Stigma Experience and Concealment Exacerbating Depression in Autistic Adults

Mediation analysis on the relationship between autistic trait concealment, autistic community connectedness, stigma experience and depression among autistic adults

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Abstract

Autistic people experience stigma because of their lack of ability to engage in social interactions. In attempts to manage stigma and protect mental health, autistic people conceal their autistic traits in daily interactions and seek support from the autistic community. Based on a sample of 409 autistic adults, this study use mediation analysis to uncover the relationship between autistic trait concealment, autistic community connectedness, stigma experience and mental health (depression) among autistic people. We found a direct positive effect of concealment (direct effect = 0.259) and stigma experience (direct effect = 0.535) on depression. Further, concealment and stigma experience appears to have a reciprocal relationship where concealment mediates the effect of stigma experience on mental health (indirect effect = 0.297), and stigma experience mediates the effect of concealment (indirect effect = 0.037). Autistic community connectedness does not mediate the effects of concealment or stigma experience on mental health.

Introduction

Autism is a neuro-cognitive condition that affects social interaction, communication and related behaviours (Botha et al., 2020). While autistic people think of their condition as a value-neutral trait, negative stereotypes perpetuate stigmatization of autism as a mental disease or disorder. Stigma from non-autistic communities and the autistic community's response to it create complex consequences on mental health among autistic people. This study aims to explore the dynamic between various factors that influence mental health outcomes, including autistic trait concealment, autistic community connectedness and stigma experience.

Autistic trait concealment is a commonly-used strategy to manage stigma (Botha et al., 2020). Namely, autistic people hide their autistic identity from non-autistic people in attempt to avoid unpleasant social interactions. However, research has shown that concealment has a negative effect on mental health (Botha et al., 2020; Jackson & Mohr, 2016). On the other hand, stigma pushes autistic people to seek support from ingroup members and enhances autistic community connectedness (Botha et al., 2022). The autistic community provides a sense of belonging and connectedness that is beneficial to mental health by providing confidence, companionship, and positive emotional experiences (Botha et al., 2022).

Integrating these factors, the objective of this study is to **determine how stigma experience, autistic trait concealment and autistic community connectedness interact to influence mental health** among autistic adults We employ mediation analysis to uncover the dynamic among the variables of interest. Our collaborator hypothesized that (i) concealment directly leads to more depression and (ii) stigma experience and connectedness mediate the effect of concealment on depression. Considering experiencing stigma precedes concealment and connectedness in time, we then investigate the significance of concealment as a *mediator* between stigma experience and depression, instead of as the explanatory variable. We hypothesized that (i) stigma experience directly leads to more depression and (ii) its effect is mediated by concealment and connectedness. The following sections provide details on the statistical methods, empirical results and a discussion of our findings and limitations.

Method

Data Collection and Summary

This study relies on survey data from a volunteer-based sample of 409 autistic adults aged between 18 and 67. Participants filled out a questionnaire consisting of a demographic survey and 7 scales measuring concealment, connectedness, autism-specific stigma experience, depression (mental health) and relevant variables. Participants rated their agreement with each item in each

scale by selecting one of the pre-determined options. Each option is assigned a score, allowing us to measure the variables by a participant's total score on the corresponding scale. The scales measuring the four variables of interest are listed below:

Camouflaging Autistic Traits Questionnaire (CATQ) measures autistic traits concealment. The CATQ items measure specific concealment behaviours such as mimicking non-autistic people's body language when interacting with them, avoiding social interactions, and practicing body language to appear "natural" to others. Higher total scores on the CATQ scale indicate more concealment behaviours.

Center for Epidemiological Studies Depression Scale (CESD) measures depressive symptoms in terms of behaviour (ex. "I talked less than usual"), cognition (ex. "I thought my life had been a failure") and emotion or feelings (ex. "I felt sad"). Higher total scores on the CESD scale indicate more depressive symptoms and worse mental health.

Measure of Autistic Community Connectedness (ACC) measures connectedness from three aspects: *belongingness* involves a sense of similarity and "tribe" among the autistic community; *social connectedness* refers to the personal relationships formed with a specific autistic person and is facilitated by accessibility to online autistic forums; and *political connectedness* is the engagement in advocating for political and social equality for the autistic community (Botha et al., 2022). Higher total scores indicate a stronger connection to the autistic community.

Stigma Experience Measure (SE) measures experience with stigma, discrimination and unfair treatment because of the autistic identity. Higher scores reflect more stigma experience.

CATQ, ACC and SE items are scored on a Likert scale ranging from strongly disagree (0) to strongly agree (4). CESD items are scored based on a scale ranging from "rarely on none of the time" (0) to "Most or all of the time" (3). Details on the sample and the scores are given in **Appendix 1**.

Hypotheses

This study first addresses our collaborator's hypotheses:

- **H1**: Autistic trait concealment has a direct (and overall) positive effect on depressive symptoms.
- **H2**: Autistic trait concealment leads to more depressive symptoms indirectly through autistic community connectedness (**H2a**) and stigma experience (**H2b**).

We then revised **H1** and **H2** by considering stigma experience as the independent variable and concealment as a mediator, taking into account the following considerations. Firstly, it is more logical to assume that experiencing stigma precedes autistic trait concealment since

concealment is a response to stigma. Therefore, we hypothesize that stigma experience leads to concealment. Secondly, previous studies suggest that experiencing stigma pushes individuals towards the autistic community (Botha et al., 2022), and we assume that stigma experience precedes connectedness. Thirdly, no research to our knowledge suggested a temporal difference between concealment and connectedness. We thus treat them as two distinct but correlated consequences of experiencing stigma, which could occur simultaneously. Methodologically, mediation analysis provides better inference when the explanatory variable, mediators, and response follow a temporal order (Lemardelet & Caron, 2022). Thus, our revised hypotheses are:

- **H3**: Stigma experience directly has a direct (and overall) positive effect on depressive symptoms.
- **H4**: Stigma experience leads to more depressive symptoms indirectly through autistic community connectedness (**H4a**) and autistic trait concealment (**H4b**).

Statistical Analysis

We used parallel mediation analysis to address the hypotheses. Parallel mediation models account for the direct effect of an independent variable (X) on the dependent variable (Y) and its indirect effect through one or more mediator(s), as shown in Figure 1. The direct effect is the regression coefficient obtained from regressing Y on X, controlling for all mediators. The indirect effect through a mediator, M, is obtained by first regressing M on X, then regressing Y on M controlling for X and all other mediators. Hence, parallel mediation models allow us to explore the direct and indirect relationships between concealment, stigma experience, autistic community connectedness and depression.

Model 1 addressed **H1** and **H2** by treating concealment as the independent variable and depression as the dependent variable. Model 1 included connectedness and stigma experience as two correlated but *in*consecutive mediators. With Model 1, autistic trait concealment influences depression through three pathways: (i) direct effect (c'), (ii) indirect effect through connectedness when controlled for stigma experience (a_1b_1), and (iii) indirect effect through stigma experience controlling for connectedness (a_2b_2). The total effect of autistic trait concealment (c) is the sum of direct and indirect effects.

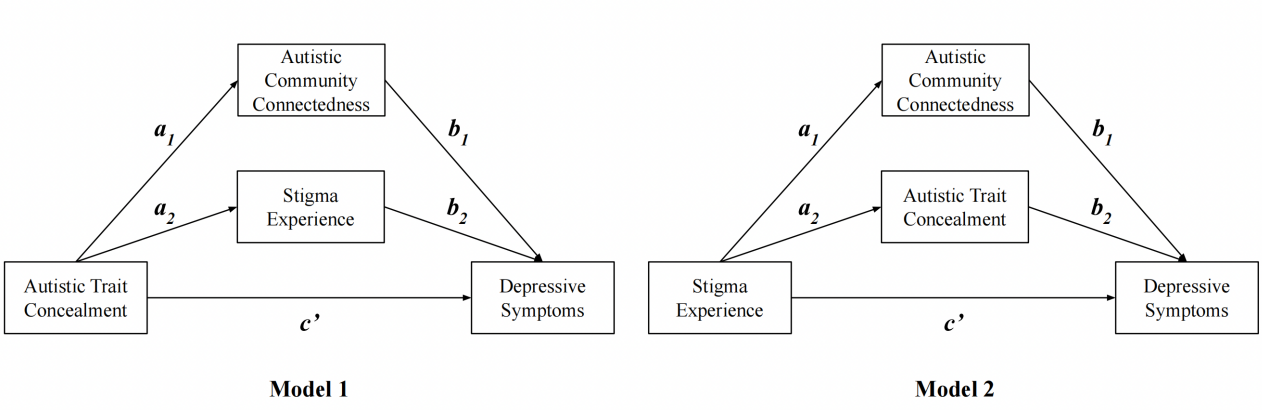

Figure 1: Parallel mediation models. The arrows indicate the direction of an effect. a_1 and a_2 are the effects of concealment (Model 1) and stigma experience (Model 2) on each mediator. b_1 and b_2 are the regression coefficients obtained by regressing depression on each mediator. The parameter c' is the direct effect of concealment (Model 1) or stigma experience (Model 2) on depression. The indirect effects are calculated as a_1b_1 and a_2b_2, and the total effect of the independent variable is $c = c' + a_1b_1 + a_2b_2$.

We then fit another parallel mediation model (Model 2) to assess hypotheses **H3** and **H4**. Model 2 treated stigma experience as the independent variable instead of a mediator. The two mediators are concealment and connectedness, assuming they are correlated but inconsecutive in time. The dependent variable remains depression.

By convention, we chose the 5% level of significance such that a p-value greater than 0.05 or a 95% confidence interval including 0 indicates an insignificant effect. We used bootstrapping technique to assess the statistical significance of the indirect effect. Bootstrapping is necessary for the calculation of confidence intervals as we are uncertain whether the indirect effects follow a normal distribution.

We verified mediation assumptions to check model adequacy. Mediation assumptions include linearity among the predictor, mediators and the response, normality and constant variance in model residuals, and independence. There are no major violations of the mediation assumptions.

Results

Autistic Trait Concealment as Predictor of Depressive Symptoms

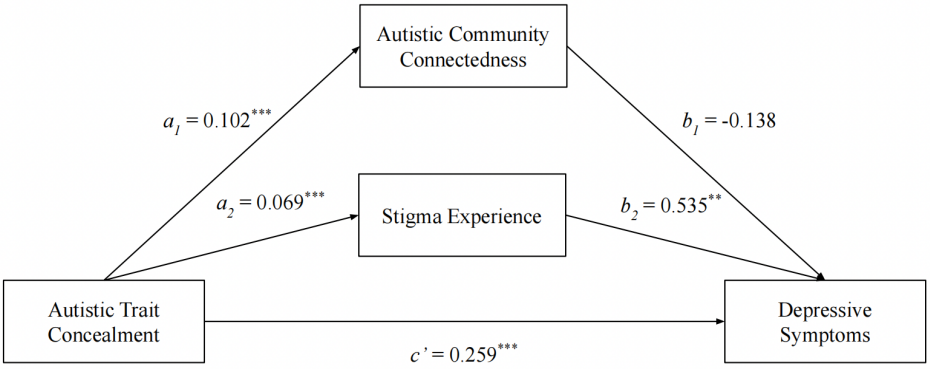

Figure 2: Model 1 mediation analysis results. Estimated effects (a_i, b_i, c') are shown on the plot. Indirect effect through connectedness is $a_1 b_1 = -0.014$, and the indirect effect through stigma experience is $a_2 b_2 = 0.037$. Concealment's total effect on depression is $c' + a_1 b_1 + a_2 b_2 = 0.282$ (Note that p-values are not available from bootstrapping). The asterisks ***, ** and * indicates statistical significance at 0.001, 0.01 and 0.05 level of significance, respectively.

Model 1 targets autistic trait concealment as an independent variable influencing depression (estimated effects are shown in Figure 2, full results shown in Table 1). Consistent with previous studies, we found a significant direct effect of autistic trait concealment on depression ($c' = 0.259,\ p < 0.05$). Controlling for connectedness and stigma experience, scoring 10 points higher on the CATQ scale (i.e. demonstrating more concealing behaviours) is associated with an average increase of 2 to 3 points on the CES-D scale (i.e. more depressive symptoms).

As we expected, stigma experience mediates the effect of concealment on depression ($a_2 b_2 = 0.037,\ p < 0.05$). Demonstrating more concealment is associated with more stigma experience ($a_2 = 0.069,\ p < 0.05$). Experiencing stigma then leads to more depression when accounting for concealment and connectedness ($b_2 = 0.535,\ p < 0.05$).

However, Model 1 results do not support the mediation effect of autistic community connectedness. Holding stigma experience constant, connectedness is significantly associated with more concealment ($a_1 = 0.102,\ p < 0.05$). To our surprise, we did not detect significant association between connectedness and depression ($b_1 = -0.138,\ p > 0.05$) or significant mediating effect of connectedness ($a_1 b_1 = -0.014,\ 95\%$ CI: $(-0.034, 0.000)$).

Accounting for the direct effect and indirect effects through stigma experience and connectedness,

Model 1 found a positive total effect of concealment on depression ($c = 0.282,\ p < 0.05$). Overall, the concealment of autistic traits harms autistic people's mental health and leads to more depressive symptoms.

Table 1: Model 1 Results - Effect of autistic traits concealment on depressive symptoms through autistic community connectedness and stigma experience

Effect	Parameter	Estimate	p-value	95% Confidence Interval
Connectedness on depression	b1	-0.138	0.05	(-0.271, 0.006)
Stigma experience on depression	b2	0.535	0.002	(0.195, 0.889)
Concealment on depression	c'	0.259	0	(0.183, 0.34)
Concealment on connectedness	a1	0.102	0.001	(0.039, 0.16)
Concealment on stigma experience	a2	0.069	0	(0.047, 0.09)
Indirect through connectedness	a1b1	-0.014	-	(-0.033, 0)
Indirect through stigma experience	a2b2	0.037	-	(0.013, 0.065)
Total effect	c' + a1b1 + a2b2	0.282	-	(0.205, 0.36)

Stigma Experience as Predictor of Depressive Symptoms

Considering the temporal precedence of stigma experience, **Model 2** treated stigma experience as the independent variable and concealment as one of the mediators (estimated effects are shown in Figure 3; full results shown in Table 2).

As expected, stigma experience has a significant direct and overall ($c = 0.697,\ p < 0.05$) positive effect on depression when accounting for connectedness and concealment. Experiencing stigma leads to more depressive symptoms ($c' = 0.535,\ p < 0.05$), a stronger connection to the autistic community ($a_1 = 0.975,\ p < 0.05$) and more concealment of autistic traits ($a_2 = 1.143,\ p < 0.05$).

The mediating effect of concealment was also significant ($a_2 b_2 = 0.297,\ p < 0.05$). Consistent with previous studies, autistic trait concealment resulting from stigma experiences lead to more depression ($b_2 \approx 0.259,\ p < 0.001$) when controlled for connectedness and stigma experience.

In line with Model 1, Model 2 did not detect a mediating effect of connectedness. Despite a significant positive association with stigma experience ($a_1 = 0.975, p < 0.05$), connectedness is insignificantly associated with depression ($b_1 = -0.138,\ p > 0.05$) and does not mediate the effect of stigma experience on depression ($a_1 b_1 = -0.135,\ 95\%$ CI: $(-0.273, 0.005)$).

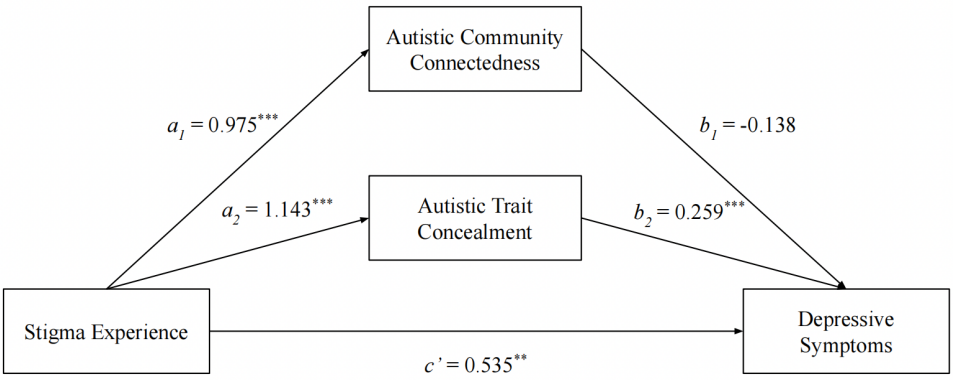

Figure 3: Model 2 mediation analysis results. Estimated effects (a_i, b_i, c') are shown on the plot. Indirect effect through connectedness is $a_1 b_1 = -0.135$, and the indirect effect through concealment is $a_2 b_2 = 0.297$. Total effect of stigma experience on depression is $c' + a_1 b_1 + a_2 b_2 = 0.697$ (Note that p-values are not available from bootstrapping). The asterisks ***, ** and * indicates statistical significance at 0.001, 0.01 and 0.05 level of significance, respectively.

Overall, Model 1 and Model 2 results supports **H1**, **H2b**, **H3** and **H4b**. Hypotheses **H2a** and **H4a** are not supported.

Table 2: Model 2 Results - Effect of stigma experience on depressive symptoms through autistic community connectedness and concealment

Effect	Parameter	Estimate	p-value	95% Confidence Interval
Connectedness on depression	b1	-0.138	0.051	(-0.271, 0.005)
Concealment on depression	b2	0.259	0	(0.183, 0.34)
Stigma experience on depression	c’	0.535	0.002	(0.195, 0.884)
Stigma experience on connectedness	a1	0.975	0	(0.76, 1.193)

Effect	Parameter	Estimate	p-value	95% Confidence Interval
Stigma experience on concealment	a2	1.143	0	(0.757, 1.525)
Indirect through connectedness	a1b1	-0.135	-	(-0.273, 0.005)
Indirect through stigma experience	a2b2	0.297	-	(0.172, 0.439)
Total effect	c' + a1b1 + a2b2	0.697	-	(0.388, 1.027)

General Discussion

This study investigates the correlation between concealment of autistic traits, stigma experience, connectedness to the autistic community, and depression in autistic adults. The results of this study align with previous research.

Mediation results supports **H1** and **H2b**. Model 1 results suggest that concealment affects mental health through two pathways. First, concealing autistic traits directly leads to more depressive symptoms (H1). Additionally, concealment is associated with more experiences with autism-related stigma, which worsens mental health (H2b). Our findings agree with the well-established finding that concealment leads to more depressive symptoms and thus worse mental health among autistic adults.

Compared to concealment, stigma experience has a more substantial negative impact on mental health. Model 2 results support **H3** and **H4b**. Experiencing autism-related stigma leads to worse mental health in general (H3). Concealment partially mediates the effect of stigma experience on mental health (H4b), in line with previous studies indicating that stigma experiences elicit autistic trait concealment and subsequently worsen mental health.

Autistic community connectedness plays a more complex role in this dynamic. Model 2 results support previous research findings that experiencing stigma strengthens the connection to the autistic community. Model 1 finds that experiencing concealment also leads to a stronger connection. However, both models fail to detect a significant effect of connectedness on depression. Connectedness thus does not mediate the effects of stigma experience and concealment on depression. Our findings do not support **H2a** and **H4a**.

Both Model 1 and Model 2 provide valid mediation results. However, we recommend using the revised Model 2 for future studies, especially those aiming to conclude causal relationships. Stigma

experience as an independent variable precedes other factors in time, giving it an advantage over autistic trait concealment. Temporal precedence strengthens mediation analysis and is a prerequisite for causal relationships.

Limitations

While this study explains the relationship between concealment, stigma experience, connectedness and mental health, the importance of "statistical significance" should not be exaggerated. We note that the effect sizes are relatively small and may or may not be *clinically* significant. However, autistic community connectedness should not be overlooked despite its statistical insignificance as a mediator. Additionally, this study is based on a sample where 87% of the participants are from Europe. The results are thus only representative of European autistic communities.

We quantified concealment, stigma experience, connectedness, and depression using participants' total scores on corresponding scales (CATQ, SE, ACC, and CES-D) that each measure different facets of these constructs. Aggregating scores across items of the scales can result in information loss as the distinct facets are combined. For example, CES-D measures various depressive symptoms (e.g. sadness, agitation, suicidal intentions) and ACC assesses various aspects of connectedness including belongingness, social connectedness, and political connectedness (*"CESD-R: Center for Epidemiologic Studies Depression Scale Revised Online Depression Assessment" CESD-R explanation* ; Botha et al., 2022). Similarly, CAT-Q measures concealment by considering the sub-categories of compensation, masking, and assimilation (Engelbrecht, 2022). Using total scores on these scales limits our ability to examine the relationships between sub-categories of depression, connectedness, and concealment.

Additionally, the SE scale consists of only three items and may not fully capture specific stigma experiences. Approximately 15% of the participants (61 out of 409) had a total SE score of 0, but it is unclear whether this indicates no stigma experiences or their experiences are not included in the SE scale.

Conclusion

With a sample of 409 autistic adults, this study carried out mediation analysis to investigate how autistic traits concealment, autistic community connectedness, stigma experience interact to influence mental health. In line with previous research, we found that autistic trait concealment and stigma experience have negative impact on autistic people's mental health. Stigma experience is a significant mediator of the relationship between concealment and depression. Reciprocally, concealment also significantly mediates the effect of stigma experience on mental health. However,

autistic community connectedness and its sub-domains do not play a significant role in the mediation relationship.

Future Directions

Further studies should determine the clinical significance of these effects and establish a threshold indicating the magnitude of the CES-D score increase that represents a clinically significant increase in depressive symptoms. Rather than aggregating scores across items, future research could also explore the distinct facets of concealment, stigma experience, connectedness and depression and investigate the unique relationships between them. We suggest factor analysis as a useful tool to group items based on the underlying facets. We also suggest developing a more comprehensive measure of stigma experiences. This could be done by including additional items that describe a wider range of stigma and discrimination experiences in the SE scale. Finally, further research could either look into autistic communities from other cultures and compare the results with the current study, or incorporate a more culturally and ethnically diverse sample to assess whether the results hold.

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Appendix

Appendix 1: Sample and Data Summary

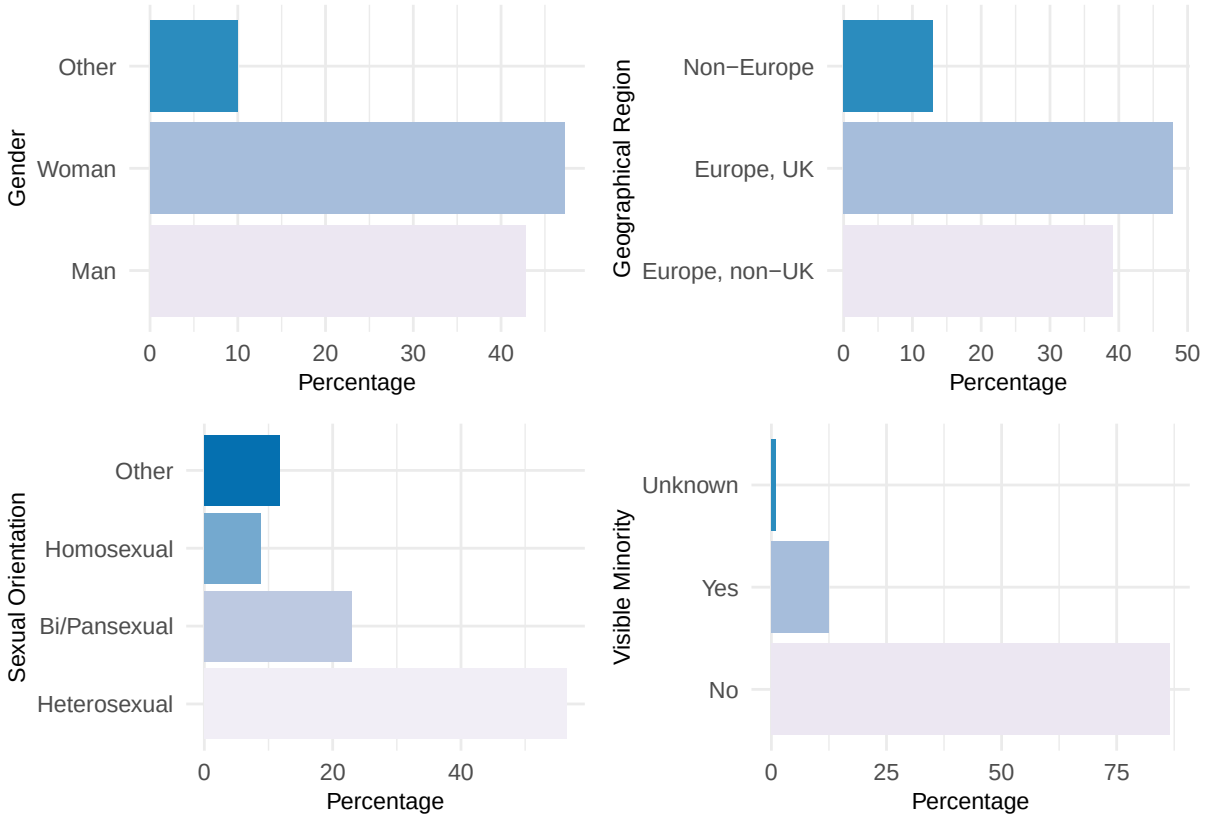

Figure 4: Distribution of the sample across gender, sexual orientation, geographical region, and visible minority groups.

Figure 4 shows the distribution of participants across geographical region, gender, sexual orientation and race/ethnicity (indicated by visible minority identity). About 87% of the participants are from Europe, but only 33 (8.1%) are from non-Western regions (i.e. Asia, Latin America and the Caribbean, and Sub-Saharan Africa). The majority (86.6%) of the participants do not identify as visible minority in their regions. The sample is relatively diverse in term of gender and sexual orientation. About 10% of the participants identify as having non-binary gender, and about 50% are non-heterosexual.

Table 3: Summary of Variables of Interest and Score Distributions

Variable	Scale (score range)	Highest total score	Lowest total score	Mean score	Standard Deviation
Autistic traits concealment	CATQ (0-92)	88	11	58.28	14.99
Depression	CESD (0-60)	56	1	28.91	12.14
Autistic community connectedness	ACC (0-40)	40	0	14.08	8.84
Stigma experience	SE (0-12)	12	0	5.21	3.69

Table 1 outlines the variables of interest and the corresponding scales. The possible score range of each scale is indicated in the brackets. Highest and lowest total scores indicate the sample maximum and minimum scores on these scales. Figure 5 shows the pairwise correlation between the four variables.

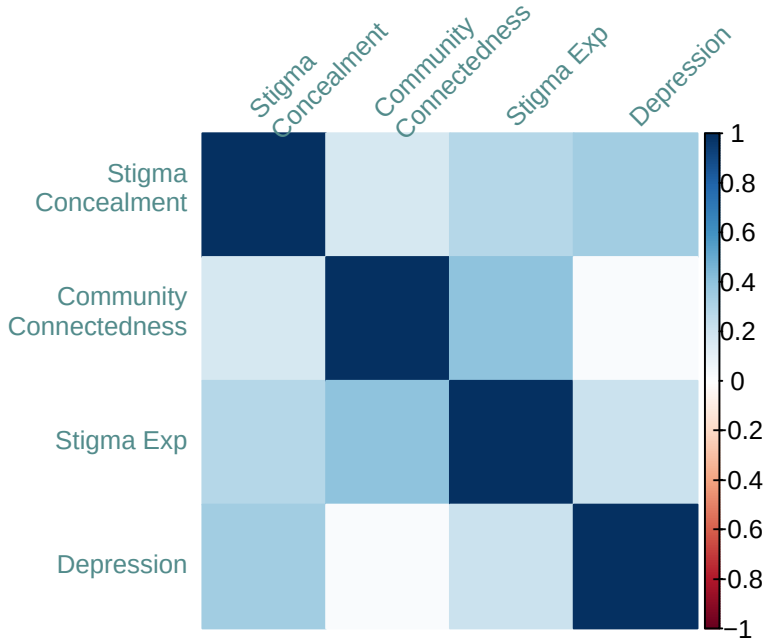

Figure 5: Correlation among predictor, mediators and response