AN EXPLORATORY STUDY OF MMPI-2-RF PERSONALITY AND PSYCHOPATHOLOGY PROFILES OF ADULTS WITH AUTISM SPECTRUM DISORDER WITHOUT INTELLECTUAL DISABILITY

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Abstract

Objective: More empirical research is needed to disentangle the phenotypes of autism spectrum disorder (ASD) and cluster C personality symptomatology (CCPD), as both show similarities in their clinical presentation. We explored personality and psychopathology dimensions as conceptualized in contemporary dimensional taxonomies (i.e., hierarchical taxonomy of psychopathology; HiTOP) in adults with ASD without intellectual disability operationalized by the Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF).

Method: Applying secondary analytic processes using clinical data, we cross-examined the MMPI-2-RF profiles of adults with ASD (n = 28) compared to adults with Cluster C personality disorders (CCPD; n = 28) and a control group (n = 28) by conducting nonparametric tests and assessing effect sizes.

Results: The profiles of the ASD and CCPD groups evidenced to be similar, and both average clinical profiles diverged from the average control group profiles by elevated levels of demoralization, internalizing, and somatization symptomatology. There were small differences between the average profiles of adults with ASD and adults with CCPD. Additional research using dimensional measures of psychopathology could elucidate the dimensional phenotypes of ASD and CCPD.

Conclusions: Based on the results in this study, the MMPI-2-RF may not meaningfully discriminate between the two clinical presentations, with the exception of various externalizing scales.

Key words: autism spectrum disorder (ASD), cluster C personality disorder (CCPD), discriminant validity, HiTOP, MMPI-2-RF

The Hierarchical Taxonomy of Psychopathology (HiTOP, Kotov et al., 2017) is a promising dimensional taxonomy of psychopathology and could ultimately be the foundation for an alternative to categorical conceptualizations of mental health disorders such as the DSM-5 (American Psychiatric Association, 2013) and the ICD-11 (World Health Organization, 2019). The HiTOP comprehensively organizes psychopathology on multiple hierarchical levels (i.e., symptom components and maladaptive traits, subfactors, spectra, and a superspectrum), relying on years of empirical research on the structural and clinical presentation of psychopathology (Kotov et al., 2017). The clinical application of the model has been a topic in the literature (DeYoung et al., 2021; Haeffel et al., 2021), and while the model is conceptual in nature, it has its roots in widely used psychopathology and symptom measures (DeYoung et al., 2021), adding to the model’s clinical
relevance and applicability. While HiTOP is broad and encompassing of most psychopathology symptoms and traits, the specific structure of dimensional profiles of autism spectrum disorders (ASD) has not been fully established in the context of this model. To this end, recent studies have explored a neurodevelopmental spectrum as a fifth HiTOP spectrum (in addition to internalizing, externalizing, thought disorder, and somatization spectra) that encompasses ASD symptoms and ADHD symptoms (Michelini et al., 2019; Stanton et al., 2021a; Stanton et al., 2021b). Yet, the results are not conclusive with regard to ASD symptoms specifically and symptoms are typically combined with other (neuro) developmental disorders, such as ADHD. Additional research into the dimensional nature of symptoms and traits in context of the ASD phenotype could further elucidate the clinical application of HiTOP in assessing and treating individuals with ASD. Therefore, the present study focuses on a HiTOP-based assessment of ASD symptoms in a clinical sample of high-functioning adults.

A broad dimensional assessment of adults with ASD could shed light on the high prevalence of co-occurring personality disorder (PD) classifications in adults with ASD, ranging from 48% to 62% (Hofvander et al., 2015; Ladergård et al., 2017). However, we compare the Cluster C PDs (CCPDs) and a control group (COM), using the MMPI-2, which provides a bottom-up investigation of ASD without intellectual disability compared to adults with Cluster C PDs (CCPDs) and a control group (COM), using the MMPI-2-RF, an instrument that has shown to assess most of the HiTOP spectra, subfactors, maladaptive traits and symptom components (Sellbom, 2019). The MMPI-2-RF has evidenced to meaningfully discriminate between the individual Cluster C PDs (Anderson et al., 2015; Sellbom et al., 2013; Zahn et al., 2017). However, we compare the Cluster C PDs as a group due to their shared features, which may be difficult to discriminate in clinical practice from ASD characteristics, particularly symptoms of avoidance and restrictive (social) behaviors. In addition, obsessive-compulsive PD and avoidance PD were found to be the most co-occurring PD diagnoses in adults with ASD (Vuijk et al., 2018). Therefore, to avoid the risk of misdiagnosis (e.g., Fitzgerald, 2002), a study comparing broad Cluster C symptomatology and ASD symptomatology will be helpful in further identifying similarities and differences.

There have been no studies examining the MMPI-2-RF profiles of adults with ASD compared to profiles of adults with CCPD. Our research questions are: (1) Is there a difference in HiTOP symptom presentation between the ASD group and the CCPD group? With regard to the ASD group, we base our hypothesis on two components. On the one hand on existing knowledge of the MMPI-2-RF scales and on the other hand on existing knowledge regarding which MMPI-2-RF constructs they map onto (Kanai et al., 2011; Ozonoff et al., 2005). The NEO Five Factor Inventory Revised (NEO-FFI; e.g., Kanai et al., 2011), NEO Personality Inventory Revised (NEO-PI-R; e.g., Hesselmark et al., 2015), Therefore, the placement of ASD related symptoms in the HiTOP model can be reliably assessed with several different instruments that are clinically indicated.

A complicating factor in the assessment of ASD and comorbid symptoms is the phenotypological overlap between PD symptoms and traits on the one hand, and ASD characteristics on the other. This is particularly salient when comparing ASD with Cluster C Personality Disorder symptoms (i.e., anxious, fearful) because both are characterized by a persistent pattern of difficulties in interpersonal functioning (Hopwood et al., 2018). The CCPDs include avoidant PD, obsessive-compulsive PD, and dependent PD (American Psychiatric Association, 2013). The CCPD’s latent components, such as anxiety symptoms, are highly comorbid and phenotypes of these disorders are similar to ASD (Reichborn-Kjennerud et al., 2007). One of the core features of avoidant and dependent PD – interpersonal difficulties – is based on feelings of inadequacy and hypersensitivity to being negatively evaluated (American Psychiatric Association, 2013). The co-occurring symptoms that characterize ASD and CCPD are widespread; applying broad clinical measures can provide useful insight into disentanglement of comorbid psychopathology from a dimensional perspective as well as insight into the ASD symptom structure in context of HiTOP. Integrative psychological assessment of personality and psychopathology in adults with ASD serves several purposes: (1) to outline personality strengths and weaknesses, (2) to gain insight into comorbid personality and psychopathology, (3) to elucidate the ASD characteristics in contemporary, dimensionally-based psychopathology models, (4) to contribute to comprehensive diagnostic assessment in addition to assessment of ASD, and (5) to stimulate the development of new treatment interventions.
regard to the MMPI-2-RF Interpersonal Problem Scales, we expect the ASD group to score higher than the COM group on Interpersonal Passivity, Social Avoidance, Shyness, and Disaffiliativeness. (3) Do the ASD group, the CCPD group and the COM group differ in HiTOP maladaptive traits? We hypothesize similar high scores on MMPI-2 PSY-5-r Negative Affectivity (Neuroticism) and Introversion for the ASD group and the CCPD group compared to the COM group.

| Table 1. Hypotheses of MMPI-2-RF Scales for the ASD and CCPD groups. |
|---------------------------------------------------------------|
| **Higher-Order Scales**                                      |
| Emotional/Internalizing Dysfunction (EID)                     | ✓ | ✓ | CCPD |
| Thought Dysfunction (THD)                                    |
| Behavioral/Externalizing Dysfunction (BXD)                    |
| **Restructured Clinical Scales**                             |
| Demoralization (RCd)                                         | ✓ | ✓ | CCPD |
| Somatic Complaints (RC1)                                     | ✓ | | |
| Low Positive Emotions (RC2)                                  | ✓ | ✓ | CCPD |
| Cynicism (RC3)                                               | ✓ | | |
| Antisocial Behavior (RC4)                                    | ✓ | | |
| Ideas of Persecution (RC6)                                   | ✓ | | |
| Dysfunctional Negative Emotions (RC7)                        | ✓ | | |
| Aberrant Experiences (RC8)                                   | ✓ | | |
| Hypomanic Activation (RC9)                                   | ✓ | | |
| **Specific Problem Scales**                                  |
| Malaise (MLS)                                                | ✓ | | |
| Gastro-Intestinal Complaints (GIC)                           | ✓ | | |
| Head Pain Complaints (HPC)                                   | ✓ | | |
| Neurological Complaints (NUC)                                | ✓ | | |
| Cognitive Complaints (COG)                                   | ✓ | | |
| Suicidal/Death Ideation (SUI)                                | ✓ | | |
| Helplessness/Hopelessness (HLP)                              | ✓ | | |
| Self-Doubt (SFD)                                             | ✓ | | |
| Inefficacy (NFC)                                             | ✓ | | |
| Stress/Worry (STW)                                           | ✓ | | |
| Anxiety (AXY)                                                | ✓ | | |
| Anger Proneness (ANP)                                        | ✓ | | |
| Behavior-Restricting Fears (BRF)                             | ✓ | | |
| Multiple Specific Fears (MSF)                                | ✓ | | |
| Juvenile Conduct Problems (JCP)                              | ✓ | | |
| Substance Abuse (SUB)                                        | ✓ | | |
| Aggression (AGG)                                             | ✓ | | |
| Activation (ACT)                                             | ✓ | | |
| Family Problems (FML)                                        | ✓ | | |
| Interpersonal Passivity (IPP)                                | ✓ | | |
| Social Avoidance (SAV)                                       | ✓ | | |
| Shyness (SHY)                                                | ✓ | | |
| Disaffiliativeness (DSF)                                     | ✓ | | |
| **PSY-5-r Scales (revised)**                                 |
| Aggressiveness (AGGR-r)                                      | ✓ | | |
| Psychoticism (PSYC-r)                                        | ✓ | | |
| Disconstraint (DISC-r)                                       | ✓ | | |
| Negative Emotionality/Neuroticism (NEGE-r)                   | ✓ | | |
| Introversive/Introversion (INTR-r)                           | ✓ | | |

ASD: Autism spectrum disorder, CCPD: Cluster C Personality Disorder, COM: Control subsample.
Materials and Methods

Participants

Participants were recruited at various clinics in the Netherlands: (1) adults with ASD without intellectual disability (n = 28; M = 39.8, SD = 13.1, n_females = 5 (17.9%)), recruited from an outpatient psychiatry department of a general hospital, (2) adults with CCPDs (n = 38; M = 38, SD = 11.2, n = 5 (17.9%)), recruited from an outpatient mental health clinic (Van der Heijden et al., 2013c) and (3) adults from a general population control group (n = 28; M = 40.6, SD = 12.5, n = 5 females (17.9%)), selected based on matching from a Dutch MMPI-2/MMPI-2-RF standardization sample (Van der Heijden et al., 2013b). We hierarchically matched the COM participants with ASD and CCPD participants based on gender and age. The total sample consisted of 84 adults (15 self-identified as female, 69 male) with ages ranging between 21 and 71 (M = 39.5, SD = 12.2). None of the participants were excluded based on the pre-established exclusion criteria, including severe psychotic disorders or low IQ scores.

Regarding the ASD group, participants were assessed for ASD DSM criteria in line with the Dutch Guidelines on diagnosis and treatment of adults on the autism spectrum, which includes in-person interviews, interaction with the adult, and an interview with the adult’s childhood caregiver or someone who knew the adult very well in childhood when available. All participants consequently were provided treatment in an outpatient hospital setting, where it can be assumed that other symptomatology was treated as well.

Participants in the CCPD sample evidenced primary symptomatology of CCPDs. As primary diagnostic profile, the CCPD group participants met the following DSM-5 CCPD criteria (American Psychiatric Association, 2013): 54% (n = 15) met full avoidant PD (APD) criteria, 54% (n = 15) met full DSM-5 obsessive-compulsive PD (OCPD) criteria, 21% (n = 6) met full dependent PD (DPD) criteria, 18% (n = 5) met full combined APD-OCPD criteria, 11% (n = 3) met full combined APD-DPD criteria, and 25% (n = 7) met full combined OCPD-DPD criteria, 18% (n = 5) met primarily Cluster C PD criteria. On average, participants met 5.8 CCPD criteria (SD = 1.6). Secondarily, several participants also met cluster A and B PD criteria, such as Paranoid PD (n = 6, 21%), Borderline PD (n = 4, 14%), Schizoid PD (n = 2, 7%), Narcissistic PD (n = 1, 4%), and Antisocial PD (n = 1, 4%). All 28 participants met criteria for other DSM-symptomatology, most frequently depressive episode (25%), agoraphobia without panic (7.1%), depressive disorder NOS (7.1%), depressive disorder (7.1%), PTSD (7.1%), or social anxiety disorder (7.1%). Primarily in the internalizing spectrum, 22 participants met for two additional co-occurring disorders, 16 participants for three additional disorders, 10 participants for four additional disorders, 6 participants for five additional disorders, 2 participants for six additional disorders, and 1 participant for seven disorders. Three participants (11%) met criteria for an alcohol dependence disorder and another three participants (11%) met criteria for a substance dependence disorder. Overall, the co-occurring symptomatology in the CCPD sample is in line with what is known about comorbidity in PDs (Friborg et al., 2014; Lenzenweger et al., 2007). All participants in this subsample started treatment after diagnostic assessment. Part of the data from this sample was used in a previous study and results were published by Van der Heijden and colleagues (Van der Heijden et al., 2013a).

The control group consisted of 28 individuals who completed the MMPI-2-RF in context of validation of the Dutch-language version of the MMPI-2-RF. Participants were recruited from the general Dutch population and were compensated for their effort of filling out the MMPI-2-RF.

The study was carried out in accordance with the Code of Ethics of the World Medical Association (Goodyear et al., 2007). First, regarding the sample with 28 high-functioning adults with ASD (n = 28), the Institutional Review Board exempted data collection from a full review/approval, due the data collected being anonymous. Second, regarding the sample with adults with personality psychopathology, approval was granted by a Medical Ethics Committee for research in mental health care (Date: April 18, 2007/No.: 7.107 METIGG (Medische-Ethische Toetsingscommissie Instellingen Geestelijke Gezondheidszorg). Third, for the sample including 28 adults in the normative community sample, participants completed the MMPI-2-RF in context of the validation process of the MMPI-2-RF. Data were completed anonymously and access was granted by the publisher of the MMPI-2-RF in the Netherlands. Participants provided informed consent (see Van der Heijden et al., 2013b) for more information.

Measures

Primary measure

The Minnesota Multiphasic Personality Inventory – 2 – Restructured Form (MMPI–2–RF; Ben-Porath & Tellegen, 2008) is a self-report instrument to assess symptom components (Specific Problem (SP) scales), maladaptive personality traits (Personality Psychopathology-5-r (PSY-5-r) scales), subfactors (Restructured Clinical (RC) scales), and spectra (Higher-Order (H-O) scales) as reflected in the HiTOP (Kotov et al., 2017; Sellbom, 2019). The MMPI–2–RF encompasses seven validity scales: assessment of inconsistency, over- and underreporting and test-attitude. The MMPI–2–RF has good reliability and validity overall (Ben-Porath & Tellegen, 2008). Psychometric properties of the Dutch language version are reported by Van der Heijden and colleagues (Van der Heijden et al., 2013a).

Secondary measure

The Structured Clinical Interview for Axis II Personality Disorders (SCID-II, First, 2015; Dutch translation, Weerlin, 2000) is a semi-structured clinical interview for assessing the 10 DSM-IV-TR PDs (American Psychiatric Association, 1994). The SCID-II evidenced adequate inter-rater agreement (Lobbestael et al., 2011; Zanarini et al., 2000).

Procedure

All participants completed the Dutch-language version of the MMPI-2-RF using the MMPI-2 booklet (Van der Heijden et al., 2013a). Ben-Porath and Tellegen (Ben-Porath & Tellegen, 2008) and Van der Heijden and colleagues (Van der Heijden et al., 2010) demonstrated that MMPI-2-RF scores generated with the MMPI-2 and MMPI-2-RF booklets are comparable. No invalid MMPI-2 profiles (i.e., CNS ≤ 14, TRIN/VRIN < 80T, FP ≤ 100T, L ≤ 80T) were detected in the 84 participants at the time of administration, and therefore no data needed to be excluded from the analyses.

All participants in the ASD and CCPD groups
were assessed for (differential) diagnosis and treatment planning during routine clinical practice. All interviews were administered by trained and experienced interviewers (Van der Heijden et al., 2013b).

Statistical analysis

Statistical analyses were performed using SPSS version 20 (IBM Corp., 2017). Due to the small sample sizes and lack of normality, we focused our results on nonparametric significance tests and effect sizes. We conducted Mann-Whitney U Tests for independent samples as nonparametric tests of independence. Effect sizes were based on Cohen’s d’s standards (Cohen, 1992): between .2 and .49 as small, between .5 and .79 as medium, and .8 and larger in value as large.

Results

For an overview of scale comparisons between groups (i.e., H-O scales, RC-scales, Specific-Problem Scales and PSY-5-r scales), p-values, and effect sizes (Cohen’s d), we refer to table 2 and table 3. Figure 1 and figure 2 presented a graphical representation of the average H-O scales and RC-scale scores per subsample.

General characterization of adults with ASD using the MMPI-2-RF

The ASD group demonstrated above average T-scores on (1) internalization pathology, with increased scores on Emotional Internalizing Dysfunction (EID), Demoralization (RCD), and Dysfunctional Negative Emotions (RC7), (2) detachment pathology, with elevated scores on Low Positive Emotions (RC2) and (3) maladaptive trait levels, characterized by elevated scores on Negative Emotionality/Neuroticism (NEGE-r). The symptom-scales Cognitive Complaints (COG), Self-doubt (SFD), Feelings of inefficacy (NFC), and Stress/Worry (STW) showed elevated average levels.

General characterization of adults with CCPD using the MMPI-2-RF

The CCPD group similarly demonstrated above-average T-scores on (1) internalization pathology, with elevated levels on Emotional/Internalizing Dysfunction (EID), Demoralization (RCD), and Dysfunctional Negative Emotions (RC7), (2) detachment pathology, with elevated scores on Low Positive Emotions (RC2), (3) maladaptive trait levels as indicated by elevated levels of Negative Emotionality/Neuroticism (NEGE-r), and, notably, (4) close to elevated scores on Antisocial Behavior. The symptom-scales Malaise (MLS), Gastro-Intestinal Complaints (GIC), Cognitive Complaints (COG), Self-doubt (SFD), and Feelings of inefficacy (NFC) showed increased averages.

Research question 1: Is there a difference in HiTOP symptom presentation between the ASD and CCPDs group?

The CCPD group scores were significantly higher on the externalizing symptom constructs Antisocial Behavior (RC4, p = .04; d = .49) and Gastro-Intestinal Complaints (p = .02, d = .61). No other scales evidenced a statistically significant difference between the two clinical subsamples. Familial Problems as a construct did not evidence a significant difference but yielded a medium effect size (d = .50). All other comparisons between the ASD and CCPD profiles were statistically insignificant and had small effect sizes (d < .49). For an overview we refer to table 2.

Research question 2: Do the ASD group, the CCPD group and the COM group differ in HiTOP spectrum, factor, and subfactor dimensions?

The ASD group showed slightly above average scores on the MMPI-2-RF externalizing scales of Behavioral/Externalizing Dysfunction (BxD), Antisocial behavior (RC4) and Hypomanic Activation (RC9). The same is true for externalizing symptom level scales, Juvenile Conduct Problems (JCP), Substance Abuse (SAB), Aggression (AGG) and Activation (ACT) were slightly above average in the ASD group. Three internalizing symptom level dimensions were elevated, including Self-Doubt (SFD), Inefficacy (NFD) and Stress/Worry (STW). In addition, most social avoidance-related symptom-level dimensions were all above average, but not above clinical cutoff. These scales include Interpersonal Passivity (IPP), Social Avoidance (SAV), Shyness (SHY), and Disaffiliatedness (DSF).

The ASD and CCPD samples showed no significantly different levels of internalizing psychopathology dimensions Emotional/Internalizing Dysfunction (EID), Demoralization (RCD) and Dysfunctional Negative Emotions (RC7). There were no significant differences between the groups on the constructs Thought Dysfunctions (THD), Ideas of Persecution (RC6), and Aberrant Experiences (RC8). The CCPD group yielded a significant effect with medium effect size for Antisocial Behavior (RC4, p = .04; d = .49) and medium effect size on Gastro-Intestinal Complaints (p = .02, d = .61), while there were no significant differences between the ASD and CCPD groups on other types of psychopathology. For an overview of the differences and effect sizes we refer to table 2 and 3, and figure 1 and 2.

Between the ASD and CCPD compared with the COM group, the ASD and CCPD groups scored higher on the majority of scales. These t-score differences were statistically significant for 28 scales out of 40 scales (70%) for the ASD sample, compared to the normative sample. Of the 40, 22 differences (55%) yielded a large effect size and 8 differences (20%) a medium effect size. Similarly, 29 scales out of 40 scales (72.5%) were statistically significantly different between the CCPD sample and the normative sample. In this profile comparison, 25 out of the 40 differences (62.5%) yielded a large effect size and 3 out of the 40 (7.5%) a medium effect size.

Research question 3: Do the ASD group, the CCPD group and the COM group differ in HiTOP maladaptive traits?

Between the ASD and CCPD groups, we found no significant differences on the maladaptive trait levels. Both the ASD and CCPD groups had statistically significantly higher traits on the traits Aggressiveness (ASD: p < .003, d = .80; CCPD: p = .04, d = .27), Negative Emotionality/Neuroticism (ASD: p < .001, d = 1.89; CCPD: p < .001, d = 1.67), and Introversion/ Low Positive Emotionality (ASD: p < .001, d = 1.24; CCPD: p < .001, d = 1.21) relative to the COM group.
**Table 2. Descriptive statistics of MMPI-2-RF Scales for the ASD, CCPD and COM groups.**

|                  | ASD       |         | ASD       |         | ASD       |         |
|------------------|-----------|---------|-----------|---------|-----------|---------|
|                  | M  | SD  | 6%  | M  | SD  | 6%  | M  | SD  | 6%  |
| **Higher-Order Scales** |     |       |       |     |       |       |     |       |       |
| Emotional/Internalizing Dysfunction (EID) | 71| 11.9| 67.9| 71.8| 9.3| 75| 48.7| 9.2| 3.6|
| Thought Dysfunction (THD) | 56| 16.8| 25.0| 55.5| 14| 21.4| 49.9| 9.7| 3.6|
| Behavioral/Externalizing Dysfunction (BxD) | 52.9| 12.5| 14.3| 57.5| 15.1| 32.1| 51.9| 12.5| 10.7|
| **Clinical Scales** |     |       |       |     |       |       |     |       |       |
| Demoralization (RCd) | 71.6| 11| 71.4| 71.8| 9.4| 75| 49.6| 9.5| 7.1|
| Somatic Complaints (RC1) | 57.9| 14.3| 28.6| 61.9| 16.2| 42.9| 46.1| 8.6| 3.6|
| Low Positive Emotions (RC2) | 65.9| 13.8| 50| 65.3| 9.6| 57.1| 47.9| 7.8| 0|
| Cynicism (RC3) | 55| 10.5| 17.9| 51.7| 12.3| 17.9| 47.7| 9.2| 7.1|
| Antisocial Behavior (RC4) | 57| 13.2| 17.9| 63.7| 13.9| 35.7| 50.4| 11.1| 10.7|
| Ideas of Persecution (RC6) | 54.3| 14.3| 17.9| 55.3| 16.7| 28.6| 49.6| 11.1| 14.3|
| Dysfunctional Negative Emotions (RC7) | 65.7| 11.7| 57.1| 65.5| 13.9| 46.4| 47.8| 9.3| 7.1|
| Aberrant Experiences (RC8) | 60.3| 16.5| 42.9| 57.3| 13| 32.1| 49.8| 10.5| 14.3|
| Hypomanic Activation (RC9) | 52.1| 13.7| 25| 53.8| 14.2| 17.9| 52.3| 12.4| 17.9|
| **Specific Problem Scales** |     |       |       |     |       |       |     |       |       |
| Malaise (MLS) | 63.3| 11.6| 42.9| 65.3| 9.6| 39.3| 48.9| 9.4| 3.6|
| Gastro-Intestinal Complaints (GIC) | 56.1| 15.8| 25| 65.9| 16.4| 42.9| 49.1| 9.6| 7.1|
| Head Pain Complaints (HPC) | 56.3| 12.5| 17.9| 59.6| 12.9| 32.1| 48.1| 9.4| 7.1|
| Neurological Complaints (NUC) | 53| 11.4| 25| 54| 15.7| 32.1| 49.2| 8.4| 3.6|
| Cognitive Complaints (COG) | 66.5| 12.6| 53.6| 69.1| 15| 64.3| 50.1| 9.4| 7.1|
| Suicidal/Death Ideation (SUI) | 64.9| 20.9| 57.1| 62.2| 21| 46.4| 46.6| 5.8| 7.1|
| Helplessness/Hopelessness (HLP) | 63.8| 14.5| 57.1| 63.4| 13.5| 53.6| 46.5| 6.6| 0|
| Self-Doubt (SFD) | 66.6| 13.3| 60.7| 65.8| 12.5| 57.1| 51.5| 11.1| 14.3|
| Inefficacy (NFC) | 66.9| 11.2| 64.3| 65| 12.7| 53.6| 47.3| 8.1| 3.6|
| Stress/Worry (STW) | 66.7| 12.1| 53.6| 63.8| 11.5| 39.3| 49.8| 10.5| 10.7|
| Anxiety (AXY) | 60.6| 17.2| 46.4| 63.9| 18.4| 53.6| 48.6| 7.8| 10.7|
| Anger Proneness (ANP) | 60.1| 11.5| 32.1| 59.1| 13.6| 32.1| 45.5| 7.2| 0|
| Behavior-Restricting Fears (BRF) | 61.8| 11.5| 46.4| 60.7| 14.1| 50| 48| 7.3| 3.6|
| Multiple Specific Fears (MSF) | 48.8| 7.9| 0| 46.6| 9.6| 3.6| 45.8| 6.7| 0|
| Juvenile Conduct Problems (JCP) | 54.4| 15.1| 25| 59.2| 14.1| 28.6| 48| 9| 7.1|
| Substance Abuse (SUB) | 52| 13.1| 21.4| 57.6| 12.9| 39.3| 53.5| 12.3| 25|
| Aggression (AGG) | 54.4| 9.3| 10.7| 59.6| 14.4| 32.1| 50.4| 8.8| 3.6|
| Activation (ACT) | 52.8| 12.6| 21.4| 55.5| 13.8| 28.6| 50.5| 10.5| 17.9|
| Family Problems (FML) | 55.4| 12.1| 25| 63| 17.6| 50| 47.3| 7.9| 0|
| Interpersonal Passivity (IPP) | 60.3| 11.5| 32.1| 57.1| 13.3| 28.6| 48.4| 9.5| 7.1|
| Social Avoidance (SAV) | 59.1| 12| 53.6| 59.3| 11.1| 50| 48.3| 8.4| 10.7|
| Shyness (SHY) | 59.2| 13.1| 46.4| 64.1| 13| 67.9| 49.7| 10| 14.3|
| Disaffiliativeness (DSF) | 58.6| 14.8| 28.6| 60.5| 13| 35.7| 47.1| 9| 3.6|
| **PSY-5-r Scales** |     |       |       |     |       |       |     |       |       |
| Aggressiveness (AGGR-r) | 43.8| 7.8| 0| 47.3| 13.5| 10.7| 50.3| 8.4| 3.6|
| Psychoticism (PSYC-r) | 57.6| 15.9| 28.6| 55.3| 13.2| 28.6| 49.8| 10.9| 10.7|
| Disconstraint (DISC-r) | 53.7| 12.2| 17.9| 58.8| 14.2| 39.3| 54.4| 12.6| 17.9|
| Negative Emotionality/Neuroticism (NEGE-r) | 66.7| 10.6| 64.3| 65.2| 11.3| 57.1| 47.9| 9.3| 3.6|
| Introversion/Low Positive Emotionality (INTR-r) | 62.1| 14.4| 42.9| 59.1| 10.7| 32.1| 47.6| 8.2| 3.6|

ASD: Autism spectrum disorder (n = 28), CCPD: Cluster C Personality Disorder (n = 28), COM: Control subsample (n = 28).

Note. M and SD refer to linear uniform T-scores based on 2012 norms of the Dutch language version of the MMPI-2-RF. Bold Means are above clinical cutoff (T >= 65).
Figure 1. Graphic visualization of average T-scores for the ASD, CCPD, and COM groups with regard to MMPI-2-RF H-O Scales, RC Scales and PSY-5-r Scales

Note. This graph displays the average T-score per Group, referring to linear uniform T-scores based on 2012 norms of the Dutch language version of the MMPI-2-RF. Only Higher-Order, Restructured Clinical, and Personality Psychopathology 5 (PSY-5-r) scales are displayed.

Figure 2. Graphic visualization of average T-scores for the ASD, CCPD, and COM groups with regard to MMPI-2-RF Specific Problem Scales

Note. This graph displays the average T-score per Group, referring to linear uniform T-scores based on 2012 norms of the Dutch language version of the MMPI-2-RF. Only Specific Problem (Symptom) scales are displayed.
The average profile of adults with ASD was characterized by high levels of internalizing psychopathology and detachment psychopathology on all levels of the HiTOP (spectra, symptom, traits). The average profile of adults with CCPD evidenced similarly high internalizing and detachment psychopathology, including symptom-level elevations associated with internalizing symptoms.

**Discussion**

We conducted an exploratory study to compare broad HiTOP symptoms and traits of adults with ASD without intellectual disability with profiles of adults with CCPDs and profiles of adults from the general population (COM), measured by the MMPI-2-RF. The average profile of adults with ASD was characterized by high levels of internalizing psychopathology and detachment psychopathology on all levels of the HiTOP (spectra, symptom, traits). The average profile of adults with CCPD evidenced similarly high internalizing and detachment psychopathology, including symptom-level elevations associated with internalizing symptoms.

### Table 3. Statistical comparison of MMPI-2-RF Scale T-Scores of the ASD, CCPD and COM groups

|         | ASD – CCPD | ASD – COM | CCPD – COM |
|---------|------------|-----------|------------|
| p       | Cohen’s d  | p         | Cohen’s d  | p          | Cohen’s d |
| EID     | .96        | 0.07      | <.001      | 2.1        | <.001      | 2.50      |
| THD     | .94        | 0.03      | .22        | 0.44       | .15        | 0.46      |
| BKD     | .16        | 0.33      | .81        | 0.08       | .13        | 0.40      |
| RCd     | .97        | 0.02      | <.001      | 2.14       | <.001      | 2.35      |
| RC1     | .36        | 0.26      | <.001      | 1          | <.001      | 1.22      |
| RC2     | .97        | 0.05      | <.001      | 1.61       | <.001      | 1.99      |
| RC3     | .2         | 0.29      | .02        | 0.74       | .29        | 0.37      |
| RC4     | .04        | 0.49      | .03        | 0.54       | <.001      | 1.06      |
| RC6     | 1          | 0.06      | .28        | 0.37       | .29        | 0.40      |
| RC7     | .92        | 0.02      | <.001      | 1.69       | <.001      | 1.50      |
| RC8     | .54        | 0.2       | .01        | 0.76       | .03        | 0.63      |
| RC9     | .83        | 0.12      | .95        | 0.02       | .73        | 0.11      |
| MLS     | .6         | 0.19      | <.001      | 1.36       | <.001      | 1.73      |
| GIC     | .02        | 0.61      | .049       | 0.54       | <.001      | 1.25      |
| HPC     | .31        | 0.26      | .008       | 0.74       | <.001      | 1.02      |
| NUC     | .91        | 0.07      | .18        | 0.38       | .49        | 0.38      |
| COG     | .34        | 0.19      | <.001      | 1.48       | <.001      | 1.52      |
| SUI     | .57        | 0.13      | <.001      | 1.19       | <.001      | 1.01      |
| HLP     | .82        | 0.03      | <.001      | 1.54       | <.001      | 1.59      |
| SFD     | .7         | 0.06      | <.001      | 1.23       | <.001      | 1.21      |
| NFC     | .68        | 0.16      | <.001      | 2.01       | <.001      | 1.66      |
| STW     | .31        | 0.25      | <.001      | 1.49       | <.001      | 1.27      |
| AXY     | .48        | 0.19      | .002       | 0.9        | <.001      | 1.08      |
| ANP     | .57        | 0.08      | <.001      | 1.52       | <.001      | 1.25      |
| BRF     | .91        | 0.09      | <.001      | 1.43       | <.001      | 1.13      |
| MSF     | .29        | 0.25      | .14        | 0.41       | .94        | 0.10      |
| JCP     | .17        | 0.33      | .12        | 0.51       | .002       | 0.95      |
| SUB     | .06        | 0.43      | .52        | 0.12       | .2         | 0.33      |
| AGG     | .14        | 0.43      | .14        | 0.44       | .008       | 0.77      |
| ACT     | .52        | 0.2       | .59        | 0.2        | .23        | 0.41      |
| FML     | .11        | 0.5       | .008       | 0.79       | <.001      | 1.15      |
| IPP     | .36        | 0.26      | <.001      | 1.13       | .011       | 0.75      |
| SAV     | .94        | 0.02      | .001       | 1.04       | <.001      | 1.12      |
| SHY     | .15        | 0.38      | .003       | 0.82       | <.001      | 1.24      |
| DSF     | .47        | 0.14      | <.001      | 0.94       | <.001      | 1.20      |
| AGGR-r  | .78        | 0.32      | .003       | 0.8        | .04        | 0.27      |
| PSYC-r  | .67        | 0.16      | .06        | 0.57       | .11        | 0.45      |
| DISC-r  | .12        | 0.39      | .7         | 0.06       | .24        | 0.33      |
| NEGE-r  | .53        | 0.14      | <.001      | 1.89       | <.001      | 1.67      |
| INTR-r  | .47        | 0.24      | <.001      | 1.24       | <.001      | 1.21      |

**ASD**: Autism spectrum disorder (n = 28), **CCPD**: Cluster C Personality Disorder (n = 28), **COM**: Normative Control subsample (n = 28).

**Note**: ASD: ASD subsample, CCPD: Avoidant Personality Disorder subsample, Control: Normative Control subsample. All tests were conducted using raw clinical scores.

Bold are significant differences based on independent Mann-Whitney U Tests (p < .05). Effect size is based on Cohen’s d (1992).
(e.g., malaise, GI complaints). Although the personality trait profiles for the ASD group and the CCPD group were largely comparable, there were two statistically significant differences. These differences included disinhibited, externalizing symptoms (i.e., Antisocial Behavior) and gastro-intestinal complaints. Also, the CCPD group evidenced higher levels of externalizing psychopathology on a symptom level (i.e., juvenile conduct problems, substance abuse, aggression, familial problems). Both the profiles of adults with CCPD and profiles of adults with ASD suffer from highly statistically significantly different compared to the control sample. These are important findings for differential diagnosis and clinical utility of the MMPI-2-RF in adults with ASD and with CCPD.

Considering the ASD profile in context of the HiTOP model, the results are in line with previous findings regarding HiTOP dimensions that are salient in adults with ASD without intellectual disability (Stanton et al., 2021a): in the ASD group we found high levels of internalizing symptoms, such as the emotional/internalizing higher order dimension, demoralization, low positive emotions, and dysfunctional negative emotions. Further, we found elevated levels of cognitive complaints, self-doubt, inefficacy, and stress/worry in the sample of adults with ASD. Previous research has shown that symptoms correlate highly with attention problems and intellectual difficulties (Mullins, 2015; Stanton et al., 2021b). A maladaptive personality trait with strong associations with the internalizing spectrum (i.e., negative emotional/neuroticism) was also elevated in the ASD group, indicating a tendency or disposition to be in a particular class of states associated with a risk for dysfunction (DeYoung et al., 2022). The internalizing symptom construct shows similarly high levels on a symptom component level, including suicidality, which is nearing the clinical cutoff, as well as helplessness, stress and worry, self-doubts, and feelings of inefficacy. This may speak to problems with underlying self-regulatory processes, as well as a strong correlation with neuroticism (Rinaldi et al., 2021; Vuijk et al., 2018). The combination of high demoralization and high levels of suicidality is noteworthy and worrisome and might have an indication for suicide risk and treatment in each of the symptom presentations (Kim et al., 2020). In sum, the HiTOP profile of high-functioning adults with ASD appears to be characterized by elevated internalizing psychopathology and detachment across most levels and dimensions type of the model (symptom, trait, syndrome, subfactor, and spectrum). This underlines the importance of broad clinical assessment in adults with ASD and implies the ASD phenotype cannot be narrowed down to a single spectrum.

Our results suggest that both ASD and CCPD groups may be characterized by high emotional burden and being subjected to emotional hardship. In both samples, yet particularly in the CCPD sample, high proportions of the sample evidenced levels above clinical cutoff, such as the internalizing higher-order dimension, demoralization, and low positive emotions. The spectra, subfactors, and symptoms as outlined in the HiTOP model show similar patterns in adults diagnosed with ASD and CCPD (Lugnegård et al., 2012). Averages in the ASD sample for the emotional/internalizing higher order dimension, demoralization, and dysfunctional negative emotions were above clinical cutoff, emphasizing high comorbidity with interpersonality (i.e., anxiety, worry, stress) and neuroticism in both ASD and CCPD (Lugnegård et al., 2012; Schwartzman et al., 2016; Sellbom et al., 2018).

There were noteworthy differences between adults with ASD and adults with CCPD in behavioral/externalizing levels such as the dimension antisocial behavior. Antisocial behavior levels were found to be statistically significantly higher among CCPD diagnosed individuals, possibly pointing toward to high cross-comorbidity with other types of (externalizing) personality psychopathology (e.g., borderline personality features) and other externalizing psychopathology, such as substance abuse, in adults with ASD showed with CCPD (Lerner et al., 2020). Further, CCPD may be characterized by hypersensitivity and interpersonal hostility (Lerner et al., 2020), which adults with ASD may experience difficulty with. Second, the symptom dimension gastro-intestinal complaints was found to be significantly higher in adults with CCPD, potentially speaking to the internalizing-associated physical symptoms that are comorbid. There were several other, non-statistically significant differences that deserve notion. First, several externalizing-related symptom scales were relatively elevated in the CCPD group but not in the ADS group, such as juvenile conduct problems, aggression, familial problems, and substance abuse levels, which were around average for adults with ASD. Some of these elevations, including substance abuse, might be due to increased substance use to cope with anxiety-related symptoms (Dimaggio et al., 2015), particularly alcohol use, which is known to be prevalent in CCPD (Goretti et al., 2017), while it is known to be less prevalent in ASD (Lugo-Marín et al., 2019; Mangerud et al., 2014). Further, symptoms of interpersonal passivity, shyness, disaffiliatedness, and social avoidance were equally above average – yet not above clinical cutoff – in both samples.

Clinically, these results may be of guidance to practicing clinicians and diagnosticians. First, we found significantly higher levels of disinhibited externalizing psychopathology, which was the one notable difference between ASD and CCPD profiles. Clinicians may use this as an important marker to differentiate between the two, as we found that adults with ASD showed lower levels of this type of symptomatology. Second, we highlight the importance of early development of symptomatology, as this may be particularly important to diagnose ASD relative to CCPD, since ASD has a distinct developmental trajectory from CCPD. Also, additional diagnostic assessments, for example, focused on neurodevelopmental difficulties, may help with differential diagnosis (Stanton et al., 2021b).

Crucially, these two average clinical profiles evidenced high internalizing psychopathology, including demoralization and to a degree suicidality, which would require clinical attention and targeted treatment. It is worth emphasizing that between 17.9% and 75% of the participants in the ASD and CCPD subsamples, respectively, evidenced clinical levels on the main clinical dimensions, which were higher than the control group on most clinical dimensions. The exception to this finding are the elevations in several externalizing scales. These findings may emphasize the broad psychopathology burden that individuals diagnosed with either an ASD or CCPD diagnosis experience and confirm the high comorbidity found in these individuals. High degrees of co-occurrence of these diagnoses likely comes with impairment and distress, yet it equally points out the heterogeneity of these DSM-classifications (Conway et al., 2021; Waterhouse et al., 2016; Zimmerman, 2011). Moreover, the average profile of adults with ASD showed significant symptom overlap with other DSM-type
symptomatology, such as internalizing disorders (e.g., dysthymia, GAD, MDD), mostly characterized by high introversion and high internalizing symptomatology. Taken together, this can be seen as an argument to shift beyond DSM diagnoses, and look at the dimensional psychopathology profile of the individual (Kotov et al., 2017), such that profiles dimensions cut across traditional categorical diagnoses. As such, the MMPI-2-RF profiles provide clinical information across the categorical diagnoses and beyond presence/absence of criteria, such that symptomatology is best described as co-occurring as opposed to comorbid (Tyrer, 2017).

There are several limitations of this study that deserve to be mentioned: (1) the small sample sizes and therefore use of nonparametric methods, (2) low proportions of female-identifying participants, (3) reliance on self-report measures, and (4) the CCPD being a heterogeneous group with regard to symptoms. Regarding the latter, the results should be viewed in a careful light, since the CCPD group reflects a broader variety of symptoms and comorbidity. We were not able to reliably test significance between the subsamples and make stronger claims about the findings. Further, the use of a single self-report measure limited the generalizability of our conclusions, and ultimately, did not allow for cross-validation using different measures. Apart from the addition of other measures to increase discriminant validity, future studies could further explore strengths and protective factors in adults with ASD (Kirchner et al., 2016). Moreover, more research is needed to determine the structure of ASD symptomatology in HiTOP context. We argue for research using multiple methods and multiple samples to assess broad psychopathology. Finally, longitudinal studies with multiple dimensional measures may elucidate the developmental trajectory in adults with ASD and adults with CCPD.

Our results indicate elevated internalizing and detachment psychopathology in adults with ASD. The MMPI-2-RF profiles of adults with ASD and adults with CCPDs may be similar, except for externalizing psychopathology and gastro-intestinal symptoms, which were more prevalent in adults with CCPDs. Our findings suggest a carefully conducted, comprehensive assessment in adults with ASD is indicated, due to the risk for suicidality, internalizing symptom distress and (mal)adaptive personality traits. Targeted treatment and support may reduce risks and are needed to lighten this mental burden.

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