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| **Table 1**Comparisons of Age and Sexamong the ADHD, ASD and TDC Groups |
|  | ADHD(*n* =89) | ASD(*n* =51) |  TDC(*n* =87) |  *F****/****χ2* | *p* |
| Age (months, mean ± SD) | 56.88±7.96 | 55.16±11.40 | 55.16±7.29 | 0.10 | 0.906 |
| Sex(male/female) | 77/12 | 45/6 | 67/19 | 3.39 | 0.184 |

SD: standard deviation; ADHD: attention-deficit/hyperactivity disorder; ASD: autism spectrum disorder; TDC: typically developing child

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| **Table 2**Comparisons of CU traits among the ADHD, ASD and TDC groups (mean ± SD) |
|  | ADHD a(*n* =89) | ASD b(*n* =51) | TDC c(*n* =85) | *F* | Posthoctest |
| Callousness | 9.49±5.20 | 12.08±6.46 | 5.45±3.58 | 30.24\*\*\* | b>a>c |
| Uncaring | 16.24±3.93 | 17.82±5.04 | 10.79±4.07 | 54.58\*\*\* | b>a>c |
| Unemotional | 4.58±2.43 | 7.26±1.79 | 4.23±2.33 | 31.19\*\*\* | b>a=c |
| Total ICU score | 30.21±9.35 | 37.16±10.19 | 20.39±7.40 | 59.87\*\*\* | b>a>c |

\*\*\* *P* < 0.001

CU: callous-unemotional; ADHD: attention-deficit/hyperactivity disorder; ASD: autism spectrum disorder; TDC: typically developing child; ICU: Inventory of Callous-Emotional Traits

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| **Table 3**Comparison of CU traits between the ADHD only, ADHD+ODD and TDC groups (mean ± SD) |
| Subscales | ADHD only a(*n* =55) | ADHD+ODD b(*n* =34) | TDC c(*n* =87) | *F* | Post hoc test |
| Callousness | 8.67 ± 5.29 | 10.82 ± 4.83 | 5.45 ± 3.58 | 20.42\*\*\* | b > a > c |
| Uncaring | 15.87 ± 4.03 | 16.82 ± 3.75 | 10.79 ± 4.07 | 40.60\*\*\* | a= b > c |
| Unemotional | 4.83 ± 2.45 | 4.18 ± 2.39 | 4.23 ± 2.34 | 1.27 | ns |
| TotalICU | 29.70 ± 10.4 | 32.04 ± 8.30 | 21.39 ± 7.40 | 30.12\*\*\* | a= b >c |

\*\*\* *P* < 0.001

CU: callous-unemotional; ADHD: attention-deficit/hyperactivity disorder; ODD: oppositional defiant disorder; ADHD + ODD: ADHD and comorbid ODD; TDC: typically developing child; ICU: Inventory of Callous-Emotional Traits

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| **Table 4**Pearson’s Correlations Coefficients Between the ICU Subscalesand Behavioural Problems and Executive Function |
| Subscales |  | Callousness Uncaring Unemotional Total ICU |
| SDQ  |  |
| Emotional symptoms |  | 0.25\*\* |  | 0.24\*\* | 0.21\*\* | 0.29\*\* |
| Conduct problems | 0.33\*\* | 0.42\*\* | 0.06 | 0.38\*\* |
| Hyperactivity | 0.47\*\* | 0.58\*\* | 0.10 | 0.54\*\* |
| Peer problems | 0.52\*\* | 0.50\*\* | 0.45\*\* | 0.61\*\* |
| Total difficulties | 0.59\*\* | 0.65\*\* | 0.30\*\* | 0.68\*\* |
| Prosocial behaviours  | -0.51\*\* | -0.69\*\* | -0.45\* | -0.68\*\* |
| BRIEF-P |  |  |  |  |
| Inhibition | 0.54\*\* | 0.68\*\* | 0.25\*\* | 0.66\*\* |
| Shift | 0.41\*\* | 0.41\*\* | 0.32\*\* | 0.49\*\* |
| Emotional control | 0.40\*\* | 0.44\*\* | 0.23\*\* | 0.47\*\* |
| Working memory | 0.53\*\* | 0.60\*\* | 0.27\*\* | 0.63\*\* |
| Plan/organize | 0.49\*\* | 0.51\*\* | 0.23\*\* | 0.55\*\* |
| ISC | 0.53\*\* | 0.64\*\* | 0.26\*\* | 0.64\*\* |
| FI | 0.45\*\* | 0.47\*\* | 0.30\*\* | 0.53\*\* |
| EMI | 0.54\*\* | 0.59\*\* | 0.27\*\* | 0.63\*\* |
| GEC | 0.56\*\* | 0.64\*\* | 0.30\*\* | 0.67\*\* |

\* *P* < 0.05, \*\* *P* < 0.01

ICU: Inventory of Callous-Unemotional Traits;SDQ: Strengths and Difficulties Questionnaire; BRIEF-P: BehaviorRatingScale of Executive Function-Preschool Version; ISC: Inhibition Self-control Index; FI: Flexibility Index; EMI: Emergent Metacognition Index; GER: Global Executive Composite.

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| **Table 5**Pearson’s Correlations Between CU Traits (subscale scoresandtotal CU scores) and ADHD Symptoms(subscales scores and total scores) |
| Subscale | Callousness | Uncaring | Unemotional | Total ICU |
| Inattention | 0.40\*\* | 0.54\*\* | -0.05 | 0.47\*\* |
| Hyperactivity | 0.32\*\* | 0.54\*\* | -0.09 | 0.42\*\* |
| Oppositional defiant | 0.31\*\* | 0.44\*\* | -0.12 | 0.34\*\* |
| Total ADHD symptoms | 0.39\*\* | 0.58\*\* | -0.07 | 0.48\*\* |

\*\* *P* < 0.01

ICU: Inventory of Callous-Unemotional Traits; ADHD: attention-deficit/hyperactivity disorder

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| **Table 6**Linear Regression AnalysisfortheEffect of CU Traits on the Symptoms of ADHD |
| Variable | *β* | *R2* | *t* | *p* |
| Attention | 0.55 | 0.20 | 8.704 | <0.001 |
| Hyperactivity | 0.39 | 0.15 | 5.224 | <0.001 |
| Oppositional defiant | 0.32 | 0.11 | 4.264 | <0.001 |
| Total ADHD symptoms | 0.49 | 0.24 | 7.023 | <0.001 |

*β* = standardized regression coefficient; *R2*= determination coefficient;CU: callous-unemotional traits; ADHD: attention-deficit/hyperactivity disorder

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| **Table 7**Identification of potential covariates  |
| Variable | TotalICUtotalscore | TotalADHD symptoms |
| *β* | *p* | *β* | *p* |
| Age | 0.06 | 0.47 | -0.05 | 0.54 |
| Sex | -0.16 | 0.04 | -0.22 | 0.00 |
| CPs | 0.50 | 0.00 | 0.34 | 0.00 |
| OD | 0.34 | 0.00 | 0.65 | 0.00 |

*β* = standardized regression coefficient;ICU: Inventory of Callous-Unemotional Traits; ADHD: attention-deficit/hyperactivity disorder; CPs: conduct problems; OD: oppositional defiant

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| **Table 8**Incremental validity of the ICU Scale for predicting ADHD symptoms and diagnosis of ADHD  |
|  | ADHD symptoms | ADHD diagnosis |
|  | *β* | *p* | *OR* (95% CI) | *p* |
| Model 1 |  |  |  |  |
| Sex | -0.16 | 0.005 | 0.74 (0.29 ~ 1.87) | 0.52 |
| OD | 0.64 | 0.00 | 1.32 (1.19 ~ 1.47) | 0.00 |
| *R12* | 0.45 |  | 0.22 |  |
| Model 2 |  |  |  |  |
| Sex | -0.13 | 0.02 | 0.89 (0.32 ~ 2.52) | 0.83 |
| OD | 0.55 | 0.00 | 1.27 (1.13 ~ 1.42) | 0.00 |
| CU | 0.27 | 0.00 | 1.13 (1.07 ~ 1.18) | 0.00 |
| *R22* | 0.51 |  | 0.35 |  |
| *ΔR2* | 0.06 |  | 0.13 |  |

*β* = standardized regression coefficient; CI= confidence interval; OR = odds ratio; OD: oppositional defiant; CU: Callous-unemotional; ADHD: attention-deficit/hyperactivity disorder

The standardized regression coefficients (*β*) were calculated by converting all predictors and outcomes to z-scores before the analysis.

Model 1 predictive variable: sex, OD

Model 2 predictive variable: sex, OD, CU