SD = 25.739	M = 52.06 SD = 4.085	M = 52.82 SD = 5.714	M = 18.71 SD = 1.908
TD Females	23	M = 87.96 SD = 25.441	M = 56.30 SD = 6.609	M = 59.91 SD = 9.520	M = 19.28 SD = 2.233

Results

Question 1: Correlation of Camouflaging and Mental Health
A series of Pearson's correlations were run for ASD and TD participants separately and grouped together to determine associations between camouflaging scores and anxiety/depression symptoms. The total CAT-Q score and SRS-2 total score were set as independent variables, and depression and anxiety symptom severity as measured by the ASR/YSR were set as the dependent variables. Additional analysis ran correlations for all 3 camouflaging subscale scores.
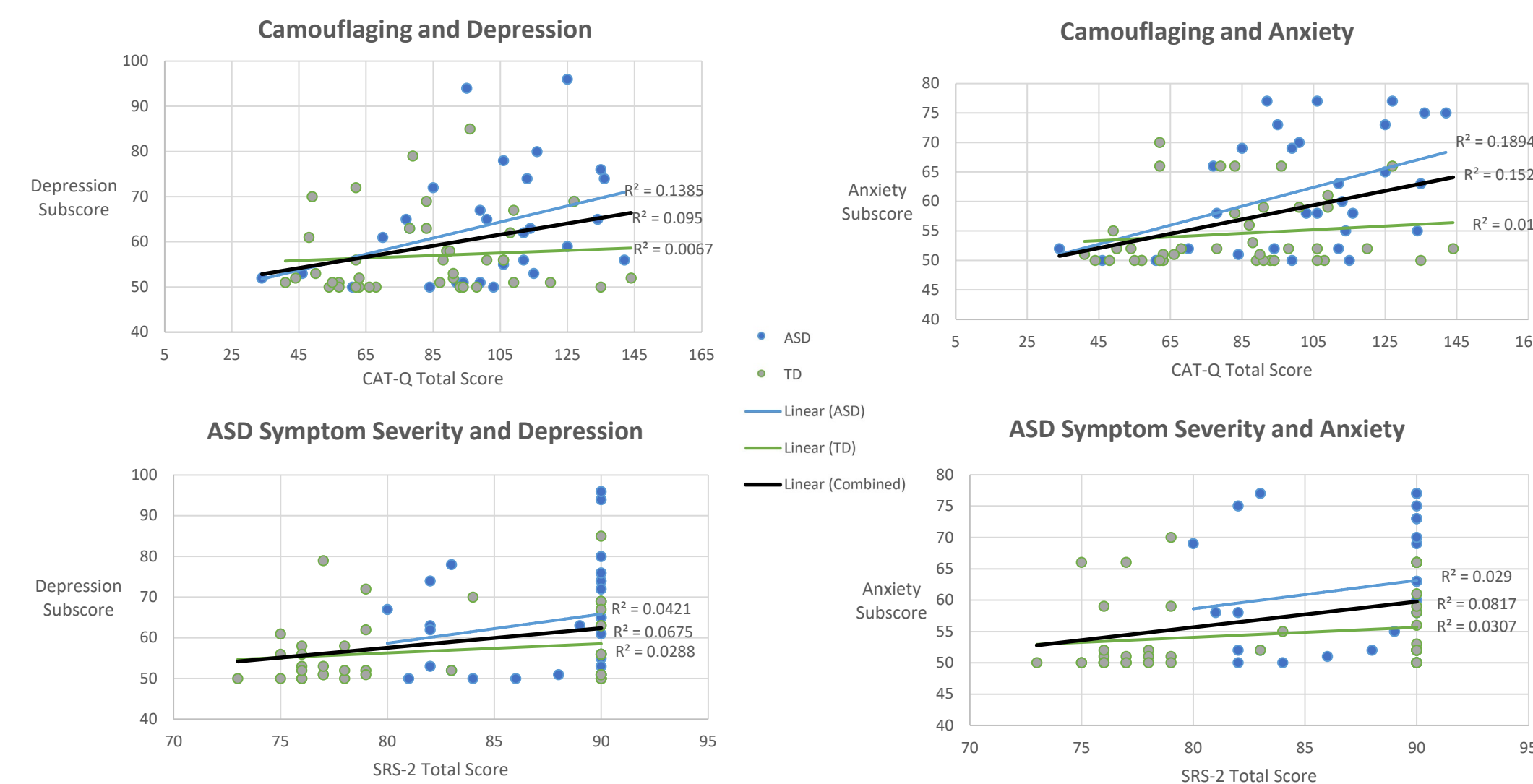
- There was a significant positive correlation between total camouflaging scores with depression ($r=0.308$, $p=0.009$) and anxiety ($r=0.391$, $p=0.001$) subscores, meaning youth with ASD and higher severity of camouflaging display more depressive and anxious behaviors.
- There was a stronger correlation for total camouflaging scores with both depression and anxiety for ASD participants, compared to the correlation among total ASD symptom severity with depression ($r=0.260$, $p=0.032$) and anxiety ($r=0.286$, $p=0.018$).
- Further analysis revealed strong correlations between the assimilation subscore on the CAT-Q and mental health for both ASD and TD participants, meaning youth that assimilate to fit into social contexts display more anxious or depressive behaviors.
  - For ASD participants there was a significant positive correlation between the CAT-Q assimilation subscale score with depression ($r=0.557$, $p=0.001$) and anxiety ($r=0.547$, $p=0.002$) subscores.
  - For TD participants there was a significant positive correlation between CAT-Q assimilation subscale scores and the anxiety ($r=0.342$ $p=0.031$) subscore.

Question 2: Camouflaging and Autism Severity as a predictors for Depression and Anxiety Symptoms
A series of Multiple Regressions were run for ASD and TD participants separately to determine whether a camouflaging subscore or autism severity would be the most significant predictor of mental health. Depression and anxiety subscores from the ASR/YSR were set as the dependent variables. The four predictors were set as SRS-2, Compensation, Masking, and Assimilation Scores.

Table 3: Camouflaging and Autism Severity as predictors of Depression for ASD participants

Predictor	β Value	p value
ASD Severity	0.163	0.351
Compensation	-0.162	0.436
Masking	-0.093	0.622
Assimilation	0.664	0.004

Table 4: Camouflaging and Autism Severity as predictors of Depression for TD participants

Predictor	β Value	p value
ASD Severity	0.175	0.284
Compensation	-0.492	0.051
Masking	0.077	0.728
Assimilation	0.494	0.026

Table 5: Camouflaging and Autism Severity as predictors of Anxiety for ASD participants

Predictor	β Value	p value
ASD Severity	0.125	0.487
Compensation	-0.069	0.746
Masking	0.009	0.964
Assimilation	0.567	0.014

Table 6: Camouflaging and Autism Severity as predictors of Anxiety for TD participants

Predictor	β Value	p value
ASD Severity	0.182	0.220
Compensation	-0.723	0.002
Masking	0.231	0.249
Assimilation	0.646	0.002

- For ASD and TD participants, the assimilation subscore is a better predictor of depression and anxiety symptoms than total ASD symptom severity and all other camouflaging subscores.
- For TD participants, the compensation subscore is a better predictor of depression and anxiety symptoms than the total ASD symptom severity
- For TD participants, compensation is the only significant predictor with a negative β value, suggesting that lower levels of compensation are related to higher levels of depression/anxiety in TD youth

Results Continued

Question 3: Sex Differences in Effects of Camouflaging
To ascertain sex differences in correlations with camouflaging and anxiety/depression, a set of partial correlations were run between males and females. Autism severity, as measured by the SRS-2 total score, was held constant and the correlations of each camouflaging subscore with anxiety and depression for males and females was measured.

Table 7: Partial Correlation of Camouflaging and Anxiety for Males

Camouflaging Subscore	r value	p value
Compensation	0.266	0.141
Masking	-0.082	0.656
Assimilation	0.511	0.003

Table 8: Partial Correlation of Camouflaging and Depression for Males

Camouflaging Subscore	r value	p value
Compensation	0.204	0.262
Masking	0.002	0.993
Assimilation	0.526	0.002

Table 9: Partial Correlation of Camouflaging and Anxiety for Females

Camouflaging Subscore	r value	p value
Compensation	-0.050	0.779
Masking	0.124	0.486
Assimilation	0.391	0.022

Table 10: Partial Correlation of Camouflaging and Depression for Females

Camouflaging Subscore	r value	p value
Compensation	0.130	0.465
Masking	0.218	0.216
Assimilation	0.492	0.003

- For males and females, there was a significant positive correlation between assimilation and depression and anxiety subscores.
- No other significant correlations were found.

Discussion

Summary
- The assimilation camouflaging subscore was the strongest predictor of, and most correlated with depression and anxiety, compared to other camouflaging subscores and autism severity. This suggests that assimilating to social contexts is more hazardous to mental health than masking traits or compensating for difficulties in social communication. These results support previous research which hypothesized that camouflaging erodes self-identity, which increases stress and anxiety (Hull, 2017).
- The effect of camouflaging on mental health seems to be more nuanced than originally hypothesized. Although the assimilation camouflaging subscore is the strongest predictor of depression/anxiety for ASD and TD populations, a greater level of compensation predicts a lower level of anxiety for TD populations. This suggests a possible difference in the mechanisms and reasons behind camouflaging between ASD and TD youth.
- For both males and females, assimilation was most correlated to depression/anxiety although females had a slightly stronger correlation for both mental health subscores. Since both males and females displayed significant correlations between depression/anxiety and assimilation, it is not clear how much of a sex difference exists in the effects of camouflaging.

Limitations
- The small sample size of this study means it is hard to generalize findings to all ASD and TD youth as well as make conclusions on sex differences in the effects of camouflaging.
- Observed differences in the predictive power of the CAT-Q vs the SRS-2 could be because the CAT-Q and ASR/YSR are both self-report while the SRS-2 is parent-report .

Future Directions
- Results from this analysis highlight the importance of developing robust mental health interventions for youth who engage in camouflaging behaviors, particularly those who engage in assimilation.
- An important next step is understanding how to make better encompassing autism diagnosis tools that can account for camouflaging to provide a proper diagnosis and social support to females with autism.

References

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