

CAMOUFLAGING AND AUTISM SPECTRUM DISORDER: SYSTEMATIC REVIEW

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ABSTRACT

In order to fit into the environment, satisfy social norms, and increase the opportunities of creating successful interpersonal interactions, individuals with autism spectrum disorder (hereinafter referred to as ASD) often try to develop coping strategies, and one such strategy is camouflaging. Camouflaging can be seen as a way in which individuals try to hide the less desirable aspects of their personality. The aim of this review was to determine the sex/gender differences in the representation of camouflaging in individuals with ASD by reviewing the relevant literature, to determine the impact of camouflaging on mental health, as well as the reasons and consequences of the camouflaging. By searching the SCOPUS database and after applying inclusion and exclusion criteria for publications in the field of autism spectrum disorder and camouflaging, a total of 10 publications were included and analyzed in the current review. Results show that individuals of the female sex/gender with ASD report higher levels of camouflaging compared to individuals of the male sex/gender with ASD. In addition to the above, it has been found that camouflaging is associated with mental health challenges. The results showed that individuals of the female sex/gender with ASD were more supportive of conventional reasons than individuals of the male sex/gender with ASD. The results of research on the consequences of camouflaging show that people with ASD who camouflage themselves most often feel unhappy because they perceive camouflaging their true identity and personality as lying and deceiving about who they really are. Also, research indicates that thanks to camouflaging, individuals with ASD did not encounter the stereotype of "autistic person", however, this caused negative consequences such as delaying or questioning their diagnosis of ASD, especially in individuals of female sex/gender with ASD.

Keywords: autism spectrum disorder, autism, camouflaging, sex/gender differences, mental health.

1. INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by challenges in social interaction, communication, and the presence of restricted and repetitive patterns of behavior, activities, and interests (APA, 2013). It is worth noting that most research on ASD has predominantly included samples of male individuals (Thompson et al., 2003). In the early descriptions of autism by Leo Kanner (1943) and Hans Asperger (1944), a predominance of males was noted, with eight out of eleven cases in Kanner's report and all cases in Asperger's report being male, and ASD was initially perceived as a disorder predominantly affecting males (Kreiser & White, 2013). The prevalence of autism is estimated to be around 1% of the population and has a higher prevalence and earlier diagnosis in males compared to females, with

ratios ranging from 3:1 to 4:1 (Fombonne, 2009; Baxter et al., 2015; Loomes et al., 2017). Several authors have suggested that males exhibit higher levels of traits and characteristics associated with ASD (Austin, 2005; Baron-Cohen et al., 2001; Constantino, 2011; Ingersoll et al., 2011). Biogenetic factors have been partially implicated in explaining the sex/gender difference in ASD (Kreiser & White, 2013; Auyeung et al., 2009; Skuse, 2009). The male bias in ASD research and under-identification of ASD in females may be influenced by the use of camouflage, a term originally used to investigate the gender ratio of ASD (Dworzynski et al., 2012; Begeer et al., 2013). Today camouflage is increasingly studied to better understand and explore different phenotypic profiles of ASD in male and female sex/gender (Hull et al., 2020; Hull et al., 2019; Hull & Mandy, 2017; Lai et al., 2016; Lai et al., 2015; Wing, 1981; Backer van Ommeren et al., 2017).

1.1 Sex/gender differences and Autism Spectrum Disorder

The male-to-female ratio observed in individuals with Autism Spectrum Disorder (ASD) could potentially be attributed to the diagnostic complexities encountered by females. These complexities may arise from the prevailing tendency to require females to exhibit more severe behavioral and cognitive difficulties (Russell & Norwich, 2010; Dworzynski et al., 2012). Acceptance of the ASD diagnosis is also more difficult for females within their educational and social environments, leading to significant consequences (Posserud et al., 2006). As a result, the concept of a distinct female phenotype of ASD has been proposed, highlighting unique manifestations and difficulties that differ from the predominantly male-based understanding of ASD (Bargiela et al., 2016; APA, 2013; Hiller et al., 2014; Lai et al., 2015; Mandy et al., 2012). Empirical evidence suggests that females with ASD may demonstrate greater social motivation and a higher capacity for forming friendships compared to males, along with a higher vulnerability to internalizing problems such as anxiety, depression, eating disorders, and sleep disorders (Head et al., 2014; Sedgewick et al., 2016). Qualitative, quantitative, and developmental differences have also been frequently discussed in research on sex/gender differences in individuals with ASD (Lai et al. 2015; Mandy et al., 2012). Conducted meta-analyses have revealed distinctions in the expression of restrictive and repetitive behaviors (hereinafter referred to as RRB). More precisely, female sex/gender individuals may exhibit less overt RRBs compared to males and can display interests that are less restricted and more socially oriented (Lai et al. 2015; Van Wijngaarden-Cremers et al., 2014; McFayden et al., 2019; Nicholas et al., 2008). Developmental differences, stigma, and societal expectations play a role in developing coping strategies and shaping the experiences, especially of females with ASD, as they face challenges when displaying characteristics stereotypically associated with masculinity (Attwood, 2007; Willey, 1999; Schuck et al., 2019; Goldman, 2013). In one study, researchers observed young girls with ASD on school playgrounds and found that their social interaction patterns were similar to those of neurotypical girls (Jorgenson et al., 2020; Dean et al., 2017). The assessment of RRBs, as covered by "gold standard" instruments, may introduce a bias toward males due to the historical pre-

dominance of the male sex/gender which may not adequately capture the specific characteristics of ASD presentation in the female sex/gender, therefore assessment biases need to be considered before universal norming for sex/gender differences (Rutter et al., 2003; Kreiser & White, 2014; Lai et al., 2015; Lai et al., 2013; Wing, 1975).

1.2 Camouflaging

Camouflage is a multifaceted concept in the literature, involving the use of specific behavioral and cognitive strategies by individuals with ASD to adapt and navigate within the context of a neurotypical population (Cook et al., 2021; Hull et al., 2017; Lai et al., 2011; Lawson, 2020; Livingston & Happe, 2017; Pearson & Rose, 2021). Female sex/gender individuals with ASD use intentional eye contact, facial expressions, gestures, and head nodding to enhance social interactions (Jorgenson et al., 2020; Hull et al., 2017; Livingston et al., 2019; Rynkiewicz et al., 2016). This type of camouflage is also called linguistic camouflage, and it includes both verbal and non-verbal strategies. Verbal camouflage includes strategies like asking questions, minimizing self-disclosure, scripting conversations, and mimicking typical communication patterns. Authors Hull & Mandy (2019) draw an analogy between chameleon behavior and camouflage in ASD. They suggest that many individuals with ASD modify their behavior, much like a chameleon changes its patterns to blend in with its environment. However, just as the chameleon's presence persists despite his efforts to "fit in", camouflage does not eliminate the existence of ASD traits. Although camouflage is not exclusive to the ASD population, it requires significantly more effort and entails greater consequences compared to the neurotypical population, leading to anxiety, depression, and internalizing problems in individuals with ASD (Barigiela et al., 2016; Cage & Troxell-Whitman, 2019; Livingston et al., 2019). Despite the negative impact, many individuals perceive camouflage as an obligation rather than a choice.

1.3 Operationalization of concepts

In this review, the term "camouflage" includes masking, assimilation, and compensation which are recognized as integral components of a broader understanding of camouflage in the existing literature. Defining camouflage more precisely is challenging due to its emerging nature as a field of study. The term "ASD" has been adopted to encompass individuals diagnosed with Autism Spectrum Disorder (ASD), Autism, Asperger's syndrome, and Pervasive Developmental Disorder not Otherwise Specified (hereinafter referred to as PDD-NOS). Regarding the terminology of sex/gender, the definitions outlined in the APA dictionary (2015) have been adopted, where "sex" refers to biological attributes and "gender" includes psychological, behavioral, social, and cultural dimensions associated with being male or female, including aspects of masculinity and femininity. Participants in the reviewed studies had self-reported or clinically confirmed diagnoses of mental health conditions such as anxiety and depression.

1.4 Aim

Based on the existing body of literature and empirical evidence we formulated the following aims:

1. To explore the disparities in the manifestation of camouflage between individuals of male and female sex/gender with a particular focus on whether camouflage serves as a contributing factor to the male-to-female ratios observed in ASD diagnoses, such as the 4:1 or 3:1 ratios;
2. To investigate the relationship between camouflaging and mental health outcomes by conducting a comprehensive review of relevant scholarly publications;
3. To examine and present the prevailing motives behind camouflaging, as well as the associated consequences experienced by individuals who employ camouflaging strategies.

By delineating these research objectives, we aimed to contribute to the existing knowledge base on camouflaging in ASD, shedding light on its potential sex/gender-related differences, its impact on mental health outcomes, and the common underlying reasons and ramifications associated with these behaviors.

2. METHOD

A thorough search was performed on the SCOPUS online database from November 2022. to January 2023., using the following keywords: "autism spectrum disorder", "autism", "camouflaging" "sex/gender differences," and "mental health". The initial search yielded a total of 375 publications. During this phase, the following inclusion criteria were applied:

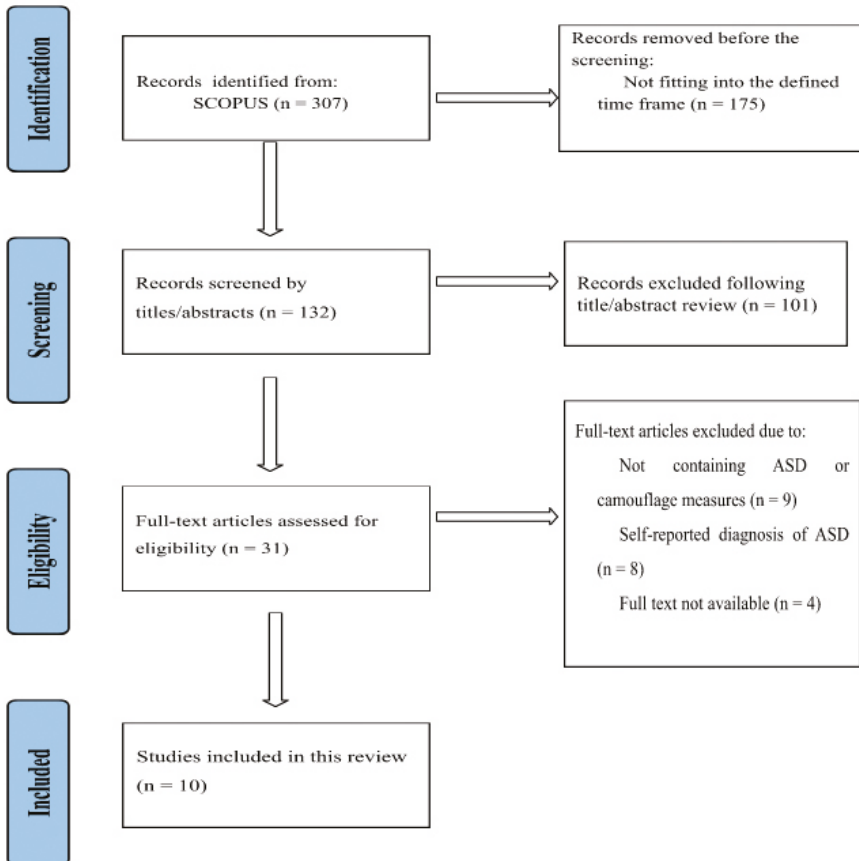
1. Publications must contain the keywords in the title;
2. Publications must be in the English language;
3. Publications must be peer-reviewed and available in the searched database.

In consideration of the expanding body of literature exploring the phenomenon of camouflaging, frequently associated with the "female phenotype" of ASD, the following inclusion criteria were established:

1. Publications were limited to the timeframe spanning from January 2017. to December 2022. including the most recent research available within the searched online database;
2. The participants in the studies were diagnosed and/or had confirmed ASD diagnosis by the end of the research;

3. The selected publications specifically incorporated measures related to both ASD (such as diagnostic criteria or assessments) and camouflaging.

Figure 1. PRISMA Flow Diagram



2.1 Authors' Contribution

Both authors, Bukva Ajla and Zechevich Daria, actively participated in the study design, including formulating research questions and objectives and demonstrating strong collaboration. They closely collaborated on developing the search strategy, screening studies, and extracting data. Bukva Ajla played a key role in synthesizing the data and organizing the findings, while Zechevich Daria provided valuable insights for data analysis and interpretation. Both authors were committed to the systematic review's written component, actively participating in drafting and revising the manuscript. They reviewed and approved the final version of the manuscript, signifying their collective responsibility and endorsement of its content.

2.2 Inter-rater agreement and reliability

The authors conducted a simultaneous identification of studies in the searched database. Out of a total of 375 studies, 175 were unanimously excluded due to not fitting within the defined time frame. In the screening phase, 132 studies were examined based on titles and abstracts, and 101 studies were collaboratively excluded for not meeting the criteria. In the eligibility phase, 31 full-text studies were independently assessed by the authors, and a marking system was used to assess inter-rater agreement. A value of 0 indicated studies that did not meet the criteria, while a value of 1 indicated studies that fully satisfied the criteria. Discrepancies emerged during this process, specifically about the inclusion or exclusion of 7 studies. The authors engaged in thorough discussions to gain insight into each other's perspectives and rationale for divergent assessments. They critically analyzed the inclusion and exclusion criteria, re-evaluated contentious studies, and aligned them with the review's objectives. In one instance where discussions did not yield a resolution, the authors sought the input of a third reviewer, who acted as an independent arbiter. Documentation of disagreements, rationale, and resolution steps was maintained for transparency and reproducibility. Through collaborative efforts, the authors achieved consensus on the inclusion or exclusion of studies, ensuring reliability and validity, and enhancing the review's quality. Cohen's kappa coefficient (κ) for inter-rater reliability was 0.517 (Kappa between 0.41 and 0.60 - moderate agreement).

Figure 2. Inter-rater agreement (Google Sheets)

1	Studies	Rater 1	Rater 2	Agreement (Bn-Cn)
2	1		0	0 =B:B-C:C
3	2		1	1 =B:B-C:C
4	3		0	0 =B:B-C:C
5	4		1	1 =B:B-C:C
6	5		0	1 =B:B-C:C
7	6		0	1 =B:B-C:C
8	7		1	1 =B:B-C:C
9	8		1	0 =B:B-C:C
10	9		1	1 =B:B-C:C
11	10		0	0 =B:B-C:C
12	11		1	0 =B:B-C:C
13	12		0	0 =B:B-C:C
14	13		1	1 =B:B-C:C
15	14		1	1 =B:B-C:C
16	15		0	0 =B:B-C:C

17	16	1	1 =B:B-C:C
18	17	0	0 =B:B-C:C
19	18	0	0 =B:B-C:C
20	19	0	1 =B:B-C:C
21	20	0	0 =B:B-C:C
22	21	1	0 =B:B-C:C
23	22	0	0 =B:B-C:C
24	23	0	0 =B:B-C:C
25	24	0	0 =B:B-C:C
26	25	0	0 =B:B-C:C
27	26	0	0 =B:B-C:C
28	27	0	0 =B:B-C:C
29	28	0	0 =B:B-C:C
30	29	0	0 =B:B-C:C
31	30	1	1 =B:B-C:C
32	31	1	0 =B:B-C:C
33			
34		Match	24
35		Total	31
36		IRA	=D34/D35
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3. RESULTS

Among the 10 studies reviewed in this study, six studies exclusively focused on participants diagnosed with ASD, while the remaining four included typical development individuals (hereinafter referred to as TD) as a comparison group. The number of participants and their age varies across the included publications. Detailed information is contained in Table.

Table 1. Number and age of participants in the included studies

Authors	Participants	Age
1. McQuain et al. (2021)	N = 502	18 - 49 years old
2. Corbett et al. (2022)	N = 116	10.0 - 16.11 years old
3. Hull et al. (2019)	N= 778	N/A
4. Schuck et al. (2019)	N=62	Adults with ASD
5. Bernardin et al. (2021)	N=140	Adolescents 13 - 18 years old
6. Hull et al. (2021)	N=305	18 - 75 years old
7. Parish-Morris et al. (2017)	N=82	6 - 17 years old
8. Cage & Troxell-Whitman (2019)	N=262	18 - 65 years old
9. Hull et al. (2017)	N=92	16 - 79 years old
10. Perry et al. (2021)	N=223	18 - 65 years old

In the study sample, a total of five studies (n=5) included participants of both female and male sex/gender, Three studies (n=3) included participants identifying as non-binary sex/gender, while two studies (n=2) had participants who did not specify their sex/gender.

ASD measures employed in the included studies varied, including *DSM-IV or DSM-V diagnosis conducted by a specialist clinic* (n=1), *Autism Spectrum Quotient (AQ-28)* (n=1), *Autism Diagnostic Observation Schedule - second edition (ADOS-2)* (n=2), *Lifetime Social Communication Questionnaire (SCQ)* (n=2), *Broad Autism Phenotype Questionnaire (BAPO)* (n=2), *Autism Diagnostic Interview-Revised (ADI-R)* (n=1), *Subthreshold Autism Trait Questionnaire (SATQ)* (n=1), and *Ritvo Autism and Asperger's Diagnostic Scale (RAADS-14)* (n=2).

Regarding the assessment of camouflage, the following measures were used: *Questionnaire for camouflage of autistic traits (CAT-Q)* (n=6), *Method discrepancies "Compensatory camouflage" (relationship between ADOS SA and TOM)* (n=2), *camouflage results obtained by subtracting S ADOS from S AQ* (n=1), *Contextual Assessment of Social Skills (CASS) and scores Vineland Scales of Adaptive Behavior (Parent/Guardian Rating Form)-2. edition (VABS)* (n=1), *online surveys and questionnaires on the "Qualtrics" platform* (n=3).

Other measures used by the authors of the publications to examine the overall functioning and for testing the variables that can affect the participants' camouflage are: *Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II)* (n=1), *State Anxiety Inventory for Children (STAI-C)* (n=1), *Neuropsychological Assessment, Second Edition (NEPSY-II)* (n=1), *Stanford-Binet Scales of Intelligence, Fifth Edition (FSIQ, VIQ, NVIQ)* (n=1), *Berkeley Expressiveness Questionnaire (BEQ)* (n=1), *Social Phobia and Anxiety Inventory (SPAI)* (n=1), *Short Depression Scale (DASS-21)* (n=2), *Interactive Test drawing skills (IDT)* (n=1), *Eye-Mind Reading Test, children's version (RMET-C)* (n=1), *Differential Ability Scales-II (DAS-II)* (n=1), *Awareness Scale of stigma* (n=1), *Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)* (n=1), *Social Anxiety Scale (LSAS)* (n=1), *Generalized Anxiety Disorder (GAD-7)* (n=1), and *Questionnaire on patient health (PHQ-9)* (n=1).

Table 2. Summary of the studies included in the review

Authors (year)	Comparison groups	Participants (N)	Age range	Mean age	Sex/gender	ASD measures	Camouflage measures	Other measures
1. McQuain et al. (2021)	ASD only	N = 502	18 - 49	32.97	Female (n=276); Male (n=226)	Autism Spectrum Quotient (AQ-28)	The Camouflaging Autistic Traits Questionnaire (CAT-Q)	N.A
2. Corbett et al. (2022)	ASD only	N = 116	10.0 - 16.11	Females- 12,93; Males - 12,78	Female (n=46); Male (n=115)	Autism Diagnostic Observation Schedule - Second Edition (ADOS-2, ADOS SA, ADOS RRB) Lifetime Social Communication Questionnaire (SCQ)	Discrepancy method "Compensatory camouflage" (relationship between ADOS SA and TOM); Contextual Assessment of Social Skills (CASS)	Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI - II); State Anxiety Inventory for Children (STAI-C); Neuropsychological Assessment, Second Edition (NEPSY-II)
3. Hull et al. (2019)	ASD n=306; TD n=472	N= 778	N/A	34.56	Female (n= 434); Male (n=301) Non-binary (n=43)	Broad Autism Phenotype Questionnaire (BAPQ)	The Camouflaging Autistic Traits Questionnaire (CAT-Q)	N/A
4. Schuck et al. (2019)	ASD n=28; TD n=34	N=62	Adults	Females- 33; Males - 23	Female (n=11); Male (n=17)	Autism Diagnostic Interview-Revised (ADI-R) Autism Diagnostic Observation Schedule - Second Edition (ADOS-2)	camouflage scores obtained by subtracting S ADOS from S AQ	Stanford-Binet Scales of Intelligence, Fifth Edition; FSIQ full-scale IQ, VIQ verbal IQ, NVIQ nonverbal IQ; Berkley Expressiveness Questionnaire (BEQ); Social Phobia and Anxiety Inventory (SPAI)
5. Bernardin et al. (2021)	ASD n=78; TD n=62	N=140	13 - 18	ASD - 15,3; TD - 15,31	ASD - female (n=23), male (n=55); TD - female (n=35), male (n=27)	Subthreshold Autism Trait Questionnaire (SATQ)	The Camouflaging Autistic Traits Questionnaire (CAT-Q)	Short stress scale for depression from DASS-21

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Authors (year)	Comparison groups	Participants (N)	Age range	Mean age	Sex/gender	ASD measures	Camouflage measures	Other measures
6. Hull et al. (2021)	ASD only	N=305	18 - 75	41.80	ASD - female (n=181), male (n=104); Non-binary (n=18)	Broad Autism Phenotype Questionnaire (BAPQ)	The Camouflaging Autistic Traits Questionnaire (CAT-Q)	The Liebowitz Social Anxiety Scale (LSAS); Generalized anxiety disorder (GAD-7); Patient Health Questionnaire (PHQ-9)
7. Parish-Morris et al. (2017)	ASD (n=65); TD (n=17)	N=82	6 - 17	9.96	Female (n=25); Male (n=57)	Autism Diagnostic Observation Schedule - Second Edition (ADOS-2); Social Communication Questionnaire (SCQ)	Autism Diagnostic Observation Schedule - Second Edition (ADOS-2)	Differential Ability Scales-II (DAS-II); Vineland Scales of Adaptive Behavior (Parent/Guardian Rating Form)-2. edition (VABS)
8. Cage & Troxell-Whitman (2019)	ASD only	N=262	18 - 65	33.62	Female (n=135); Male (n=111); Non-binary (n=12); N/A (n=4)	Ritvo Autism and Asperger's Diagnostic Scale (RAADS-14)	The Camouflaging Autistic Traits Questionnaire (CAT-Q); Qualtrics platform - "Reasons for camouflage"; "Contexts of camouflage" (Disconnect Theory - formal and interpersonal contexts)	Depression, Anxiety and Stress Scale (DASS-21)
9. Hull et al. (2017)	ASD only	N=92	16 - 79	Females - 40,71; Males - 48,03; Non-binary - 40,71	Female (n=55); Male (n=30); Non-binary (n=7)	DSM-IV or DSM-V diagnosis from a psychiatrist or clinical psychologist at a recognized specialist ASD clinic;	Online survey "Qualtrics" platform - "Camouflaging survey"	N/A
10. Perry et al. (2021)	ASD only	N=223	18 - 65	34,19	Female (n=130); Male (n=53); Non-binary (n=39); N/A (n=1)	Ritvo Autism and Asperger's Diagnostic Scale (RAADS-14)	Online survey "Qualtrics" platform; The Camouflaging Autistic Traits Questionnaire (CAT-Q)	The Stigma Consciousness Scale; Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)

3.1. Sex/gender distribution differences of camouflaging in individuals with ASD

A study by McQuaid et al. (2021) aimed to replicate previous research on increased camouflage among female adults with ASD. They found that female sex/gender individuals with ASD reported higher needs, preferences, and higher levels of camouflage on all three Cat-Q subscales (assimilation, compensation, masking) compared to their male and nonbinary counterparts. Schuck et al. (2019) found that camouflaging was more prevalent in female sex/gender. In a unique comparison between groups diagnosed with ASD in childhood/adolescence and adulthood, this study showed that individuals diagnosed in adulthood reported significantly higher levels of camouflage. Similar findings were made by Hull et al. (2019) in their study of self-reported camouflaging behaviors of individuals with ASD and TD of different sex/gender identities. Findings consistently indicated that females with ASD performed higher on measures of camouflage. This difference can be attributed to experiences related to sex/gender and cultural norms (Hull et al., 2019; Schuck et al., 2019). Effect sizes were found to be moderate, with the largest differences observed on the total CAT-Q scale, and no significant sex/gender differences were found on the compensation subscale, indicating that individuals with ASD of all sexes/genders may use similar levels of compensatory strategies. Non-binary individuals with ASD had higher CAT-Q scores compared to females, indicating increased camouflage risks. Previous research confirms higher camouflaging behaviors in individuals with ASD compared to TD. Corbett et al. (2022) found sex/gender differences in RRB, with females showing fewer RRB but similar levels of social affective behavior compared to males. Compensation, based on Livingston's model, operationalized as the difference between social communication and interaction behavior (ADOS SA; perceived ability) and social cognition performance on a theory of mind task (NEPSY TOM; actual ability), varied by sex/gender and was related to vocal expressiveness. Participants were divided into four groups: high compensation, low compensation, deep compensation, and unknown group. Females and those in high and deep compensation groups exhibited greater vocal expression, indicating the importance of speech modulation in functional abilities and camouflage. Parish-Morris et al. (2017) examined linguistic camouflage and found sex/gender differences in the production of "UM" and "UH" words. Males produced more "UH", and females produced more "UM" words. Females produced "UM" in approximately 75% of pauses, while males produced "UM" during an average of 56% of "UM/UH" pauses. It was found that the "UM" ratio and average "UH" production were associated with VABS socialization scores in the ASD group. These studies highlight the influence of sex/gender on camouflage behaviors in individuals with ASD (McQuaid et al., 2021; Hull et al., 2019; Corbett et al., 2022; Parish-Morris et al., 2017).

3.2. The impact of camouflaging on mental health

To examine the relationship between camouflaging behaviors, internalizing symptoms, and stress in individuals with and without ASD, a study was conducted by Bernardin et al. (2021) and they aimed to investigate whether higher levels of camouflage are associated with increased anxiety, depression, and stress. The analysis of the results showed a significant association between camouflaging and higher levels of anxiety and depression in individuals with and without ASD, with camouflage being a significant predictor of stress in females. The authors suggest that camouflaging may potentially contribute to poorer mental health outcomes, but it is worth considering that individuals with pre-existing mental health difficulties may be more inclined to engage in camouflage behaviors as a coping mechanism (Bernardin et al., 2021). However, Hull et al. (2019) did not observe statistically significant interactions between sex/gender and camouflaging, but camouflage positively predicted generalized anxiety, depression, and social anxiety even after controlling the level of ASD traits and age of participants. Higher levels of camouflage were associated with lower feelings of belonging, increased suicidality, reduced self-esteem, and less interpersonal closeness, all of which are closely linked to poorer mental health outcomes. Notably, the predictive effect of camouflage on depression was relatively small compared to its impact on generalized and social anxiety. Other authors also examined the contexts of camouflage and its association with mental health costs. Cage & Troxell-Whitman (2019) categorized the participants into three groups based on their camouflaging levels: low camouflage, “switchers” (individuals who alternated between camouflaging in certain contexts and not camouflaging in others), and high camouflage. The “switchers” exhibited anxiety and stress symptoms that may be equal and/or comparable to those who consistently engaged in high levels of camouflage. Consistently low camouflagers displayed significantly lower stress and anxiety symptoms than switchers. On the other hand, individuals with high levels of camouflage exhibited significantly higher anxiety symptoms than those with low levels of camouflage (Cage & Troxell-Whitman, 2019). Despite the mental health costs associated with camouflaging, individuals with ASD must also consider the repercussions of non-acceptance or abuse when choosing not to camouflage. Consequently, camouflaging can be seen as a protective strategy employed by individuals with ASD to safeguard themselves and manage an identity that is stigmatized by others. Perry et al. (2021) found a negative relationship between autism-related stigma and mental well-being, although stigma did not mediate the mental health benefits of camouflage. The impact of camouflage on well-being may vary among individuals (Bernardin et al., 2021; Hull et al., 2019; Cage & Troxell-Whitman, 2019; Perry et al., 2021).

3.3. Reasons and consequences of camouflaging

Drawing upon the “Disconnect Theory” by Ragins, 2008., Cage & Troxell-Whitman (2019) identified two distinct contexts for camouflaging: formal and interpersonal.

Female individuals displayed stronger support for conventional reasons (primarily focused on camouflaging in work or educational environments) compared to their male counterparts. There were no significant sex/gender differences in the endorsement of relational reasons, which encompassed camouflaging to establish social connections or fit in with others. Age of diagnosis interacted with camouflaging reasons, with adults endorsing conventional reasons more strongly regardless of sex/gender. Camouflaging was motivated by the desire to fit in, secure employment, establish social connections, and ensure personal safety (Hull et al., 2017). Participants viewed camouflaging as a means to assimilate and conceal undesirable aspects of their personality and involved adopting learned behaviors and creating an alternative identity. The majority of respondents reported feeling social pressures from the general population which conditioned individuals with ASD to modify their behaviors in order to be accepted by others and avoid stigmatization (Perry et al., 2021; Hull et al., 2017; Pearson & Rose, 2021). Moreover, a pragmatic aspect of the motivation for camouflaging was the desire to secure employment and attain qualifications, as respondents believed that these opportunities were less attainable when their ASD traits were more evident. The motivation to camouflage was also linked to establishing social connections and relationships. Due to the social challenges associated with ASD, many participants reported struggling to form friendships and romantic attachments, despite their strong desire to do so. Camouflaging was perceived as a means to overcome initial barriers to bonding and facilitate the development of future relationships. Perry et al. (2021) reported that individuals employing individualistic strategies had higher camouflaging levels, suggesting a link between individualistic strategies and increased camouflaging. Stigmatization of ASD contributes to the persistence of camouflaging and the main consequences of camouflaging are exhaustion, the imposition of high expectations, and negative self-perception (Hull et al., 2017; Perry et al., 2021).

4. DISCUSSION

This systematic literature review aims to explore the prevalence of camouflage, its impact on mental health, and the underlying reasons and consequences, with a specific focus on sex/gender differences. Within a five-year timeframe, 10 studies were reviewed, shedding light on camouflage as a potential explanation for sex/gender disparities in ASD. Camouflaging involves concealing behaviors and traits that deviate from societal norms, and it is more commonly observed among females with ASD. The studies attribute this higher prevalence to social expectations, cultural norms, and the male-focused conceptualization of ASD. Female sex/gender individuals with ASD may perceive higher societal expectations placed upon them compared to their male sex/gender counterparts, leading to increased camouflage of behaviors, interests, and speech in an attempt to gain acceptance and integration into society.

Also, linguistic camouflage was investigated, revealing that females use “UM” more frequently than “UH” during speech pauses, signaling greater social and communicative sophistication. However, these subtle sex/gender differences in language may contribute to the underdiagnosis or misdiagnosis of females with ASD, as diagnostic tools are more tailored to male characteristics (Parish-Morris et al., 2017). Regarding the relationship between camouflage and mental health, various studies have found associations with elevated anxiety and depression levels, but the role of sex/gender as a variable yielded mixed results. These divergent findings suggest that the relationship between camouflaging and mental health outcomes may be influenced by additional factors that interact with sex/gender. Further research is needed to understand the complex interplay between camouflage, sex/gender, and mental health. Camouflaging is associated with negative mental health outcomes, including burnout and diminished quality of life and it is also suggested that individuals with compromised mental health may be more inclined to employ camouflage as a coping strategy (Hull et al. 2019; Bernardin et al., 2021). Individuals who selectively camouflage experience similar levels of anxiety and depression symptoms as those who consistently camouflage (Cage & Troxell-Whitman, 2019). The high prevalence of camouflage among individuals with ASD indicates their investment of significant time and energy in understanding and assimilating into the neurotypical world, often at the expense of their mental well-being, and this suggests that discrimination and internalized stigma form the foundation for poor mental health outcomes (Cage & Troxell-Whitman, 2019; Botha & Frost, 2018). Camouflage can be also seen as a protective strategy employed by individuals with ASD to safeguard themselves from non-acceptance or mistreatment, but it comes with costs and may contribute to loneliness, isolation, and delayed or missed diagnoses. ASD-related stigma negatively affects mental well-being, emphasizing the importance of addressing the motivations behind camouflage. Motivations for camouflage often stem from conformity to social norms, with work or educational contexts being cited frequently by females. Camouflaging also relates to the desire for social connections, with individuals altering their identities to present a more socially acceptable persona. This can lead to guilt, loneliness, and a sense of deception in relationships (Hull et al., 2017). Camouflage entails adherence to “rules” regarding language, speech, and interaction. Examples of such rules included forcing and maintaining appropriate eye contact, adopting a more “you-oriented” approach in conversations, and spending time planning interactions to gain a sense of control, but also some individuals aimed to minimize their participation and swiftly exit interactions. All of this can result in exhaustion which was the most frequently reported consequence. Participants also report other negative outcomes of camouflaging such as delays in diagnosis, and inadequate support for ASD challenges. Some individuals felt that the relationships formed through camouflaging were built on deception which intensified their experiences of loneliness and isolation, as they believed that no one genuinely knew or understood them. This literature review underscores the need for further research to understand

the complex relationship between camouflage, sex/gender, and mental health outcomes. Considering intellectual functioning is crucial when examining camouflage in individuals with ASD. The studies consistently showed that participants had sufficient cognitive abilities, including verbal skills, to independently complete surveys, questionnaires, and tests. They demonstrated awareness of ASD characteristics and the ability to articulate their emotions. Thus, higher intellectual functioning appears to be a prerequisite for engaging in camouflage. This raises the question of whether camouflage is primarily observed in individuals with high-functioning ASD and if the level of intellectual functioning affects the likelihood of camouflaging.

4.1 Limitation

One limitation of this review is the limited availability of information regarding IQ measures in the majority of the included studies. Another limitation pertains to the demographic heterogeneity observed within the study samples. Considering that numerous variables, such as participants' diverse backgrounds, varying times of ASD diagnosis, socio-economic status, ethnicity, religion, and cultural characteristics can potentially influence camouflage. The inclusion of more homogeneous samples would enhance the validity of the findings. Furthermore, although camouflaging was operationalized similarly across the studies, the assessment of camouflage itself utilized different instruments which may have contributed to divergent outcomes and conclusions. Future research endeavors should strive for consistency by employing standardized instruments and methodologies to evaluate camouflage, thereby establishing more concrete and reliable results. It is important to acknowledge the limited number of studies encompassed in this review. Given the expanding literature on camouflage and its increasing use to elucidate the "female phenotype" of ASD, we opted to focus on a narrower time frame and recent research. Nonetheless, future investigations should encompass a broader range of studies to comprehensively explore the relationship between camouflage and intellectual functioning. Additionally, it may be valuable to investigate whether there exists a threshold level of intellectual functioning beyond which individuals with ASD are more inclined to engage in camouflage or possess the ability to effectively camouflage.

5. CONCLUSION

By reviewing the relevant literature, it was found that camouflaging is present in both male and female sex/gender, but it is more prevalent in individuals of female sex/gender. This higher propensity for camouflaging in females can be attributed to societal norms and pressures they face, including stigmatization for displaying ASD characteristics that are perceived as masculine. Camouflaging, while serving as a coping mechanism, significantly impacts mental well-being. It is described as ex-

hausting and emotionally taxing, leading to mental health challenges such as low self-esteem, stress, anxiety, and depression. Camouflaging may contribute to the higher prevalence of internalizing disorders and suicidality in females with ASD, as well as the delayed diagnosis compared to males. Studies consistently show lower levels of camouflaging in typically developing individuals compared to those with ASD.

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