Commentary: 'Camouflaging' in Autistic People – Reflection on Fombonne (2020)

Meng-Chuan Lai [1,2,3,4,5,*], Laura Hull [6], William Mandy [6], Bhismadev Chakrabarti [4,7,8,9], Christine Wu Nordahl [10], Michael V. Lombardo [4,11], Stephanie H. Ameis [1,2,3], Peter Szatmari [1,2,3], Simon Baron-Cohen [4], Francesca Happé [12], Lucy Anne Livingston [12,13,*]

[1] The Margaret and Wallace McCain Centre for Child, Youth & Family Mental Health, Azrieli Adult Neurodevelopmental Centre, and Campbell Family Mental Health Research Institute, Centre for Addiction and Mental Health, Toronto, ON, Canada
[2] Department of Psychiatry, The Hospital for Sick Children, Toronto, ON, Canada
[3] Department of Psychiatry, Faculty of Medicine, University of Toronto, Toronto, ON, Canada
[4] Autism Research Centre, Department of Psychiatry, University of Cambridge, Cambridge, UK
[5] Department of Psychiatry, National Taiwan University Hospital and College of Medicine, Taipei, Taiwan
[6] Research Department of Clinical, Educational and Health Psychology, University College London, London, UK
[7] Centre for Autism, School of Psychology & Clinical Language Sciences, University of Reading, Reading, Reading, UK
[8] India Autism Center, Kolkata, India
[9] Department of Psychology, Ashoka University, Sonipat, India
[10] The MIND Institute and Department of Psychiatry and Behavioral Sciences, University of California Davis, Sacramento, CA, USA
[11] Laboratory for Autism and Neurodevelopmental Disorders, Center for Neuroscience and Cognitive Systems @UniTn, Istituto Italiano di Tecnologia, Rovereto, Italy
[12] Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK
[13] Wales Autism Research Centre, School of Psychology, Cardiff University, Cardiff, UK

* Equal contribution, co-corresponding authors

Correspondence:

Meng-Chuan Lai, Centre for Addiction and Mental Health, 80 Workman Way, Toronto, ON M6J 1H4, Canada; Email: mengchuan.lai@utoronto.ca

Lucy Anne Livingston, School of Psychology, Cardiff University, 70 Park Place, CF10 3AT, Cardiff, UK; Email: livingstonl@cardiff.ac.uk

Abstract

Fombonne's (2020) editorial is a thought-provoking appraisal of the literature on 'camouflaging', whereby some autistic people mask or compensate for their autistic characteristics as an attempt to fit in and to cope with disabilities under neurotypical social norms. Fombonne (2020) highlights three issues of contention: (1) construct validity and measurement of camouflaging, (2) camouflaging as a reason for late autism diagnosis in adolescence/adulthood, and (3) camouflaging as a feature of the 'female autism phenotype'. Here, we argue that (1) establishing construct validity and measurement of different aspects of camouflaging is warranted; (2) subjective experiences are important for the differential diagnosis of autism in adolescence/adulthood; and (3) camouflaging is not necessarily a feature of autism in female individuals—nevertheless, taking into account sex and gender influences in development is crucial to understand behavioural manifestations of autism. Future research and clinical directions should involve clarification of associated constructs and measurements, demography, mechanisms, impact (including harms and benefits), and tailored support.

Fombonne's (2020) editorial critically appraises the theory and empirical research on so-called 'camouflaging' in autism. It provides a timely critique of (1) the construct validity and measurement of camouflaging, (2) late diagnosis of 'camouflaged' autism, and (3) camouflaging as a feature of the so-called 'female autism phenotype'. We agree with many of the points raised, for example that (1) camouflaging is an example of coping strategies used by some autistic people to adapt socially—it is neither a core feature of autism nor specific to autism, nor is it the defining characteristic of an autism subtype; (2) regardless of camouflaging, autism diagnosis in adolescence/adulthood should involve detailed assessment of other psychiatric conditions and still requires core autism features to be present in early development; and (3) greater sensitivity to autistic behavioural examples in females (and other historically neglected groups) is required. We welcome this critical analysis and the opportunity to further the constructive discussion.

Constructs related to and Measurement of 'Camouflaging'

Fombonne (2020) rightly points out the polysemy of the term 'camouflaging' in current research, and the challenges related to the under-established construct validity, measurement ambiguity, and conceptual overlap with other constructs (see Supplement-Table 1). The term—first coined in autobiographical and clinical writings—refers to the phenomenon that some individuals consciously or unconsciously seek to hide their autistic presentation by masking and by employing compensatory strategies to navigate the social world. Stimulated by these observations, we and others conducted qualitative research to conceptualize the construct, followed by quantitative efforts to operationalize and measure the phenomenon in relation to other constructs (e.g., mental health, cognitive function), using 'camouflaging' as a place-holder to guide further scientific conversations and inquiries (before a better term can be co-identified with the autism communities and stakeholders). There are potentially converging but variable definitions and measures. These span from subjective reflections on one's efforts to mask and compensate (e.g., CAT-Q (Hull et al., 2019) or Compensation Checklist (Livingston, Shah, Milner, & Happé, 2020)), behavioural/linguistic features (e.g., fine-grained analysis of behaviour/language (Parish-Morris et al., 2017)), discrepancies between internal autistic characteristics and observable behaviour (e.g., internal-external discrepancy (Lai et al., 2017; Livingston, Colvert, Social Relationships Study, Bolton, & Happé, 2019)), or real-world social

interaction (e.g., playground behaviour (Dean, Harwood, & Kasari, 2017)). This research is still in its infancy but there is rigorous ongoing work to identify the relations between these operationalizations and measurements. Addressing the unsettled construct validity is a priority—via iterative refinement of the construct and its measurement to identify overlapping factor structures with various current measures and associations with established constructs (Supplement-Table 1).

Although this research stems from, and resonates with, many autistic people's lived experiences, there is little empirical evidence to suggest it is specific to autistic people, and it is certainly not a core diagnostic feature of autism (Hull et al., 2020). We have not defined nor conceptualized "*'Camouflaged Autism' as a new ASD subtype*" and agree with Fombonne (2020) that camouflaging is "*one of several available coping and adaptive strategies that autistic individuals may employ to adjust to their social environment*" (p.737). For this very reason, studying camouflaging offers a uniquely valuable socio-ecological (instead of person-focused) approach to understand strategies used by autistic and other marginalized individuals to cope in mainstream social contexts, considering their respective strengths and constraints. This informs new opportunities for better socio-ecological support.

We consider the internal-external discrepancy approach, which aims to quantify the discrepancy between the internal ('true') state and observable autistic behaviours, a particularly valuable (although not the sole) measurement approach. We agree with Fombonne (2020) that self-report (e.g., the Autism-Spectrum Quotient) does not define 'true autism' (although we do argue for the value of subjective experiences in improving the understanding of autism; see next section). Importantly, measurement of cognitive abilities proposed to underpin social behaviour is particularly useful in the discrepancy conceptualization. This cognition-behaviour discrepancy approach was used by both Lai et al. (2017) and Livingston et al. (2019) but not acknowledged by Fombonne (2020). On the basis of cognitive theory, unobservable cognition is a meaningful predictor of behaviour, and disparities between the two using robust cognitive (e.g., mentalizing tasks) and behavioural observation tools (e.g., Autism Diagnostic Observation Schedule, ADOS) give us theoretically-grounded proxy measurements of a phenomenon for which we do not yet have a reliable direct measure (e.g., high camouflaging is approximated by few social-communication symptoms on the ADOS yet poor mentalizing performance). The same discrepancy approach has been useful in understanding other neurodevelopmental conditions;

e.g., individuals with dyslexia who demonstrate typical reading speeds (i.e., behaviour) yet continue to show difficulties on phonological processing tasks (i.e., cognition). Fombonne (2020) also argues that "*a linear combination of two scores measuring the same construct should result in another index of the same construct*" (p.735). Yet, the essence of the discrepancy approach is to quantify the mismatch between *different levels* of autism presentations (e.g., cognition vs. behaviour), hence reflecting fine-grained phenotypes rather than simply another index of 'autism severity'. The approach is also advantageous as it does not rely exclusively on self-report, making it more feasible for diverse autism subgroups (e.g., in cognitive ability, insight, age). On a final note, there are robust alternatives to discrepancy/difference scores within social psychology (e.g., response surface analysis) that can measure (mis)matching and should be explored further.

Fombonne (2020) also draws attention to a critical issue with measurement in psychiatry: the absence of ground truth on 'true' autism (and most psychiatric diagnoses) based on non-behavioural characteristics (e.g., biomarkers). In the absence of ground truth, the validity of any discrepancy measure (which relies on a comparison of 'how X appears' vs. 'how X truly is') is inherently limited. One way to overcome this is using a network-based approach (as opposed to measuring latent variables as in structural equation modelling), in which neuropsychiatric conditions are assumed to arise from the causal interplay between symptoms/characteristics through myriad biological, psychological and societal mechanisms, bypassing the need for ground truth measures (Borsboom, Cramer, & Kalis, 2019). 'Symptom networks' graphically map out the inter-relationships between and clustering of multidimensional measures, with highly associated nodes topologically closer to one another. In this framework, various measures of observable autistic behaviour and estimations of autistic features (e.g., social-cognitive performance) in a network model can reflect different scenarios of a person's state, including mental health. A scenario of unequivocal autism is shown by nodes representing different levels of autism features forming a cluster/module; a scenario of camouflaging in autism is indicated by specific behavioural nodes departing from this cluster/module, with the possible appearing of other symptom clusters/modules representing mental health sequelae.

Late Autism Diagnosis in the Presence of 'Camouflaging'

We strongly agree with Fombonne (2020) that it is pivotal to differentiate a late diagnosis of autism (e.g., in adolescence/adulthood) from other psychiatric conditions. Diagnosticians should agree: (1) that early atypicality in core autistic features must be ascertained by multiple sources for a late autism diagnosis to be made; (2) that differential diagnosis is core to a late diagnosis and must be based on detailed evaluation of childhood and adulthood psychopathology, their developmental trajectories and possible equifinality; and (3) diagnosis is not simply based on scores on specific instruments, e.g., the ADOS (Lai & Baron-Cohen, 2015). Notwithstanding this, qualitative research with individuals who received a first autism diagnosis in adulthood has highlighted the need to consider the contribution of camouflaging to varied timing of autism diagnosis (Bargiela, Steward, & Mandy, 2016; Livingston, Shah, & Happé, 2019).

The existence of camouflaging challenges the long-held conception of autism as a predominantly behaviourally-diagnosed phenomenon. We consider this an opportunity to gain a deeper understanding of autism and to refine and improve how it can be captured. As a condition first defined in children, it is understandable that the diagnostic process heavily relies on 'objective' behavioural observation and history-taking from informants. Subjective experiences have been relatively under-weighted in the diagnosis of neurodevelopmental conditions, despite the fact that subjective report is an important general factor for psychiatric diagnoses (e.g., in depressive disorders, it is not adequate to assess symptoms and related distress/impairment via behavioural observation alone). More appreciation for subjective experiences (in addition to observed behaviour and informant-reported developmental history) in autism and psychiatric differential diagnosis is important as it gives clinicians insight into the nature of the longstanding distress and functional impairment in neurotypical contexts. For example, a person may perform well during behavioural observation (e.g., make good eye contact and affect orientation, reciprocate well in conversation and show social overtures) but further probing into self-report of how they manage in social situations may indicate the intense practice and effort across development that has gone into superficially expressing those social skills. This is highlighted by the value of the discrepancy approach. Such intense practice and effort may also lead to mental health challenges, contributing to psychiatric differential diagnosis. Clinically, we regularly assess coping experiences in social situations in autistic adolescents/adults who were diagnosed early in life. The same kind of experiences, developmental trajectories, and adaptive and mental health outcomes should also be included when first diagnosing autism in

adolescence/adulthood to better contextualize functional difficulties. Overall, we argue that understanding camouflaging actually facilitates better appraisal of developmental history and current behavioural presentation and improves diagnosis and differential diagnosis of autism in adolescence/adulthood.

A related concern raised by Fombonne (2020) regards reduction of the construct of autism to a "*simplified trait or (neuro)psychological characteristic...almost akin to a personality style*" (p.736). We agree that such simplification is problematic, but believe this issue is not simply a result of the de-stigmatization of autism. It also reflects fundamental, unsettled nosological challenges of autism regarding (1) dimensional vs. categorical views, or a mixture of both; and (2) relationships between childhood-onset neurodevelopmental conditions and adulthood personality (and personality disorders). Characteristics of autism as a presentation of 'childhood personality' (which may persist into adulthood) have been conceptualized by pioneer researchers such as Hans Asperger and Sula Wolff, yet how such a conceptualization in childhood is longitudinally linked to adulthood personality and personality disorders as defined nowadays remains under-investigated. This is further compounded by the overlap of diagnostic descriptions of personality disorders and autism characteristics likely shown in adulthood, i.e., clusters A (especially schizoid) and C (especially obsessive-compulsive) in DSM-5 or Detachment and Anankastia traits/patterns in ICD-11, despite operationally imposed exclusion criteria (e.g., 'does not occur exclusively' or 'are not better explained by' existing autism or other mental/developmental diagnosis) (Lai & Baron-Cohen, 2015). More extensive nosological discussions on adult-diagnosed neurodevelopmental disorders vs. personality difficulties/disorders is needed to guide future practice. We argue that ruling out childhood-onset neurodevelopmental conditions including autism is essential before personality difficulties/disorders diagnoses are made, but they may not need to be mutually exclusive.

'Camouflaging' and the 'Female Autism Phenotype'

We agree with Fombonne (2020) that the concept of a 'female autism phenotype' should not be taken as implying a discrete subtype of autism, but should be viewed as a way of highlighting the importance of recognizing sex and gender (and other socio-cultural) influences on the presentation of autism across the lifespan. Beyond accounting for confounding factors

that distribute unevenly across sexes/genders, recent research emphasizes recognizing and measuring behavioural exemplars of autistic characteristics that may be modulated by sex-related biological factors and gender-related sociocultural contexts in development, which reflect the defining broad constructs (i.e. social-communication and RRBI features) independent of sex/gender (Lai & Szatmari, 2020). Camouflaging can be part of such phenotypic presentation, but should not be viewed as female-specific, nor a sufficient or necessary component of the 'female autism phenotype'; autistic boys/men and non-autistic individuals engage in camouflaging too. The adaptive and mental health impacts of camouflaging that are key to ongoing care for autistic individuals and differential diagnosis in late diagnostic assessment, however, may be closely associated with sex and gender factors. In agreement with Fombonne (2020), we do not argue for creating "*gender-specific diagnostic criteria, algorithms, norms, and cut-offs*" (p.737), but emphasize that "*to improve the recognition of autism across sexes and genders, the nuances across nosology, behavioural presentation, developmental change, and contextual biases should all be appreciated*" (p.118; Lai and Szatmari (2020)).

Research and Clinical Directions

First, determining the extent of camouflaging amongst the autistic population is paramount. As Fombonne (2020) highlights, it is unknown how many undiagnosed autistic adults exist. Yet, answering this question is not trivial as estimations of those who are genuinely autistic but undiagnosed change as our diagnostic conceptualization of autism changes. Improved conceptualization and measurement of camouflaging will help us to come closer to the answer. Such measures could be incorporated into population-based, longitudinal studies of autism and other clinical populations to enable a thorough investigation, overcoming the various biases associated with self-selected, largely female or clinical samples. Using such studies, it will be possible to determine how camouflaging relates to a clinical diagnosis of autism (versus other psychiatric diagnoses), how prevalent camouflaging is amongst the full spectrum of autistic individuals (including those with lower cognitive abilities) and assess developmental trajectories and sex and gender influences. Such studies will pose intriguing questions about the genuine population prevalence of autism, its true sex/gender ratio, and heritability.

Second, with more work to establish construct validity, we need to determine which components/aspects of camouflaging are specific to autism and how the quality/quantity of strategies distribute across autistic and non-autistic individuals who experience social challenges/distress (e.g., social anxiety). Camouflaging components may lie on continua. What remains unclear is what strategies are distinct in autism considering the cognitive strengths and constraints, particularly when their frequency/intensity reaches a threshold. Genetically sensitive population-based studies will be informative for unpacking this as they enable exploration of whether the genes/environments underlying camouflaging in the general population are comparable to those underlying camouflaging in diagnosed autistic individuals.

Third, there is much to be learned about mechanisms. Camouflaging is not a core feature of autism but is evident amongst certain autistic individuals. There are autistic people who (1) want to camouflage and successfully employ them; (2) want to camouflage but are unable to employ them, potentially due to cognitive difficulties; (3) do not want to camouflage; and (4) are oblivious to the notion of camouflaging. We currently have very limited understanding of what drives the differences. With improved measurement of camouflaging, we can further investigate its cognitive (controlled and automatic) and other psychological and social drivers and modulators (e.g., personality, social motivation, person-environment fit). Similarly, the neurobiological underpinnings of camouflaging in autism are yet to be established. We have identified associations with medial prefrontal cortex activation during self-referential cognition (Lai et al., 2019) and neural excitation-inhibition ratio (Trakoshis et al., 2020). These findings are initial starting points and require replication and extension to allow for more precise mechanistic understanding of the interactive pathways underlying camouflaging.

Finally, the field is only just beginning to understand the impact of camouflaging on autistic people and the implications for society. We and others have shown that camouflaging is generally associated with poorer mental wellbeing for autistic people, although longitudinal research is required to establish any causal relationship. Heavy use of camouflaging may have a cost for individuals' mental health and sense of self, as well as access to support (e.g., in the workplace; Livingston, Shah, et al. (2019)), and may perpetuate the stigma surrounding autism (Mandy, 2019). This raises important questions about the degree to which camouflaging should be encouraged or taught to autistic people. Fombonne (2020) highlights, as we have elsewhere (Livingston & Happé, 2017; Mandy, 2019), that current autism interventions (e.g., social skills

training) involve teaching autistic people strategies to compensate for, or mask, autistic characteristics. We need to consider whether such interventions may be potentially problematic for some autistic people, and there may be lessons to be learnt from autistic individuals who are resistant to societal pressure to 'act neurotypical' and who thus experience better mental health. Nonetheless, social coping strategies can be adaptive, empowering and support autistic people in leading independent and fulfilling lives. As a field we need to critically reflect on how and when in development it is beneficial or detrimental for autistic people to camouflage, and how we can change societies to be more autism-friendly and lessen this burden on autistic people.

Acknowledgements

The conceptualization of this commentary has greatly benefited from the vibrant discussion threads on social media stimulated by Fombonne (2020), such as https://twitter.com/ERubenstein90/status/1283048443980677126, https://twitter.com/milton_damian/status/1284005617980538880, https://twitter.com/Noahsasson/status/1298286732853555203, etc.

M-CL is supported by the Academic Scholars Award from the Department of Psychiatry, University of Toronto, the Ontario Brain Institute via the Province of Ontario Neurodevelopmental Disorders (POND) Network (IDS-I l-02), the Canadian Institutes of Health Research (CIHR) (PJT 159578 and a CIHR Sex and Gender Science Chair, GSB 171373), the Innovation Fund of the Alternative Funding Plan for the Academic Health Sciences Centres of Ontario (CAM-18-004, CAM-20-004), and the Slaight Family Child and Youth Mental Health Innovation Fund via the CAMH Foundation. WM is supported by the UK National Institute of Health Research, UK Medical Research Council, European Research Council, Health Education England and Autistica. BC is supported by the UK Medical Research Council, Leverhulme Trust, British Council, and the European Research Council. CWN is supported by the National Institutes of Mental Health (NIMH) (R01MH104438), MIND Institute Intellectual and Developmental Disabilities Research Center (U54HD079125) and an Autism Center of Excellence grant awarded by the National Institute of Child Health and Development (NICHD) (P50HD093079). MVL is supported by funding from the European Research Council (ERC) under the European

Union's Horizon 2020 research and innovation programme under grant agreement No 755816. SHA currently receives funding from the National Institute of Mental Health (R01MH114879), Canadian Institutes of Health Research, the Academic Scholars Award from the Department of Psychiatry, University of Toronto, and CAMH Foundation. PS is supported by the Patsy and Jamie Anderson Chair in Child and Youth Mental Health, University of Toronto, Hospital for Sick Children and Centre for Addiction and Mental Health, Toronto, Canada. SBC is funded by the Autism Research Trust, UK Medical Research Council, the Wellcome Trust, the Templeton World Charitable Foundation, the National Institute of Health Research (NIHR) Applied Research Collaboration East of England (ARC EoE) programme and the NIHR Biomedical Research Centre in Cambridge; SBC also received funding from the Innovative Medicines Initiative 2 Joint Undertaking (JU) under grant agreement No 777394. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and EFPIA and AUTISM SPEAKS, Autistica, SFARI. FH is part funded by the NIHR Biomedical Research Centre at South London and Maudsley NHS Foundation Trust and King’s College London. The views expressed are those of the authors, and not necessarily those of the NIHR, NHS or Department of Health and Social Care.

References

Bargiela, S., Steward, R., & Mandy, W. (2016). The Experiences of Late-diagnosed Women with Autism Spectrum Conditions: An Investigation of the Female Autism Phenotype. *J Autism Dev Disord, 46*(10), 3281-3294.

Borsboom, D., Cramer, A., & Kalis, A. (2019). Brain disorders? Not really... Why network structures block reductionism in psychopathology research. *Behav Brain Sci, 42*(E2), 1-54.

Dean, M., Harwood, R., & Kasari, C. (2017). The art of camouflage: Gender differences in the social behaviors of girls and boys with autism spectrum disorder. *Autism, 21*(6), 678-689.

Fombonne, E. (2020). Camouflage and autism. *J Child Psychol Psychiatry, 61*(7), 735-738.

Hull, L., Lai, M. C., Baron-Cohen, S., Allison, C., Smith, P., Petrides, K. V., et al. (2020). Gender differences in self-reported camouflaging in autistic and non-autistic adults. *Autism, 24*(2), 352-363.

Hull, L., Mandy, W., Lai, M. C., Baron-Cohen, S., Allison, C., Smith, P., et al. (2019). Development and Validation of the Camouflaging Autistic Traits Questionnaire (CAT-Q). *J Autism Dev Disord, 49*(3), 819-833.

Lai, M. C., & Baron-Cohen, S. (2015). Identifying the lost generation of adults with autism spectrum conditions. *Lancet Psychiatry, 2*(11), 1013-1027.

Lai, M. C., Lombardo, M. V., Chakrabarti, B., Ruigrok, A. N., Bullmore, E. T., Suckling, J., et al. (2019). Neural self-representation in autistic women and association with 'compensatory camouflaging'. *Autism, 23*(5), 1210-1223.

Lai, M. C., Lombardo, M. V., Ruigrok, A. N., Chakrabarti, B., Auyeung, B., Szatmari, P., et al. (2017). Quantifying and exploring camouflaging in men and women with autism. *Autism, 21*(6), 690-702.

Lai, M. C., & Szatmari, P. (2020). Sex and gender impacts on the behavioural presentation and recognition of autism. *Curr Opin Psychiatry, 33*(2), 117-123.

Livingston, L. A., Colvert, E., Social Relationships Study, T., Bolton, P., & Happé, F. (2019). Good social skills despite poor theory of mind: exploring compensation in autism spectrum disorder. *J Child Psychol Psychiatry, 60*(1), 102-110.

Livingston, L. A., & Happé, F. (2017). Conceptualising compensation in neurodevelopmental disorders: Reflections from autism spectrum disorder. *Neurosci Biobehav Rev, 80*, 729-742.

Livingston, L. A., Shah, P., & Happé, F. (2019). Compensatory strategies below the behavioural surface in autism: a qualitative study. *Lancet Psychiatry, 6*(9), 766-777.

Livingston, L. A., Shah, P., Milner, V., & Happé, F. (2020). Quantifying compensatory strategies in adults with and without diagnosed autism. *Mol Autism, 11*(1), 15.

Mandy, W. (2019). Social camouflaging in autism: Is it time to lose the mask? *Autism, 23*(8), 1879-1881.

Parish-Morris, J., Liberman, M. Y., Cieri, C., Herrington, J. D., Yerys, B. E., Bateman, L., et al. (2017). Linguistic camouflage in girls with autism spectrum disorder. *Mol Autism, 8*, 48.

Trakoshis, S., Martinez-Canada, P., Rocchi, F., Canella, C., You, W., Chakrabarti, B., et al. (2020). Intrinsic excitation-inhibition imbalance affects medial prefrontal cortex differently in autistic men versus women. *Elife, 9*, e55684.