

SOCIAL CAMOUFLAGING AND MENTAL HEALTH IN ADOLESCENCE:
DIFFERENCES BY SEX AND DIAGNOSIS

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ABSTRACT

Camouflaging is a term used to describe the set of strategies that autistic individuals use to hide or mask autistic traits. Importantly, nonautistic individuals can also camouflage, as autistic traits are distributed throughout the general population. Some studies suggest that autistic females camouflage more than autistic males, and many studies have found that camouflaging is negatively associated with mental health and wellbeing in autistic individuals. However, research in this area has mainly focused on adults and has included few comparisons between autistic and nonautistic individuals. The goals of the two studies included in this thesis were to 1) compare levels of camouflaging by sex and diagnosis in autistic and neurotypical adolescents and 2) to examine age, sex, autism diagnosis, and camouflaging as predictors of depression, anxiety, and stress levels in autistic and non-autistic adolescents. The first study found that females reported higher levels of camouflaging when not accounting for age, but that an age-by-diagnosis interaction effect emerged. This interaction showed that older nonautistic adolescents reported significantly higher levels of camouflaging than younger nonautistic adolescents, but the reported camouflaging levels of older and younger autistic adolescents did not differ significantly across the age groups. Findings of the second study suggest that level of camouflaging is an important predictor of depression, anxiety, and stress in autistic and non-autistic adolescents and that camouflaging may be particularly distressing for females, regardless of diagnosis. These findings inform our understanding of camouflaging, how it may develop differently across autistic and nonautistic individuals, and its consequences in adolescence.

CHAPTER 1
SOCIAL CAMOUFLAGING IN AUTISTIC AND NEUROTYPICAL
ADOLESCENTS:
A PILOT STUDY OF DIFFERENCES BY SEX AND DIAGNOSIS

This chapter includes the accepted preprint version of *Social Camouflaging in Autistic and Neurotypical Adolescents: A Pilot Study of Differences by Sex and Diagnosis*, published in the *Journal of Autism and Developmental Disorders* (full publication details below).

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Abstract

Camouflaging is a process through which individuals mask autistic traits. Studies suggest autistic females may camouflage more than autistic males. However, research has focused on adults and includes few comparisons between autistic and neurotypical individuals. This study compared levels of camouflaging by sex and diagnosis in autistic and neurotypical adolescents. Females reported higher overall levels of camouflaging when not accounting for age. When accounting for age, an age by diagnosis interaction effect emerged. This possible effect of age on camouflaging has implications for understanding how camouflaging behaviors develop and warrants further exploration. Differences also emerged on behaviors labeled as masking and assimilation, subcomponents of camouflaging, with females appearing more similar to their neurotypical peers on behaviors related to social awareness.

Introduction

Camouflaging is a process through which individuals work to mask or hide their autistic traits, first discussed in relationship to the sex ratios in young autistic children as females masking autistic traits (Wing, 1981). Autistic individuals describe many strategies involved in camouflaging, with main goals being to appear more “normal” and to “pass” as neurotypical (Hull et al., 2017; Livingston, Shah, & Happé, 2019). Important components of camouflaging include learning rules for social interactions and hiding more obvious autistic traits, such as ‘stimming’ and responses to sensory overstimulation (Baldwin & Costley, 2016; Hull et al., 2017). Camouflaging can also include verbal and nonverbal strategies to compensate for autistic traits. For example, autistic women have described more intentional eye contact or looking as close to the eyes of others as possible while interacting with them, focusing on displaying context-appropriate facial expressions and gestures, and intentionally nodding in agreement while others are talking to show interest in the conversation (Hull et al., 2017; Livingston et al., 2019; Rynkiewicz et al., 2016). Specific verbal strategies include asking questions of others, minimizing the amount of time spent talking about oneself or one’s interests, and preparing topics for conversation in advance (Hull et al., 2017; Livingston et al., 2019).

Consequences of Camouflaging for Autistic Individuals

Camouflaging can lead to benefits for individuals, including improved connections with others, an increased ability to fit in with others, and greater ease of maintaining employment (Head, McGillivray, & Stokes, 2014; Hull et al., 2017). However, it has also been reported to have detrimental effects. Camouflaging requires heightened, constant monitoring of social situations, as well as significant effort to

respond appropriately in those situations. It has been described by autistic individuals as mentally, physically, and emotionally draining (Baldwin & Costley, 2016; Hull et al., 2017; Livingston et al., 2019). Recent research with autistic adults found that camouflaging was related to higher rates of depression and reduced feelings of acceptance (Cage, Di Monaco, & Newell, 2018). Camouflaging autistic traits may also be a significant predictor of suicidality in both autistic and neurotypical adults (Cassidy, Townsend, Pelton, Robertson, & Rodgers, 2019; Cassidy, Bradley, Shaw, & Baron-Cohen, 2018). Finally, Cage and Burton (2019) compared neurotypical observer ratings of first impressions of autistic and neurotypical males and females and found that ratings for autistic females were significantly more favorable than autistic males but significantly less favorable than neurotypical females. Though the sample size was relatively small ($n = 40$; 10 participants in each group), this suggests that camouflaging may not be as successful in improving first impressions for autistic females as it is for neurotypical females.

Sex Differences in Autism and Levels of Camouflaging

Potential sex differences in camouflaging may contribute to the proposed female autism phenotype, or the ways in which autistic females present differently than autistic males (Hull & Mandy, 2017; Hull, Petrides, & Mandy, 2020). Differences in restricted and repetitive behaviors and interests (RRBIs) have also been suggested as components of the female autism phenotype. For example, autistic females may present with less obvious RRBIs and with interests that are more socially-oriented than autistic males (McFayden, Albright, Muskett, & Scarpa, 2019; Nicholas et al., 2008). In addition, there is evidence that special interests in autism may fall along typical gender lines

(Sutherland, Hodge, Bruck, Costley, & Klieve, 2017). The female autism phenotype may not be as easily recognized due to the underrepresentation of autistic females in autism research. It is possible that this contributes to an under-recognition and under-diagnosis of autistic females.

Related research has shown that autistic females often behave more like neurotypical individuals in social situations than autistic males (Attwood, 2007). The strategies involved in camouflaging may contribute to this difference. In one study, researchers observed children on the playground at school and found that the social interaction patterns of young autistic girls was similar to those of neurotypical girls (Dean, Harwood, & Kasari, 2016). These autistic girls appeared to be engaged with peers for similar amounts of time as their neurotypical classmates, but closer examination showed that their engagement patterns were very different. Specifically, they were unable to stay engaged with one group. Instead, they stayed close to and engaged with different groups throughout recess or stayed on the perimeter of a group while engaging in the same activity (e.g., jumping rope). Importantly, autistic boys looked more different than neurotypical boys, as they spent more time alone and not engaged in play (Dean et al., 2016). Overall, the social deficits of autistic girls were much less noticeable.

Autistic females also score more similarly to their neurotypical peers on a measure of friendship (Head et al., 2014). Specifically, these autistic females scored significantly lower on the measure than neurotypical girls, but similarly to neurotypical boys. This suggests that the social difficulties of autistic boys may be more noticeable in comparison with their neurotypical peers, as the autistic girls were able to “fit in” more than the autistic boys by scoring similarly to more of their neurotypical peers.

Researchers also found that the speech of autistic girls may sound more similar to their peers than that of autistic boys, which the researchers describe as ‘linguistic camouflage’ (Parish-Morris et al., 2017).

Researchers who have attempted to operationalize camouflaging found that autistic males and females both engage in camouflaging, but that adolescent girls and adult women report higher levels of camouflaging than adolescent boys and adult men (Lai et al., 2017; Lai et al., 2019; Rynkiewicz et al., 2016; Schuck, Flores, & Fung, 2019). These four studies included a total of 180 autistic adults (ages 18-55 years, 70 females) and 33 children (ages 5-10 years, 17 females). The studies including adult participants operationalized camouflaging through contrasting scores on behavioral presentation and intrinsic status (i.e., self-report) of autistic traits, with the rationale that the difference between the two would reflect the level of autistic traits that were camouflaged. For example, two of the studies operationalized camouflaging by subtracting scores on the Autism Diagnostic Observation Scale (ADOS; a measure that reflects the clinician’s observations of the individual; Lord et al., 2012) from scores on the Autism Spectrum Quotient (AQ; a self-report of autism traits; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001; Lai et al., 2017; Schuck et al., 2019). The study including children measured camouflaging in 33 autistic children (16 girls) ages 5-10 years by comparing the use of gestures during tasks on the ADOS and hypothesized that the more vivid use of gestures by females may indicate higher levels of camouflaging (Rynkiewicz et al., 2016). While the findings of all four studies indicated that autistic females engaged in higher levels of camouflaging, the measurement of

camouflaging in these studies may be too narrow to capture the different strategies reported to be part of camouflaging.

In addition to comparing levels of camouflaging in autistic adults, Lai et al. (2019) sought to compare brain-behavior relations related to mentalizing and self-representation, both processes likely involved in camouflaging. They identified sex differences in these processes which may help explain the tendency for females to report higher levels of camouflaging. In their sample of 58 autistic adults (29 females), higher levels of camouflaging were associated with a heightened self-representation response in the ventromedial prefrontal cortex for autistic women only. In addition, autistic men demonstrated hypoactivity in both mentalizing and self-representation responses compared to neurotypical men, while this discrepancy was not seen between autistic women and neurotypical women.

The Camouflaging Autistic Traits Questionnaire

Given the evidence for camouflaging in autistic individuals and potential sex differences, Hull and colleagues (2018) developed a self-report measure of camouflaging, the Camouflaging Autistic Traits Questionnaire (CAT-Q). Hull et al. (2019) administered the CAT-Q to 832 adults (ages 16-82 years; 354 autistic individuals and 478 neurotypical individuals). Autistic participants reported significantly higher levels of camouflaging based on the CAT-Q total score and all subscale scores, and autistic traits were positively correlated with camouflaging levels in both the autistic and the neurotypical participants. Robinson, Hull, and Petrides (2020) reported that autistic participants reported higher levels on total scores and all subscales of the CAT-Q than neurotypical participants. Hull et al. (2020) administered the CAT-Q to 306 autistic and 472 neurotypical adults in order

to explore sex differences in camouflaging. Autistic females reported higher total levels of camouflaging, as well as higher levels of camouflaging on two of the three subscales (masking and assimilation) than autistic males. There were no significant sex differences in camouflaging among neurotypical participants.

Recently, the CAT-Q was used to explore camouflaging levels in 262 autistic adults (135 females; Cage & Troxell, 2019). In addition to completing the CAT-Q, participants also responded to questions about the contexts in which they camouflaged, the reasons they camouflaged, and mental health symptoms. Results showed that females were more likely to report reasons for camouflaging related to work or school contexts, such as camouflaging in order to be able to communicate ideas at work or to aid with working with classmates or coworkers. No other sex differences were reported.

Camouflaging, Impression Management, and Adolescence.

Researchers have drawn comparisons between camouflaging and impression management (Hull et al., 2019; Robinson et al., 2020). Impression management was first introduced by Erving Goffman in 1959 and describes the ways in which individuals work to present themselves in specific ways in social situations (Goffman, 2002). Impression management, also referred to as self-monitoring (Snyder, 1979), has long been recognized as playing an important role in interpersonal behavior. This is especially true during adolescence.

Social relationships become more complicated and social cognitive capabilities increase during adolescence, leading youth to become more attuned to how others view them (Blakemore & Choudhury, 2006). During this time, increased importance is placed on the opinions of others, fitting in, and making and maintaining friendships (Brechwald

& Prinstein, 2011). This is also a time when youth navigate the important developmental process of identity formation, as they work to develop an identity that is both meaningful to them and accepted by peers (Erikson, 1968, 1980; Sullivan, 1953). Friendships and relationships with peers play a central role in identity formation (Brown, 2004). Feedback from peers serves as a powerful reinforcer in the process, since increased importance is placed on the opinions of others at this time (Brechwald & Prinstein, 2011). Given all of this, it is not surprising that impression management, also referred to as self-monitoring, plays a significant role in development during adolescence.

Researchers have shown that, in neurotypical individuals, impression management increases from early to late adolescence (Pledger, 1992). Throughout adolescence, as youth become more concerned with social comparison and fitting in, impression management aids in the development of socially acceptable behaviors that lead to a more stable identity with age (Allen, 1986). Impression management not only plays a role in identity formation during adolescence, but also in normative behavior, social adaptation, and friendship development and maintenance (Fine, 2011; Kumru & Thompson, 2003; Pledger, 1992).

It is important to include data from a neurotypical population regarding camouflaging behaviors in adolescent samples due to the fact that some level of impression management, which is closely related to camouflaging, is developmentally “normal” during this period of time. Though previous studies of adults suggest that autistic adults engage in higher levels of camouflaging than neurotypical adults, this should be examined in adolescents. Inclusion of a neurotypical sample could also help identify specific ways in which autistic adolescents differ in this important developmental

process, which could lead to improved support. In these ways, studying camouflaging behaviors during adolescence would help further characterize autistic camouflaging. It is also important to begin to identify the developmental trajectory of camouflaging in autistic individuals.

Current Study

As discussed previously, researchers have explored camouflaging behaviors through interviews or surveys with autistic individuals (e.g., Bargiela, Steward, & Mandy, 2016; Sutherland, Hodge, Bruck, Costley, & Klieve, 2017; Tierney, Burns, & Kilbey, 2016); however, only one of these existing studies that focus on camouflaging include a neurotypical comparison group (Hull et al., 2020), and not all of the studies included males. All participants in the studies including males were adults (ages 18-79 years). In one of the studies including males, the population was self-selecting based on an advertisement for a study “looking at the experiences of coping behaviors in social situations.” Hull and colleagues (2020) stressed the need for further investigation of camouflaging, including the need to investigate sex differences in camouflaging in other populations. At this time, there is no research examining sex differences in camouflaging among autistic and neurotypical adolescents.

The objectives of this pilot study were to compare levels of camouflaging by sex and diagnosis in autistic and neurotypical adolescents. This could lead to better characterization of camouflaging, especially in younger individuals. Comparing camouflaging in autistic and neurotypical individuals could also help elucidate the differences between impression management and camouflaging.

Methods

Participants

In order to avoid introducing participant bias or recruiting a self-selecting sample, recruitment materials did not mention camouflaging or social coping skills. Autistic participants were sent mass recruitment emails for survey participation through the database of a specialty clinic for autism and neurodevelopmental disorders, as well as through the Simons Foundation Powering Autism Research for Knowledge (SPARK) database, a U.S.-based online research cohort (SPARK Consortium, 2018). Autistic participants were eligible if they were between the ages of 13 and 18 years, diagnosed with autism, and did not have a diagnosis of intellectual disability. Autism diagnoses in SPARK are self- or parent-reported. Research on the first web-based registry for autism, the Interactive Autism Network, has indicated that parent-reported diagnosis of autism is highly valid. (Daniels et al., 2012; Lee et al., 2010).

Neurotypical participants were recruited for survey participation through social media and advertisements in a local university email announcement. The advertisement and announcement included a link to information about the study that led to the consent form and surveys. Neurotypical participants were eligible if they were between the ages of 13 and 18 years and did not have an individualized education program (IEP). Participants were not asked about specific developmental challenges or mental health diagnoses. Study eligibility was determined within the survey through questions about whether the participant (1) had an autism diagnosis, (2) had a diagnosis of intellectual disability, and (3) had an IEP.

Survey participants were 140 adolescents ages 13-18 years ($M = 15.15$, $SD = 1.66$). Seventy-eight survey participants were autistic, and 62 survey participants were neurotypical. Participants responded to a series of questions to report their sex. The first question was, “What is your gender?” Participants could select from a list including “girl/woman,” “boy/man” and “other (please tell us)”. If the participant selected girl/woman or boy/man, no other information was gathered. If the participant selected other, they were first given an open text field to report their gender, then asked “what sex were you assigned at birth?” and finally asked “what gender do you currently identify with?” Only one respondent reported a gender other than girl/woman or boy/man. This participant was not included in analyses.

Though the goal was a 1:1 ratio of females to males in this study, 55 autistic participants were male and 23 were female. This was equal to a female: male ratio of 1:2.4. Given that participants did not have a comorbid diagnosis of intellectual disability, this ratio is significantly more equal than the ratio of autistic females to autistic males in this population (approximately 1:9; (Frazier, Georgiades, Bishop, & Hardan, 2014). Of the neurotypical participants, 28 were male and 35 were female.

All autistic participants demonstrated elevated autism traits on the Subthreshold Autism Traits Questionnaire (SATQ; Kanne, Wang, & Christ, 2012) relative to the neurotypical group (see Table 1 for SATQ scoring summary). One neurotypical male was excluded due to the presence of elevated autism traits. Specifically, the total score on the SATQ for this participant (59) was higher than any autistic male scores in this sample (range = 12-57), as well as higher than any autistic participant scores (range = 7-57) reported previously (Kanne et al., 2012). Males ($M = 14.84$ years, $SD = 1.57$) were

younger than females ($M = 15.59$, $SD = 1.70$). This difference was significant and represented a small-sized effect ($t(138) = -2.676$, $p = .008$, $d = 0.46$). There was no significant difference in age between autistic and neurotypical participants ($t(138) = .996$, $p = .91$).

Pairwise comparisons with Bonferroni correction across the four groups within the sample (autistic male, autistic female, neurotypical male, neurotypical female) revealed that autistic females ($M = 39.52$, $SD = 10.48$) had significantly higher SATQ scores than neurotypical females ($M = 19.54$, $SD = 7.75$, $p < .001$) and neurotypical males ($M = 22.85$, $SD = 9.29$, $p < .001$). Autistic males ($M = 38.41$, $SD = 11.53$) also had significantly higher SATQ scores than neurotypical females ($p < .001$) and neurotypical males ($p < .001$).

Measures

Participants completed an online survey including the SATQ and the Camouflaging Autistic Traits Questionnaire (CAT-Q; Hull et al., 2019). In addition to completing these two measures, participants provided basic demographic information (age and sex) and answered several additional questions about their camouflaging behaviors.

The SATQ is a 24-item self-report measure used to assess autistic traits. Previous research indicates the SATQ has acceptable internal consistency ($\alpha = 0.73$) and reliability (0.79) (Kanne et al., 2012). Participants rated each item on a 4-point Likert-type scale from “false, not true at all” (0) to “very true” (3). Higher scores on the SATQ represent higher levels of autistic traits. The SATQ includes five subscales: social interaction and enjoyment, oddness, reading facial expressions, expressive language, and rigidity.

Evidence suggests that the SATQ may capture information about autism traits above and beyond other commonly used measures such as the Broad Autism Phenotype Questionnaire (BAPQ; Hurley, Losh, Parlier, Reznick, & Piven, 2007) and the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001). Among others, the SATQ may provide information about eye contact, expressive language, use of gestures, and others' perceptions of the individual, all of which are closely related to camouflaging (Kanne et al., 2012). In addition, the SATQ outperformed other frequently used measures in a comparison of reliability and construct validity of available measures of quantitative autistic traits (Nishiyama et al., 2014). Internal consistency of the Subthreshold Autism Trait Questionnaire (SATQ) in this sample was excellent ($\alpha = 0.91$).

The CAT-Q contains 25 items related to camouflaging behaviors, such as copying body language or facial expressions and forcing eye contact. Previous research indicates the CAT-Q has excellent internal consistency ($\alpha = 0.94$) and acceptable reliability (0.77) (Hull et al., 2019) Participants rated each item on a Likert-type scale from “strongly disagree” (1) to “strongly agree” (7). In addition to a total score, subscores in the areas of compensation, masking, and assimilation were calculated by summing the items in each subscale. The compensation subscale measures strategies used to avoid social and communication difficulties. Example items from the compensation subscale include “I have tried to improve my understand of social skills by watching other people” and “I learn social cues from watching television, films, or books.” The masking subscale measures strategies used to hide autistic traits. Example items from the masking subscale include “I monitor my body language or facial expressions so that I appear interested by the person I am interacting with” and “I always think about the impression I make on

others.” The assimilation subscale measures strategies used to fit in with others. Example items from the assimilation subscale include “In social situations, I feel like I am pretending to be ‘normal’” and “I need the support of other people in order to socialize.

Higher scores on the CAT-Q represent higher reported levels of camouflaging. Internal consistency of the Camouflaging Autistic Traits Questionnaire (CAT-Q) in this sample was good ($\alpha = 0.86$). Given that the CAT-Q had not been used in participants ages 13-15 years, we also examined Cronbach’s alpha by the two age groups (13-15 years and 16-18 years), by sex and diagnosis, and by all four participant subgroups. Internal consistency was good across all groups (range = .84 – .89).

Data Analysis

Levels of Camouflaging: CAT-Q Total Scores. A series of ANOVAs and MANOVAs were used to (a) examine differences in levels of camouflaging between autistic participants and neurotypical participants and (b) examine sex differences in levels of camouflaging within and between the autistic and neurotypical participant groups.

Levels of Camouflaging: CAT-Q Subscale Scores. As the concept of camouflaging and its components are still being defined, we also compared mean scores on the CAT-Q subscales. A MANOVA was used to make the same comparisons described above based on subscale scores. In addition, independent samples *t*-tests were conducted to make pairwise comparisons between the four groups (autistic females, autistic males, neurotypical females, and neurotypical males). To account for multiple comparisons and control for Type I error rate, Bonferroni corrections were used for these analyses, with a corrected significance value of $p < .003$.

The data met all assumptions for ANOVA and MANOVA. Partial eta squared

(η_p^2) was used as an effect size measure for ANOVA and MANOVA, with values under .04 indicating a small effect, values .04–.10 indicating a moderate effect, and values above .14 indicating a large effect (Cohen, 1988; Lenhard & Lenhard, 2016). Cohen's d was used as an effect size measure for pairwise comparison tests, with values under 0.4 indicating a small effect, values of .05-.07 indicating a moderate effect, and values above 0.8 indicating a large effect (Cohen, 1988; Lenhard & Lenhard, 2016).

Results

Levels of Camouflaging: CAT-Q Total and Subscale Scores by Sex and Diagnosis

Table 1 includes a summary of CAT-Q total scores and subscale scores. Results of the first ANOVA, with sex (male, female) and diagnosis (autistic, non-autistic) as the fixed factors, revealed significant small-sized main effect of sex ($F(1,137) = 4.63, p = .03, \eta_p^2 = .03$) on CAT-Q total scores. Results of the MANOVA comparing CAT-Q subscale scores with sex and diagnosis as fixed factors revealed a large-sized main effect of diagnosis (Wilk's $\Lambda = 0.75, F(3,135) = 15.29, p < .001, \eta_p^2 = .254$). Univariate analyses of the three subscales revealed significant differences by diagnosis on the masking subscale ($F(1,137) = 15.09, p < .001, \eta_p^2 = .10$) and assimilation subscale ($F(1,137) = 25.13, p < .001, \eta_p^2 = .16$), but no significant effect on the compensation subscale ($F(1,137) = 0.68, p = .41, \eta_p^2 = .01$). Examination of means revealed that neurotypical participants reported significantly higher levels of masking on the CAT-Q ($M = 38.26, SD = 7.09$) than autistic participants ($M = 31.29, SD = 10.24$), and autistic participants reported significantly higher levels of assimilation ($M = 33.56, SD = 8.81$) than neurotypical participants ($M = 26.21, SD = 9.30$).

Table 1
Participant Characteristics

| | Autistic Sample | | | Neurotypical Sample | | |
|------------------|-----------------|----------------|---------------|---------------------|----------------|---------------|
| | All | Female | Male | All | Female | Male |
| N | 78 | 23 | 55 | 62 | 35 | 27 |
| Age (SD) | 15.03 (1.67) | 15.48 (1.78) | 14.84 (1.59) | 15.31 (1.65) | 15.66 (1.66) | 14.85 (1.54) |
| SATQ Total (SD) | 38.74 (11.17) | 39.52 (10.48) | 38.41 (11.53) | 20.98 (8.54) | 19.54 (7.75) | 22.85 (9.29) |
| CAT-Q Total (SD) | 99.46 (21.27) | 106.13 (22.37) | 96.67 (20.35) | 98.39 (21.36) | 101.25 (21.32) | 94.67 (21.25) |
| CAT-Q Comp (SD) | 33.60 (10.35) | 38.26 (9.39) | 33.07 (10.42) | 32.92 (10.66) | 34.31 (10.05) | 33.41 (11.57) |
| CAT-Q Mask (SD) | 31.29 (10.24) | 35.00 (7.73) | 29.75 (10.81) | 38.26 (7.09) | 38.69 (7.00) | 37.70 (7.29) |
| CAT-Q Assim (SD) | 33.56 (8.81) | 33.56 (8.93) | 33.56 (8.83) | 26.21 (9.30) | 28.26 (9.60) | 23.56 (8.34) |

Note. SD: standard deviation; SATQ: Subthreshold Autism Traits Questionnaire; CAT-Q: Camouflaging Autistic Traits Questionnaire; CAT-Q Comp: Compensation subscale; CAT-Q Mask: Masking subscale; CAT-Q Assim: Assimilation subscale.

Given the significant differences on CAT-Q subscales by diagnosis, independent samples *t*-tests with Bonferroni correction ($p < .003$) were conducted to explore differences between the four groups (autistic females, autistic males, neurotypical females, and neurotypical males). See Figure 1 for a summary of the results of these analyses. There were no significant differences between groups on the compensation subscale.

On the masking subscale, autistic males reported significantly lower levels ($M = 21.75$, $SD = 10.81$) than neurotypical females ($M = 30.69$, $SD = 7.00$, $t = -4.76$, $p < .001$, $d = -1.03$) and neurotypical males ($M = 37.70$, $SD = 7.29$, $t = -3.93$, $p < .001$, $d = -0.92$). There was no significant difference on masking between autistic females ($M = 27.00$, $SD = 7.73$) and neurotypical males or females. In addition, there was no significant difference between neurotypical males and females on the masking subscale.

On the assimilation subscale, autistic females reported significantly higher levels ($M = 25.56$, $SD = 8.95$) than neurotypical males ($M = 15.56$, $SD = 8.34$, $t = 4.09$, $p < .001$, $d = 1.16$), but not neurotypical females. Autistic males reported significantly higher levels of assimilation ($M = 25.56$, $SD = 8.83$) than neurotypical males ($t = 4.91$, $p < .001$, $d = 1.15$). It is worth noting that autistic females and autistic males had nearly identical mean scores on the assimilation scale; however, the difference in sample size between the two groups contributed to whether there were significant differences between their scores and the scores of their neurotypical peers. There were no significant differences between autistic males and autistic females or neurotypical males and neurotypical females.

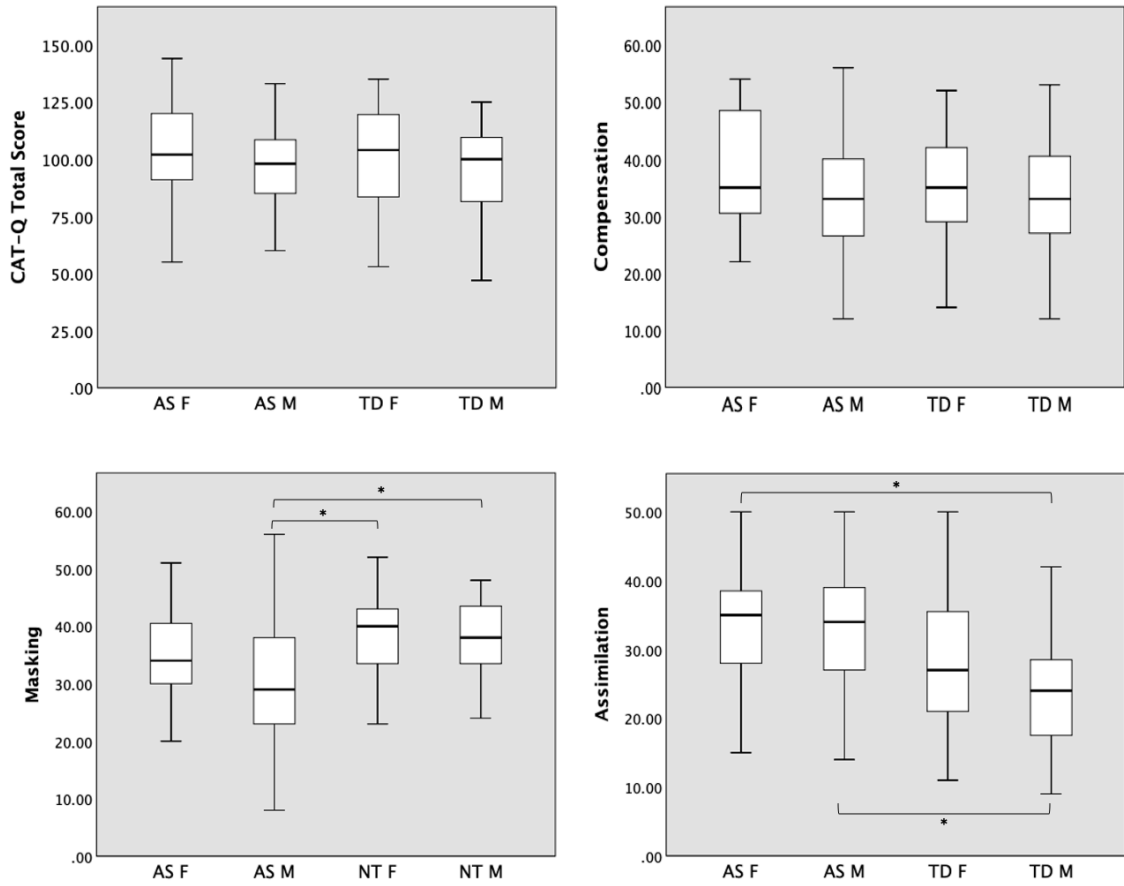
Levels of Camouflaging: CAT-Q Total Scores by Sex, Diagnosis, and Age

Given that the CAT-Q had not previously been used in individuals 13-15 years,

we examined graphs of mean total scores on the CAT-Q by age and sex, as well as by age and diagnosis to determine whether age may have been impacting scores. Examination of these graphs (see Figure 2) revealed that age may also serve as a main effect on total CAT-Q scores or as part of an interaction effect with sex or diagnosis. As a post-hoc analysis, a second ANOVA compared CAT-Q total scores and included sex, diagnosis, and age as fixed factors. Due to the low number of participants in some cells in the analysis, two categories of age were used in analyses. The first category included participants ages 13-15 years and the second category included participants ages 16-18 years. Results of this second ANOVA revealed a significant interaction with a small effect size of age by diagnosis ($F(1,134) = 3.97, p = 0.048, \eta_p^2 = .03$). The effect of sex did not reach significance in this model ($F(1,134) = 3.67, p = .06, \eta_p^2 = .03$). In addition, there was not a significant main effect of age ($F(1,344) = 0.78, p = 0.38, \eta_p^2 = .01$).

Teasing apart the age by diagnosis interaction, there was no significant difference on CAT-Q scores ($t(76) = 0.74, p = .46$) between 13-15-year-old autistic participants ($N = 46, M = 100.96, SD = 19.94$) and 16-18-year-old autistic participants ($N = 32, M = 97.31, SD = 23.20$). However, there was a difference in CAT-Q scores ($t(60) = -2.40, p = .02, d = 0.77$) between 13-15-year-old neurotypical participants ($N = 33, M = 92.52, SD = 21.59$) and 16-18-year-old neurotypical participants ($N = 29, M = 105.07, SD = 19.37$). Only the CAT-Q total scores of neurotypical participants were significantly different between the two age groups, with older neurotypical participants reporting significantly higher levels of camouflaging.

Figure 1.
Comparisons of CAT-Q total and subscale scores by group.



Note. AS = autistic. NT = neurotypical. F = female. M = male. Asterisk represents statistically significant difference between groups.

Discussion

We found small but significant sex differences in overall camouflaging as measured by CAT-Q total scores. However, a novel and unexpected finding of this study was the impact of age on overall CAT-Q scores. When age was included in our model as a post-hoc analysis, an interaction between age and diagnosis emerged for CAT-Q total scores. Another novel finding of this study was that neurotypical participants reported higher levels of masking than autistic participants. Autistic females scored more similarly on the masking subscale to their peers than autistic males, suggesting an important sex difference where autistic females may appear more similar to their peers than autistic males.

CAT-Q Total Scores

Consistent with previous findings (e.g., Hull et al., 2019, Hull et al., 2020) female participants reported higher levels of camouflaging. However, this was true only when comparing total scores on the CAT-Q without accounting for age. When accounting for age, there were no longer significant differences by sex ($p = .06$) and instead an interaction effect between age and diagnosis emerged. It is possible that in a larger sample, significant sex differences would emerge even when accounting for age. Though there was no significant effect of sex in this model including age, both sex and the significant age by diagnosis interaction had small effect sizes ($\eta_p^2 = .03$). The confidence interval around this effect size for both sex and the age by diagnosis interaction (.00 to .09) indicated that a small to moderate effect could be expected for either or both variables if a significant effect was identified in a larger sample.

The potential age difference we found in levels of camouflaging has not been documented before. Further analysis revealed that levels of camouflaging by age were only significantly different for neurotypical participants, with older participants reporting higher levels. As previous research has focused on studying camouflaging in adults and has not explored the role age may play in camouflaging during adolescence, this finding may indicate that there are developmental differences as autistic youth age.

The trends in Figure 2 show that both adolescent males and females in this sample reported lower levels of camouflaging at ages 13-15 years and higher levels of camouflaging at ages 16-18 years. This is consistent with previous findings showing that impression management tends to increase from early to late adolescence for neurotypical individuals (Pledger, 1992). However, this trend was different for the autistic participants in this study. Autistic females reported high levels of camouflaging at 13-15 years and 16-18 years, while autistic males reported higher levels of camouflaging at 13-15 years than at 16-18 years. In fact, at 16-18 years, autistic females and neurotypical males and females were all reporting total CAT-Q scores of approximately 102-106, while autistic males were reporting lower CAT-Q total scores of approximately 92. Given the pilot nature of this study, this is a finding that requires further investigation to determine whether these trends are seen in a larger sample.

CAT-Q Subscale Scores by Diagnosis

A unique finding of this study was that differences in levels of camouflaging between autistic and neurotypical participants depended on the CAT-Q subscale that was being analyzed. The three subscales in the CAT-Q are compensation, masking, and assimilation. Several previous studies have found that autistic participants score higher on

all three subscales than neurotypical participants (Hull et al., 2019, Hull et al., 2020; Robinson et al., 2020).

When looking more closely at levels of camouflaging through comparing participant scores on the CAT-Q subscales, results revealed no significant differences between autistic and neurotypical participants on the subscale of compensation. Previous research found autistic participants scored significantly higher on this subscale. This scale measures “strategies used to actively compensate for difficulties in social situations” (Hull et al., 2019, p. 825) and includes items such as “I have tried to improve my understanding of social skills by watching other people” and “I learn social cues from television, films, or books.” In this sample, neurotypical adolescents reported an average compensation score of 32.94. This is higher than average compensation scores reported for neurotypical adults in previous research (range 26.01-28.44; (Hull et al., 2019; Hull et al., 2020; Robinson et al., 2020). As discussed in the introduction, adolescence is a period during which social demands increase and individuals become more aware of and concerned with how others view them. This may contribute to increased levels of social difficulty and compensation during adolescence for neurotypical individuals.

Previous research with adult samples found that neurotypical and autistic participants scored more similarly on the masking subscale than other CAT-Q subscales, suggesting that there may be more overlap between the two groups on the behaviors involved in masking (Hull et al., 2019; Hull et al., 2020; Robinson et al., 2020).

However, this was the first study to find that neurotypical participants report higher levels of masking, and this was found despite the fact that no neurotypical participants reported elevated levels of autism traits on the SAT-Q. It is important to note that although the

masking scale measures “strategies used to hide autistic characteristics or portray a non-autistic persona” (Hull et al., 2019, p. 825), the items included in this scale are not specific to autism traits (e.g., “I monitor my body language or facial expressions so that I appear interested by the person I am interacting with” and “I always think about the impression I make on other people”) and may be used for a variety of reasons.

Consistent with previous research, autistic participants reported significantly higher levels of assimilation than neurotypical participants. Assimilation includes “strategies that reflect trying to fit in with others in social situations” (Hull et al., 2019, p. 825) and includes items such as “In social situations, I feel like I am pretending to be ‘normal’” and “I need the support of other people in order to socialize.” These items may reflect behaviors more closely linked to social skills deficits, and therefore be more likely to be endorsed by autistic individuals.

One possible explanation for the higher scores reported on the masking subscale by neurotypical participants is that the items on the masking scale reflect behaviors that are closely related to social awareness. For example, higher levels of social awareness may lead to an increased propensity to monitor and adjust one’s face and body to appear interested in someone else. The fact that neurotypical participants reported higher levels of these potential social awareness behaviors may be explained by the fact that a deficit in social skills is one of the core diagnostic criteria for autism and therefore autistic participants may underestimate the amount needed to interact with others. Interestingly, autistic females did not report significantly different levels of masking than their neurotypical peers. This difference by diagnosis was due to significantly lower levels reported by autistic males. Although the difference between autistic males and females

was not significant, this finding is consistent with previous research that has suggested that autistic females may appear more similar to their typically developing peers than autistic males (e.g., Attwood, 2007; Head et al., 2014), and is important for understanding camouflaging differences between autistic males and females.

Another possible explanation for the differences between autistic and neurotypical adolescents on both the masking and assimilation subscale may be related to the differences in peer relationships for autistic and neurotypical adolescents. For example, autistic adolescents report higher levels of loneliness and spend more time isolated from peers or in the periphery compared to neurotypical adolescents (Bauminger & Kasari, 2000; Locke, Ishijima, Kasari, & London, 2010). Despite lower levels of integration in peer groups, autistic adolescents still rate friendships as important and rewarding and express a desire to fit in (Humphrey & Lewis, 2008; Vine Foggo & Webster, 2017). In addition, higher levels of awareness of social difficulties is associated with increased concerns regarding reputation (Humphrey & Lewis, 2008). Neurotypical adolescents may use masking behaviors in order to maintain existing relationships with peers, while the combination of awareness of social difficulties and desire to fit in may lead to increased levels of assimilation behaviors as autistic adolescents work to assimilate into existing peer groups.

CAT-Q Subscale Scores by Gender

A relatively novel contribution of this study was the comparison of CAT-Q total and subscale scores by both sex and diagnosis. Unlike the findings in the only previous study to compare CAT-Q subscales by both sex and diagnosis (Hull et al., 2020), we did not find any sex differences within the autistic participants in CAT-Q total or subscale

scores. In an adult sample, Hull et al., (2020) found that autistic females reported significantly higher levels of masking and assimilation than autistic males.

Autistic adolescents in this study reported lower scores for the CAT-Q total and all three subscales than autistic adults in the Hull et al. (2020) study, while neurotypical adolescent females scored higher overall and higher on compensation and masking and neurotypical adolescent males scored higher on compensation and masking. Thus, the general finding when comparing findings between the adolescents in this study and adults in Hull et al. (2020) is that while neurotypical participants may engage in higher levels of camouflaging during their adolescent years than their adult years, autistic individuals may exhibit the opposite pattern, reporting higher levels of camouflaging during adult years than adolescent years. Self-monitoring, which is similar to camouflaging, increases throughout adolescence in neurotypical youth during the period of identity formation (Pledger, 1992). It is possible that neurotypical individuals are more likely than autistic individuals to reach an identity they feel is in line with social norms, leading to a decrease in self-monitoring with age. In contrast, autistic individuals may be more likely to continue and increase self-monitoring/camouflaging in order to conform to social norms.

Limitations

While this pilot study adds several important new findings to the literature, results should be considered with the following limitations of the study in mind. First, this study relied on a relatively small sample, especially true when considering sample sizes of the four groups based on sex and diagnosis, and when considering the number of participants of each age. This limited the power of our study and could explain the lack of

a significant interaction between sex and diagnosis on CAT-Q scores. Though notable differences on the CAT-Q subscales were found by sex and diagnosis (e.g., higher levels of masking in the neurotypical group), the limited sample size in this study makes it difficult to generalize these results and draw broader conclusions about the concepts the CAT-Q subscales are measuring. In addition, the CAT-Q was validated using an adult sample (ages 16 years and older). Due to the small sample size, psychometric testing of the CAT-Q could not be conducted with the adolescent participants in this study.

Another limitation was the disproportionate number of males and females between the autistic and neurotypical groups. Though this was addressed in all analyses by controlling for sex and diagnosis, more equal proportions of males and females within groups would strengthen the study, especially given its focus on sex differences. Similarly, the female participants were significantly older than the male participants. To address this, graphs of the data were analyzed to determine when age should be included in statistical analyses. However, in a small sample this difference may have still affected results. In addition, there were many more autistic males ($N = 55$) than autistic females ($N = 23$) in this study.

Extensive demographic data was not collected. This data would have allowed for improved statistical models. For example, accounting for other factors that may impact camouflaging (e.g., socioeconomic status, previous social skills training) could have further explained some of the variance in the data. It has also been suggested that cognitive abilities may impact camouflaging. This data was not available for participants, though no neurotypical participants reported having an individualized education program and none of the autistic participants had a comorbid diagnosis of intellectual disability.

Despite this, better characterization of differing cognitive abilities within the sample could have improved statistical models. Finally, results may be impacted by differences across groups in the ability to self-reflect and accurately respond regarding internal states.

Implications for Future Research

The results of this study add to the literature and warrant replication in a larger sample. Many questions still remain regarding camouflaging in autistic and neurotypical individuals and sex differences in camouflaging. Though internal consistency of the CAT-Q in this sample was good across all participant groups, an important next step for research is the use of the CAT-Q with a larger sample of adolescents. This would allow for psychometric testing to examine whether the CAT-Q works the same with younger adolescents (ages 13-15 years) as it does with older adolescents and adults.

As noted in previous studies, autistic females in this sample looked more similar to their neurotypical peers in their camouflaging behaviors than autistic males (e.g., there were not as many significant differences in levels of camouflaging). Future research should continue to compare autistic and neurotypical males and females on the CAT-Q total scores and subscales, focusing on the similarities and differences between autistic males and females and the implications these have for treatment and support. In addition, future research with adolescents should collect more extensive demographic and phenotypic data, such as socioeconomic status and cognitive abilities, as these may also help explain differences in levels of camouflaging.

The findings in this study suggested camouflaging differences by sex, with females reporting higher levels of camouflaging. However, a significant increase in camouflaging levels by age in the neurotypical group created an age by diagnosis

interaction. When this was accounted for, results showed no sex differences in levels of camouflaging in this study. Though the sample size of this study makes it difficult to interpret this finding, it does highlight the need for future research in this area. This is especially true given the similarities between camouflaging and impression management and the tendency for impression management to increase throughout adolescent in neurotypical individuals. The role age may play in camouflaging should be included in future research, and longitudinal studies could be particularly useful to shed light on this potential effect. Importantly, a replication of this pilot study in a larger sample would allow for examination of whether sex differences in camouflaging remain when controlling for age during adolescence. In addition, a replication could further explore the trends of neurotypical individuals reporting higher levels of camouflaging in adolescence compared to adulthood and autistic individuals reporting the opposite.

The findings of this study do suggest significant overlap in camouflaging behaviors of autistic and neurotypical adolescents. As discussed in the introduction, researchers have drawn a comparison between camouflaging and the concept of “impression management” (Hull et al., 2018). Though camouflaging is similar to impression management, Hull et al. (2018) argued that the increased effort needed for autistic individuals to camouflage makes it more detrimental. Questions remain regarding whether camouflaging is truly unique from impression management, and if so, whether the CAT-Q differentiates between the two. Future research should aim to further characterize the concept of camouflaging, explore similarities and differences between camouflaging and impression management, and, if important differences between the two are found, assess whether the CAT-Q accurately captures these differences. This research

could provide important clarification about what makes camouflaging behaviors unique in autistic participants and may also help explain why camouflaging is reported to be more mentally taxing for some than others.

CHAPTER 2

**ASSOCIATIONS BETWEEN SOCIAL CAMOUFLAGING AND
INTERNALIZING SYMPTOMS IN
AUTISTIC AND NON-AUTISTIC ADOLESCENTS**

This chapter includes the accepted preprint version of *Associations Between Social Camouflaging and Internalizing Symptoms in Autistic and Non-Autistic Adolescents*, published in *Autism* (full publication details below).

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Lay Abstract

Autistic individuals have more mental health difficulties than non-autistic individuals. It is important to understand why this might be. Research has shown that camouflaging, or strategies used to hide autistic traits, might contribute to mental health difficulties in autistic adults. We examined whether this was also the case for autistic adolescents. Our study included 140 adolescents ages 13-18 years (62 non-autistic, 58 female). All participants answered questions about camouflaging, autistic traits, and mental health difficulties. We found that autistic and non-autistic adolescents who reported higher levels of camouflaging also reported higher levels of depression, anxiety, and stress. We also found that camouflaging might be particularly stressful for females. These findings improve our understanding of camouflaging during adolescence and point to potential ways to support autistic adolescents, such as help with social skills, self-acceptance, and self-esteem. The findings also support the importance of increasing autism acceptance in the general population.

Abstract

Autistic individuals experience higher rates of psychiatric comorbidities than their peers. Camouflaging, the process through which individuals hide autistic traits, can be detrimental to mental health. This may be particularly true for autistic females, though research on sex differences in the relationship between camouflaging and mental health has focused on adults. The purpose of this study was to extend previous research on camouflaging and mental health through examining age, sex, autism diagnosis, and camouflaging as predictors of depression, anxiety, and stress levels in autistic and non-autistic adolescents. One hundred forty adolescents ages 13-18 years (62 non-autistic, 58 female) completed an online survey including measures of camouflaging, autistic traits, and internalizing symptoms. Hierarchical linear regression was used to examine age, sex, diagnosis, and camouflaging as predictors of internalizing symptoms. Findings suggest that level of camouflaging is an important predictor of depression, anxiety, and stress in autistic and non-autistic adolescents and that camouflaging may be particularly distressing for females, regardless of diagnosis. These findings inform our understanding of camouflaging and its consequences and point to future directions for support for autistic and non-autistic adolescents. Clinicians may consider interventions targeting social skills, self-acceptance, and self-esteem to reduce possible negative effects of camouflaging.

Introduction

Psychiatric comorbidities are common among autistic individuals and have many negative consequences, such as decreases in daily functioning levels (Mattila et al., 2010). Anxiety may lead to increases in social withdrawal among autistic individuals, and comorbid depression is associated with increased suicidality (Cassidy et al., 2014; Wise et al., 2019). Autistic individuals have higher rates of suicidal ideation and attempts compared to the general population (Cassidy et al., 2014). It is important to understand the mechanisms behind the increased risk for psychiatric comorbidities in autistic individuals, and one potential explanatory factor is the use of strategies to hide autistic traits. The use of these strategies is known as camouflaging, and it has been shown to be associated with poorer mental health in adults (Hull et al., 2019). However, there is a need to understand the role camouflaging may play in adolescence.

Internalizing Symptoms and Disorders in Autistic and Non-autistic Adolescents

Many studies find that autistic adolescents report higher levels of internalizing symptoms (e.g., anxiety, depression, stress) and higher prevalence of internalizing disorders (e.g., generalized anxiety disorder, major depressive disorder) than their non-autistic peers. For example, studies have found that autistic adolescents report higher levels of anxiety and depression than non-autistic adolescents (Keith et al., 2019; Mertens et al., 2017; Rynkiewicz & Łucka, 2015; van Steensel et al., 2011). Anxiety disorders are reportedly the most common comorbid conditions in autistic youth, with a meta-analysis reporting the average prevalence rate to be around 40% across studies (van Steensel et al., 2011). This meta-analysis included children up to age 18 years and found that studies with older youth reported higher prevalence of anxiety than studies with younger participants. Thus,

it is reasonable to estimate that the prevalence in autistic adolescents is higher than 40%. In comparison, around 32% of non-autistic adolescents meet criteria for an anxiety disorder (Merikangas et al., 2010). Similarly, parents of 20.2% of a sample of 1272 autistic adolescents reported that their child had been diagnosed with depression (Greenlee et al., 2016). This is nearly double the prevalence rate reported for non-autistic adolescents by a nationally representative survey of over 10,000 adolescents (11.0% lifetime prevalence; Avenevoli et al., 2015).

While non-autistic adolescent females report higher levels of anxiety and mood disorders than non-autistic males, there have been conflicting findings regarding sex differences in psychiatric comorbidities among autistic adolescents (Merikangas et al., 2010). Some studies including autistic adolescents report the same trends by sex while others report no significant differences or even reversed trends (Margari et al., 2019; Mattila et al., 2010; Oswald et al., 2016; Rynkiewicz & Łucka, 2015). These largely mixed findings regarding sex differences in psychiatric comorbidities in autism may be due to differences in sample size, sex distributions, and measures used across studies.

An important, but underutilized, methodological component for research comparing psychiatric comorbidities in autistic and non-autistic youth is to include autistic and non-autistic adolescents in the same study samples in order to compare across both sex and diagnosis while reducing variability due to samples and procedures. This can improve understanding of the similarities and differences for these populations. Studies including both autistic and non-autistic adolescents have found that adolescent autistic females may report higher levels of anxiety and depression than non-autistic females, while the same pattern is not found for males (Oswald et al., 2016; Pisula et al.,

2016). Another study including both autistic and non-autistic adolescents ages 8-18 years found that autistic females were at heightened risk for internalizing symptoms compared to autistic males and non-autistic females (Solomon et al., 2012). The number of studies examining psychiatric comorbidities in autistic adolescents that include both autistic and non-autistic participants is quite limited in number, despite the clear need for and implications of such research.

Relation of Camouflaging to Mental Health and Wellbeing

An important aspect of understanding mental health in autistic individuals is understanding what factors may contribute to poorer mental health and wellbeing. One topic in this area that has received considerable interest recently is the construct of camouflaging. This is the process through which autistic individuals mask, hide, or compensate for their autistic traits (Hull et al., 2019). Camouflaging is similar to the well-developed construct of self-monitoring, or sensitivity to the expressive behaviors of others and the ability to modify self-presentation across settings (Lennox & Wolfe, 1984). Both camouflaging and self-monitoring reflect behavior change with the goal of managing the impression made on others, and the similarities between the two constructs have been noted by researchers (Hull et al., 2019; Lai et al., 2019). However, one way in which camouflaging is differentiated from self-monitoring is by its specific focus on strategies used to compensate for social difficulties related to autistic traits, which exist at varying levels across non-autistic and autistic individuals (Constantino & Todd, 2003). Findings show that autistic adults tend to report higher levels of camouflaging than non-autistic adults (Hull et al., 2020a, 2019; Robinson et al., 2020). Some studies suggest that autistic females may engage in higher levels of camouflaging than autistic males (e.g.,

Hull et al., 2020a). However, findings in this area are mixed and others have reported no sex differences (e.g., Cage & Troxell-Whitman, 2019).

Though research on camouflaging has focused mainly on measuring levels in adults, the construct seems particularly relevant to adolescents due to the similarities between camouflaging and self-monitoring and what is known about related developmental processes during this time. Studies in non-autistic populations show that self-monitoring behaviors and concern for formation of and acceptance into peer groups develop across the lifespan, beginning as early as 6 years of age (e.g., Bennett & Yeeles, 1990b, 1990a; Banerjee, 2002, Watling & Banerjee, 2007, Parker & Gottman, 1989). Self-monitoring is a component of the typical developmental process of identity formation, and it tends to increase throughout adolescence in response the desire to form peer relationships in increasingly complex social landscapes (Erikson, 1980; Kumru & Thompson, 2003; Pledger, 1992; Selman, 1980). The similarities between camouflaging and self-monitoring suggest that adolescence may also be a time when individuals engage in high levels of camouflaging behaviors.

An earlier study using the current study's sample suggested that both autistic and non-autistic adolescents camouflage, and that while non-autistic participants significantly increased their use of camouflaging throughout adolescence, autistic participants did not (Authors, 2020). The finding in non-autistic participants is consistent with literature indicating that the use of behaviors to modify self-presentation increases throughout adolescence in non-autistic individuals (Pledger, 1992). However, both the younger and older autistic participants in this sample reported camouflaging levels similar to the older non-autistic participants, suggesting that autistic adolescents may begin camouflaging at

high levels earlier than their non-autistic peers. Another study in youth ages 7-14 years also found that both autistic and non-autistic participants camouflaged autistic traits (Wood-Downie et al., 2020). However, these studies are, to our knowledge, the only examination of camouflaging in non-autistic adolescents to date, and many questions about camouflaging in autistic and non-autistic adolescents remain.

Individuals report that camouflaging can be beneficial. Researchers suggest that camouflaging improves the ability of autistic individuals to fit in with others (Cage & Troxell-Whitman, 2019). Clinicians have noted that some autistic individuals appear to use cognitive skills in order to respond appropriately in social situations (Attwood, 2007). Autistic adults also report that camouflaging has helped them improve their connections with others, gain employment, and get along with others at work. They also report that camouflaging their autism so others are not aware of their diagnosis makes it more likely that they will be accepted by peers (Hull et al., 2017). In this study of autistic adults, males were more likely to report positive consequences of camouflaging than females. The authors posited that this may be due to the use of different camouflaging techniques which could lead to different consequences or to camouflaging being a more satisfying process for males, though they did not elaborate on these points (Hull et al., 2017). The benefits of camouflaging have not been studied for non-autistic individuals. However, research has shown that self-monitoring is positively associated with wellbeing and negatively associated with loneliness in non-autistic individuals (Clinton & Anderson, 1999; Selvidge et al., 2008).

Despite its potential benefits, camouflaging has also been associated with maladjustment in both autistic and non-autistic adults. This is opposite of the association

between self-monitoring and wellbeing and highlights the second important difference between the two constructs. Camouflaging has been related to higher rates of depression, anxiety, and reduced feelings of acceptance in autistic adults, particularly for autistic women (Bargiela et al., 2016; Cage et al., 2018; Hull et al., 2017; Lai et al., 2017). While there is a lack of qualitative research on camouflaging in autistic men, autistic women describe feeling drained after camouflaging due to the amount of effort involved in monitoring social situations and quickly deciding how to respond in a way that will be deemed socially appropriate (Baldwin & Costley, 2016; Hull et al., 2017). In non-autistic adults, higher levels of camouflaging are associated with higher levels of psychological distress and lifetime suicidality (Beck et al., 2020; Cassidy et al., 2019). The association between camouflaging and suicidality in autistic individuals reported by Cassidy et al. (2019) was mediated by thwarted belongingness. Although the nature of the relationship between camouflaging and poorer mental health is unclear, potentially reflecting unidirectional or bidirectional causality, or merely correlational as a byproduct of other variables, the clear association between camouflaging and internalizing symptoms warrants further study. To our knowledge, no studies have yet been published examining the potential relationship between camouflaging and internalizing symptomology in autistic and non-autistic adolescents.

Current Study

The current study examines the role of sex, diagnosis, and camouflaging in relationship to symptoms of depression, anxiety, and stress in autistic and non-autistic adolescents. Specifically, we aimed to determine whether levels of camouflaging would significantly predict levels of internalizing symptoms above and beyond sex and

diagnosis. This research may improve our understanding of the consequences of camouflaging for autistic and non-autistic adolescents and aid in identifying areas for improved support to decrease mental health difficulties and increase wellbeing.

Methods

Participants

One hundred forty adolescents ages 13-18 years participated in this study. A power analysis conducted using G*Power (Faul et al., 2007) indicated that this sample size was sufficient to detect main effects and interactions with a medium effect size ($f^2=.15$; Cohen, 1988), an alpha of .05, and a power of .80 (minimum needed $n=103$). Participants included 78 autistic adolescents (23 females, 55 males) and 62 non-autistic adolescents (35 females, 27 males). Mean age was similar across groups (autistic sample $M=15.03$, $SD=1.68$; non-autistic sample $M=15.31$, $SD=1.65$).

Autistic participants were eligible for the study if they were diagnosed with autism, between the ages of 13-18 years, and did not have a diagnosis of intellectual disability. They were recruited through the database of a specialty clinic for autism and through the Simons Foundation Powering Autism Research for Knowledge (SPARK) database (SPARK Consortium, 2018). Non-autistic participants, eligible if they were between the ages of 13-18 years and did not have a diagnosis of autism or an individualized education program (IEP; based on self- or parent-report), were recruited through advertisements in a local university email announcement (sent to all university faculty, staff, and students) and social media. Confirming that the non-autistic participants did not have an IEP provided evidence that their cognitive ability was sufficient to respond to the survey questions independently.

Measures

All participants completed the Subthreshold Autism Traits Questionnaire (SATQ; Kanne, Wang, & Christ, 2012), the Camouflaging Autistic Traits Questionnaire (CAT-Q; Hull et al., 2019), and the short-form Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995) and provided basic demographic information (age and sex).

The SATQ is a measure used to assess autistic traits that has been shown to be highly correlated with other self-report measures of autistic traits and to have good internal consistency ($\alpha=0.73-0.91$) and reliability (0.79) in autistic and non-autistic individuals ages 16 years and older (Kanne et al., 2012; Nishiyama et al., 2014). It includes 24 items and 5 subscales (social interaction and enjoyment, expressive language, reading facial expressions, oddness, and rigidity). Participants rated each item on a 4-point Likert scale from ‘false, not true at all’ to ‘very true,’ with higher scores reflecting higher levels of autistic traits. Example items include ‘I sometimes take things too literally, such as missing the point of a joke or having trouble understanding sarcasm’ and ‘I enjoy social situations where I can meet new people and chat (i.e. parties, dances, sports, games).’ Internal consistency of the SATQ in this sample was excellent ($\alpha=.91$).

The CAT-Q contains 25 items related to camouflaging behaviors. Participants rated each item on a 7-point Likert scale from ‘strongly agree’ to ‘strongly disagree.’ Higher scores on the CAT-Q reflect higher levels of camouflaging behaviors. Example CAT-Q items include ‘I have tried to improve my understanding of social skills by watching other people’ (compensation), ‘I always think about the impression I make on

other people' (masking), and 'In social situations, I feel like I am "performing" rather than being myself' (assimilation).

The CAT-Q has demonstrated excellent internal consistency ($\alpha=0.94$) and acceptable reliability (0.77) in previous research (Hull et al., 2019). It has also shown to be positively correlated with autistic traits in both autistic and non-autistic individuals (Hull et al., 2019). The CAT-Q has not yet been validated in individuals ages 13-15 years. However, analyses of internal consistency of the CAT-Q in this study across 13-15-year-old participants and 16-18-year-old participants suggested acceptable levels across groups (13-15 years $\alpha=0.857$; 16-18 years $\alpha=0.864$). In the current sample, overall internal consistency of the CAT-Q was also good ($\alpha=.86$).

The DASS-21 is a shortened version of the Depression Anxiety Stress Scales, a 42-item measure used to assess internalizing symptomology (Lovibond & Lovibond, 1995). The DASS-21 has 21 items and 3 subscales (depression, anxiety, and stress). The DASS-21 total score is a valid measure of general psychological distress (Henry & Crawford, 2005). Participants rate each item on a 4-point Likert scale from 'did not apply to me at all' to 'applied to me very much or most of the time' based on the past week. Higher scores represent higher symptom levels. The DASS-21 has been shown to be appropriate for use with adolescents, including adolescents on the autism spectrum (Griffiths et al., 2017; Mellor et al., 2015). It has demonstrated excellent internal consistency in autistic adolescents ($\alpha=0.94$; Rhind et al., 2014). Internal consistency of the DASS-21 in this sample was excellent ($\alpha=.91$).

Procedure

All study procedures were approved by the university Institutional Review Board (IRB), and consent/assent was obtained for all participants. Autistic community members were not involved in the development, design, or interpretation of results. For participants ages 13-17 years, caregivers were emailed a link to survey information and consent forms. Caregivers could then provide consent for their child to participate before providing the link to their children. Survey information was also presented to the adolescents prior to obtaining their assent to participate. Participants who were 18 years old reviewed information and consent forms themselves. Completion of the surveys took approximately 10-20 minutes and participants could exit and return to the survey to complete it within one week of starting.

Analysis

All analyses were performed in R (R Core Team, 2020). Figures were created using the ggplot2 package in R (Wickham, 2016). Hierarchical regression analyses were used to examine the relationship between DASS-21 internalizing symptoms and age, diagnosis, sex, and CAT-Q total scores. A separate set of analyses was conducted for each subscale of the DASS-21 (depression, anxiety, and stress). Continuous predictors were mean centered in order to increase interpretability of intercepts and interactions (Judd et al., 2017). Age was entered into the first block of each analysis as a control variable. Diagnosis and sex were added to the model in the second block as initial variables of interest based on findings in the literature regarding differences in internalizing symptoms by sex and diagnosis. CAT-Q total scores were added to the model in the third block to examine whether camouflaging levels explained variance in

internalizing symptoms above and beyond other variables of interest. Finally, 2-way interactions between all variables of interest (diagnosis, sex, and CAT-Q scores) were added to the models in block 4 and the 3-way interaction of these variables was added in a fifth block if a significant 2-way interaction was found. Follow-up analyses of simple slopes and comparisons of means were conducted when significant interactions were identified. The data met all assumptions of linear regression.

Results

Table 1 presents means and standard deviations for all study variables. CAT-Q scores for autistic participants ($M = 99.46$) are similar to those reported by Hull et al. (2020b; $M = 105.03$) in an autistic adolescent sample. SAT-Q scores for both autistic participants ($M = 38.7$) and non-autistic participants ($M = 21.0$) were similar to those reported by Kanne et al. (2012; autistic $M = 40.8$, non-autistic $M = 22.7$) in the original development of the measure. SAT-Q scores and CAT-Q scores were significantly correlated for non-autistic individuals, $r(60) = .40, p = .001$, but not for autistic individuals $r(75) = -.01, p = .95$. Hierarchical regression analysis was used to examine predictors of DASS-21 subscale scores (depression, anxiety, and stress). A summary of the results of these analyses is provided in Table 2 and figures for the best fitting model for each subscale score are shown in Figure 1.

Depression and anxiety scores were best predicted by Model 3, which included age, diagnosis, sex, and CAT-Q total scores as predictors. For both depression and anxiety, CAT-Q was the only significant predictor, with higher levels of camouflaging predicting higher symptoms of depression and anxiety. Model 4, examining two-way

interactions, was not significantly better than Model 3 and none of the two-way interactions were significant.

Table 1
Means and standard deviations

| | Autistic Sample | | | Non-autistic Sample | | |
|---------------------|-----------------|----------------|---------------|---------------------|----------------|---------------|
| | All | Female | Male | All | Female | Male |
| N | 78 | 23 | 55 | 62 | 35 | 27 |
| SATQ Total (SD) | 38.74 (11.17) | 39.52 (10.48) | 38.41 (11.53) | 20.98 (8.54) | 19.54 (7.75) | 22.85 (9.29) |
| Social Interaction | 13.26 (5.39) | 13.64 (5.10) | 13.10 (5.55) | 7.02 (4.03) | 6.20 (3.38) | 8.12 (4.61) |
| Expressive Language | 3.94 (1.90) | 3.90 (2.09) | 3.96 (1.83) | 2.42 (1.52) | 2.26 (1.48) | 2.63 (1.57) |
| Facial Expressions | 5.47 (2.40) | 5.21 (2.43) | 5.58 (2.40) | 2.50 (2.03) | 2.23 (1.78) | 2.86 (2.30) |
| Oddness | 6.95 (3.44) | 7.04 (3.78) | 6.91 (3.32) | 3.66 (2.72) | 3.73 (2.99) | 3.56 (2.39) |
| Rigidity | 9.30 (2.83) | 9.30 (2.93) | 9.30 (2.81) | 5.42 (2.69) | 5.23 (2.98) | 5.67 (2.29) |
| CAT-Q Total (SD) | 99.46 (21.27) | 106.13 (22.37) | 96.67 (20.35) | 98.39 (21.36) | 101.25 (21.32) | 94.67 (21.25) |
| DASS-21 Total (SD) | 35.43 (19.62) | 34.87 (21.81) | 35.69 (18.78) | 25.55 (19.18) | 30.17 (20.33) | 19.56 (16.01) |
| Depression | 9.57 (8.52) | 8.96 (9.34) | 9.84 (6.95) | 7.00 (6.86) | 7.94 (6.95) | 5.78 (6.66) |
| Anxiety | 10.19 (8.15) | 10.61 (8.69) | 10.00 (7.58) | 7.84 (6.99) | 9.26 (7.58) | 6.00 (5.77) |
| Stress | 16.41 (8.83) | 15.30 (9.30) | 16.90 (8.71) | 10.45 (7.95) | 12.51 (8.71) | 7.78 (5.98) |

Note. SATQ: Subthreshold Autism Traits Questionnaire; CAT-Q: Camouflaging Autistic Traits Questionnaire; DASS-21: short-form Depression Anxiety Stress Scales.

Table 2. Results of hierarchical regression analyses predicting DASS-21 scores

| Model (M) ^a | Adjusted R ² | Significant Predictors | F | B [95% CI] | t |
|-------------------------------------|-------------------------|----------------------------------|---------|---|-------------------------------|
| DASS-21 Depression | | | | | |
| M1: age | .00 | - | 0.06 | - | - |
| M2: sex, diagnosis | .01 | - | 1.30 | - | - |
| M3: CAT-Q | .10 | CAT-Q | 4.50** | .12** [0.05,0.28] | 3.70 |
| M4: 2-way interactions ^b | .10 | Dx | 3.23** | 3.70* [0.15,7.25] | 2.06 |
| DASS-21 Anxiety | | | | | |
| M1: age | .00 | - | 0.81 | - | - |
| M2: sex, diagnosis | .02 | Dx | 1.92 | 2.87* [0.18,5.56] | 2.11 |
| M3: CAT-Q | .21 | CAT-Q | 9.92*** | .16*** [0.11,0.22] | 5.70 |
| M4: 2-way interactions ^b | .21 | Dx CAT-Q | 6.06*** | 3.83* [0.57,7.09] .12* [0.01,0.22] | 2.33 2.26 |
| DASS-21 Stress | | | | | |
| M1: age | .00 | - | 0.80 | - | - |
| M2: sex, diagnosis | .11 | Dx | 6.36** | 6.40*** [3.42,9.36] | 4.25 |
| M3: CAT-Q | .17 | Dx CAT-Q | 7.58*** | 6.02*** [3.13,8.91] .11** [0.03,0.17] | 4.13 3.15 |
| M4: 2-way interactions ^b | .24 | Dx Sex Sex*Dx Sex*CATQ | 7.00*** | 9.12*** [5.41,12.82] 4.12* [0.08,8.16] -7.46* [-13.13,-1.80] .21** [1.80,0.34] | 4.87 2.02 -2.61 3.15 |
| M5: 3-way interaction ^c | .23 | Dx Sex Sex*Dx Sex*CAT-Q | 6.09*** | 9.18*** [5.44,12.93] 4.14* [0.08,8.20] -7.42* [-13.12,-1.73] .23** [0.04,0.42] | 4.85 2.02 -2.58 2.39 |

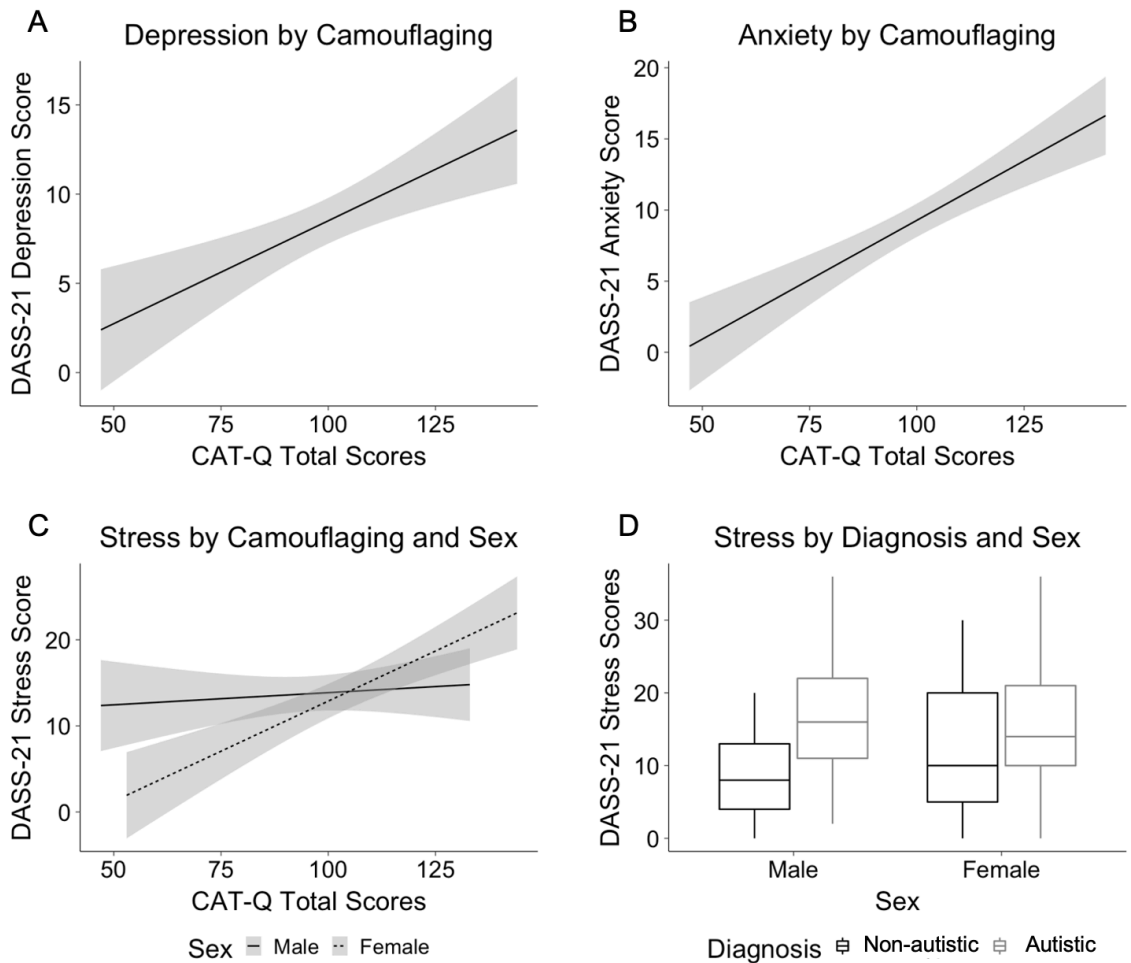
Note. CAT-Q: Camouflaging Autistic Traits Questionnaire; DASS-21: short-form Depression Anxiety Stress Scales. ^aEach model included all predictors from the prior step and added the new predictor(s) listed; ^b2-way interactions included sex*diagnosis, sex*CAT-Q, and diagnosis*CAT-Q; ^c3-way interaction was sex*diagnosis*CAT-Q.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Stress scores were best predicted by Model 4, which included age, diagnosis, sex, CAT-Q total scores, and all 2-way interactions between diagnosis, sex, and CAT-Q total scores as predictors. In this model, diagnosis and sex were both significant predictors of stress, though their interpretation is qualified by the significant 2-way interactions of sex*diagnosis and sex*CAT-Q. Follow-up analyses were conducted to probe the two significant 2-way interactions. Regarding the significant interaction between sex and diagnosis, there was no significant difference on stress scores ($t(56) = -1.162, p = .25, d = 0.29$, BCa 95% CI [-7.599, 2.019]) between autistic females ($N = 23, M = 15.30, SD = 9.93$) and non-autistic females ($N = 35, M = 12.51, SD = 8.71$). However, there was a significant difference in stress scores ($t(76) = -4.883, p < .01, d = 1.22$, BCa 95% CI [-12.846, -5.402]) between autistic males ($N = 51, M = 16.90, SD = 8.67$) and non-autistic males ($N = 27, M = 7.78, SD = 5.98$), with autistic males reporting higher levels of stress. Regarding the significant interaction between camouflaging and sex, camouflaging was not a significant predictor of DASS-21 stress scores for males ($b=.02, t(79) = 0.40, p = .69$, BCa 95% CI [-0.07, 0.10]), while it was a significant predictor of stress scores for females ($b = .23, t(55) = 4.60, p < .01$, BCa 95% CI [0.13, 0.33]).

Figure 1.

Figures for best models for DASS-21 depression, anxiety, and stress scores.



Note. A=Depression Model 3; B=Anxiety Model 3; C and D=Stress Model 4. Error bands depict 95% confidence intervals. CAT-Q: Camouflaging Autistic Traits Questionnaire; DASS-21: short-form Depression Anxiety Stress Scales

Discussion

To our knowledge, this was the first study to explore the potential relationship between camouflaging, sex, autism diagnosis and symptoms, and internalizing symptoms in autistic and non-autistic adolescents. Consistent with previous findings in adults, camouflaging was significantly associated with higher levels of anxiety and depression in both autistic and non-autistic individuals (Cage et al., 2018; Hull et al., 2020a; Lai et al.,

2017). There was also a significant association between camouflaging and stress, though this differed based on sex, with camouflaging acting as a significant predictor of stress scores for females but not for males. Finally, there was a significant interaction between sex and diagnosis in predicting stress scores, with autistic males reporting higher levels of stress than non-autistic males, but no similar pattern for females. These findings have important clinical implications and implications for future research in the areas of characterization and treatment of anxiety, depression, and stress in both non-autistic and autistic adolescents.

When considering the DASS-21 depression and anxiety scores, camouflaging levels were stronger predictors than sex or diagnosis. Though few studies examining the relationship between camouflaging and internalizing symptoms have included both non-autistic and autistic participants, this is consistent with the findings of Hull and colleagues (2019), who found that camouflaging was positively correlated with anxiety and depression in autistic adults and positively correlated with social anxiety in non-autistic adults. These authors also found that camouflaging was negatively correlated with wellbeing for both autistic and non-autistic adults. The findings of the current study suggest that camouflaging may be associated with anxiety and depression levels during adolescence regardless of diagnosis.

While in line with previous camouflaging research showing the negative association between camouflaging and mental health and wellbeing, this finding is in contrast to findings of a positive association between self-monitoring and wellbeing. This may point to a critical difference between the two constructs. In a study of non-autistic adults, feelings of authenticity mediated the relationship between self-monitoring and

wellbeing (Pillow et al., 2017). In addition, the authors found that the “public performance” dimension of the self-monitoring measure used interacted with authenticity in predicting wellbeing. Specifically, public performance, a dimension of self-monitoring, was positively associated with wellbeing when authenticity was high, but not when authenticity was low. As camouflaging is conceptualized as the use of strategies to hide or mask autistic traits, it may be the case that doing so leads to lower feelings of authenticity as individuals are working to mask part of themselves from others. This is also in line with the finding in the current study that levels of autistic traits were significantly correlated with camouflaging levels in the non-autistic participants. Given all of this, authenticity is a potential third variable that may help further explain the association between camouflaging and wellbeing.

It is important to emphasize that there is not currently research that can clarify the direction of causality between poorer mental health and camouflaging. It is possible that camouflaging leads to poorer mental health, but it is also possible that individuals experiencing poorer mental health may be more likely to camouflage. For example, individuals experiencing anxiety may be likely to more closely and consistently monitor their behavior around others. It is also possible that the relationship is bi-directional and that camouflaging and poor mental health impact each other. To build on the previous example, individuals experiencing anxiety may be more likely to closely monitor their behavior around others, and the experience of doing so may be distressing and contribute to increases in internalizing symptoms. Finally, it is possible that another important variable is influencing both camouflaging levels and internalizing symptoms. As another

example, it is possible that individuals who feel they do not fit in with others are more likely to camouflage more and to report higher levels of internalizing symptoms.

For the DASS-21 subscale of stress, differences emerged based on sex and diagnosis. A significant interaction between camouflaging and stress showed that camouflaging levels had more of an impact for females than for males, with females demonstrating both lower levels of stress than males with lower levels of camouflaging and higher levels of stress than males with higher levels of camouflaging. In other words, the same pattern of association between camouflaging and mental health was found for females across all three subscales, while this was only found in the depression and anxiety subscales for males.

One possible explanation for this difference by sex is that camouflaging may be more stressful for adolescent females than for adolescent males. Adolescence is a time when social relationships become more important and complex, and this may be particularly true for females. A large review of sex differences in peer relationships supports the notion that adolescent girls must navigate different social dynamics and meet different social expectations than their male peers (Rose & Rudolph, 2006). Some of the main findings of this review were that girls engage in more social conversation and self-disclosure, are more sensitive to the status of their relationships with peers, are exposed to more stressors in their friendships and with their peers, and are more likely to spend time thinking about relationship stress. The authors also note that many of these differences increase throughout adolescence. This increased complexity for females could lead to social challenges that differ for males and females, and the camouflaging behaviors used to address these difficulties could in turn be experienced as more stressful

for females due to the increased importance placed on them. In contrast, camouflaging could impact mental health without being associated with the same day-to-day stress for males as it is for females.

Another possible explanation for the differences based on sex in DASS-21 stress scores is related to variation in camouflaging behaviors across settings. A previous study in autistic adults found that patterns of camouflaging use across settings impacted the relationship between camouflaging and DASS-21 stress scores (Cage & Troxell-Whitman, 2019). These authors assessed whether participants reported high levels of camouflaging across all settings (formal vs. informal), low levels of camouflaging across settings, or a tendency to camouflage more in one type of setting than in the other. They found that participants who reported high levels of camouflaging across all settings reported the highest levels of stress. Our study found that camouflaging level was a significant predictor of DASS-21 stress scores for females, but not for males. It is possible that males and females were engaging in different patterns of camouflaging across settings. For example, females may have been camouflaging at high levels across most or all settings while males were more likely to vary how much they camouflaged in different settings. It may be the case that the increased complexity in female adolescent relationships necessitates more camouflaging in informal settings with friends for females than for males, while both males and females camouflage in formal settings. Setting data were not collected in our study, so this hypothesis could not be addressed empirically and thus, warrants further study.

In the current study, there was also a significant sex by diagnosis interaction on the DASS-21 stress subscale, with autistic males reporting significantly higher levels of

stress than non-autistic males, but no significant difference between autistic and non-autistic females. This lack of difference between autistic and non-autistic females may be explained by the more complex social relationships of adolescent females previously discussed. A significant difference may appear for males due to increased stress for autistic males regarding the formation and maintenance of relationships compared to their peers. Though autistic adolescents report similar levels of desire for friendships and fitting in as their peers, they experience higher levels of loneliness (Locke et al., 2010; Vine Foggo & Webster, 2017). This discrepancy may account for the increased distress for autistic males compared to non-autistic males in this study, whereas social relationships may be experienced as similarly stressful for autistic and non-autistic females.

Limitations

Although the findings of this study have important implications, a few limitations are important to note. We did not collect in-depth demographic information, such as race/ethnicity and socioeconomic status, which may have improved the predictive power of the models and helped to control for potential confounding variables. We did not collect data regarding IQ; however, IQ was not found to predict camouflaging levels in a recent study with a similar sample (Hull et al., 2020b). A larger sample size, particularly for autistic females, would also improve the power of analyses comparing males and females. The findings of this study may not generalize across the autism spectrum, as the sample did not include individuals with intellectual disability. The cross-sectional design of this study did not allow us to assess causal relationships, and as discussed earlier, the lack of setting information related to camouflaging did not allow us to assess its potential

impact on the outcome variables. Finally, the current study utilized only self-report measures of adjustment. The use of multi-informant reports (e.g., parent, clinician, teacher) may have provided a more complete picture of the adolescents' adjustment.

Clinical Implications

The findings of this study have important clinical implications. As camouflaging was an important predictor of depression and anxiety, camouflaging levels could be an important consideration during assessment and possible treatment planning when clinicians are working with autistic or non-autistic adolescents presenting with depression and/or anxiety. Due to the lack of knowledge around the nature of the relationship between camouflaging and internalizing symptoms, assessment and treatment planning should focus on understanding how camouflaging functions for the individual and identifying other potential treatment targets (e.g., feeling a lack of connections with others).

It is also important for clinicians to consider how similar treatment targets for autistic and non-autistic adolescents may require different processes. For example, some level of camouflaging might be more important for autistic individuals in order to “fit in” socially. Direct teaching and support in social skills may benefit autistic adolescents. It has been suggested that there could be a distinct difference between skills learned through social skills training and camouflaging (Green et al., 2019). Specifically, camouflaging may be driven by anxious thoughts and rules developed by the individual as opposed to skills learned through social skills training, which may be more naturalistic and less effortful. Given that the mechanisms involved in the relationship between camouflaging and mental health difficulties have not yet been well-defined, it is unclear

whether social skills training would be beneficial. Clinicians should exercise caution in implementing social skills interventions to ensure that they are not inadvertently reinforcing feelings of alienation or inauthenticity.

However, working with individuals to help them feel more comfortable during social interactions is only one potential component of treatment for adolescents presenting with anxiety and/or depression and high levels of camouflaging. In addition, these youth may benefit from receiving treatment focused on increasing self-acceptance and self-esteem. The use of camouflaging behaviors should be explored on an individual basis in order to determine the unique benefits and negative consequences that result from those behaviors. This would allow clinicians to target only the aspects of camouflaging that are harmful for the individual. In addition, intervention is needed outside of that implemented directly with the individuals experiencing mental health difficulties. The relationship between camouflaging and poorer mental health outcomes supports the call for attention in the area of increasing autism acceptance in the general population. Work to increase autism acceptance could allow for autistic individuals to act in ways that are truer to themselves while still forming connections with others, which may reduce levels of stress during social interactions and improve mental health and wellbeing.

Implications for Future Research

This study identifies critical avenues for future research. Replication of this study in a larger sample would increase the generalizability of the findings and allow for psychometric testing of the CAT-Q in younger participants. Longitudinal studies will also be important for increasing understanding of the relationship between camouflaging and

mental health throughout adolescence. Importantly, longitudinal studies could also shed light on whether there is a causal relationship between the two, and if so, in which direction.

Future studies should also include additional variables. First, extensive demographic information was not collected in this study due to concerns with participant fatigue, but this will be an important contribution of future research in order to help ensure appropriate representation of minority groups in the sample. It would also be helpful to collect data on whether and when participants have previously received formal social skills training in order to examine whether this may impact the relationship between camouflaging behaviors and mental health difficulties. Another possibility would be to examine relationships between camouflaging and mental health/wellbeing outcomes before and after participation in a social skills training program. It is imperative to better understand the relationship between camouflaging, social skills interventions, and mental health difficulties in order to ensure that interventions are beneficial for autistic individuals. Authenticity, as mentioned earlier, could be another variable considered as a potential mediator or moderator in future work. Finally, research should consider collecting data regarding patterns of camouflaging across contexts to assess whether this impacts the association between camouflaging and mental health difficulties.

A final important direction for future research will be to continue to clarify the construct of camouflaging. Direct comparison of camouflaging and self-monitoring will help elucidate similarities and differences between the two. This research should also focus on the relationships between camouflaging and self-monitoring with external correlates, such as mental health and wellbeing. A critical component of such research

will be the inclusion of both autistic and non-autistic participants in the same studies in order to allow for the comparison of the patterns between camouflaging, self-monitoring, and external correlates across groups.

Conclusion

Findings suggest that camouflaging is associated with poorer mental health in adolescence, regardless of autism diagnosis or sex. They also highlight potential differences in levels of stress related to camouflaging. Adolescent females, but not males, reported the same relationship between camouflaging and stress as between camouflaging and depression and anxiety. These findings contribute to a developmentally-informed understanding of camouflaging and have important implications regarding assessment and treatment of autistic and non-autistic adolescents presenting with depression, anxiety, or elevated levels of general psychological distress. Assessment should consider camouflaging behaviors. If the individual reports high levels of camouflaging, a potential treatment focus could be determining which aspects of camouflaging are beneficial and which aspects may be harmful and working to address the harmful aspects. Social skills training may also reduce the effort needed to camouflage for autistic adolescents, which could alleviate the negative effects of camouflaging on mental health and wellbeing. Both autistic and non-autistic adolescents presenting with these difficulties and reporting high levels of camouflaging should also receive treatment focused on bolstering self-acceptance and self-esteem. Finally, interventions targeting increased autism acceptance in the general population may decrease the need for individuals to camouflage.

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