

Supporting Information for *Irritability and Emotional Impulsivity as Core Feature of ADHD and ODD in Children*

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Table S1*Criteria for Item Reduction of the DADYS Questionnaire*

Item	Item description	Skewness	Kurtosis	Not all response categories were used	> 90% not clinically relevant (response 0/1)	Number of item-item correlations < .3 (bold if > 50%)	Number of item-item correlations >.8	Of those with item-item correlation > .8, additionally rated as redundant by at least 2 out of 3 clinicians	Of those that fulfill criteria for exclusion: DSM-5 criteria for DMDD?	Excluded
1	Is a happy child					9				
2	Exhibits mood swings					7	1			
3	Responds positively to adults			Yes	Yes	32				
4	Switches easily between activities					9				
5	Calms down after being angry					12				
6	Easily frustrated					9				
7	Responds positively to peers			Yes	Yes	32				
8	Prone to temper tantrums					9	3	Yes	No	✓
9	Can wait for good things					11				
10	Takes pleasure in distress of others	XX	XX		Yes	32				✓
11	Can modulate excitement in high-energy situations					11				
12	Whiny/Clingy	X	X		Yes	27				✓
13	Prone to exuberant/disruptive outbursts of emotions					7				
14	Angry about limit-setting					6				
15	Verbalize emotions					14				
16	Sad/Listless	X	XX		Yes	14				✓
17	Overly exuberant when engaging others to play					18				
18	Displays flat affect	XX	XX		Yes	33				✓

19	Responds negatively to friendly approaches by peers	XX	XX	Yes	Yes	34					✓
20	Impulsive					9					
21	Empathetic/Caring					27					
22	Displays exuberance others find intrusive		X			15					
23	Appropriate negative emotions when others are hostile					37					✓
24	Inappropriate emotions when engaging others in play	X	XX		Yes	13					✓
25	Demands must be met immediately					7					
26	Quickly angry/ Temper tantrums					7	7		Yes		✓
27	Often irritable					6	4				
28	Often offended					7	1				
29	Prolonged verbally aggressive tantrums					8	1		Yes		Yes
30	Prolonged physically aggressive tantrums	X	XX		Yes	16					Yes
31	Chronically irritable mood	X	X		Yes	10					
32	Easily annoyed by others					7					
33	Often loses temper					6	4				
34	Stays angry					10					
35	Is mostly angry	X		Yes	Yes	9					
36	Is often angry					7	5		Yes		✓
37	Loses temper easily					8	4		Yes		✓
38	Irritability causes problems					6					

Note. X = skewness/kurtosis larger than one standard deviation. XX = skewness/kurtosis larger than two standard deviations. Excluded items are highlighted in grey.

Table S2*Exploratory Factor Analysis of the DADYS Questionnaire*

Item description	Factor 1	Factor 2	Factor 3
Is a happy child	-.37*	.53*	.10
Exhibits mood swings	.94*	.12*	.04
Responds positively to adults	.07	.86*	-.01
Switches easily between activities	-.45*	.36*	-.04
Calms down after being angry	-.83*	.06	-.25*
Easily frustrated	.79*	.00	.16*
Responds positively to peers	-.01	.90*	.10
Can wait for good things	-.61*	.12	-.14
Can modulate excitement in high-energy situations	-.41*	.26*	-.42*
Prone to exuberant/disruptive outbursts of emotions	.61*	-.15*	.30*
Angry about limit-setting	.81*	.03	.10
Verbalizes emotions	-.19*	.40*	-.17
Overly exuberant when engaging others to play	.15*	.02	.71*
Impulsive	.70*	.08	.31*
Empathetic/Caring	-.01	.61*	-.08
Displays exuberance others find intrusive	.01	-.13	.89*
Demands must be met immediately	.71*	-.02	.22*
Often irritable	.99*	.09	.01
Often offended	.95*	.05	.01
Prolonged verbally aggressive temper tantrums	1.02*	.24*	-.09
Prolonged physically aggressive tantrums	.80*	.07	-.00
Chronically irritable mood	.72*	-.23*	-.18*
Easily annoyed by others	.75*	.00	.19*
Often loses temper	.93*	.02	.06
Stays angry	.98*	.00	-.39*
Is mostly angry	.75*	-.28*	-.18*
Irritability causes problems	.61*	-.17*	.34*

Note. The extraction method was principal axis factoring with an oblique (GEOMIN) rotation.

Assigned items are marked in bold.

Table S3

Standardized Factor Loadings (Standard Error) for the Confirmatory Factor Analysis of the Correlated Factors Models with Three AD Factors

Item	Factor loading (SE)
AD- Irritability/Emotional Impulsivity	
Exhibits mood swings	.89* (.02)
Switches easily between activities	.59* (.05)
Calms down after being angry ^a	.63* (.05)
Easily frustrated	.77* (.04)
Can wait for good things	.70* (.04)
Angry about limit-setting	.78* (.03)
Impulsive	.81* (.03)
Demands must be met immediately	.77* (.04)
Often irritable	.98* (.01)
Often offended	.93* (.01)
Prolonged verbally aggressive tantrums	.87* (.02)
Prolonged physically aggressive tantrums	.68* (.04)
Chronically irritable mood	.80* (.03)
Easily annoyed by others	.84* (.03)
Often loses temper	.93* (.02)
Stays angry ^a	.77* (.03)
Is mostly angry	.81* (.03)
Irritability causes problems	.87* (.02)
AD-Positive Emotionality	
Is a happy child	-.84* (.06)
Responds positively to adults ^b	-.36* (.09)
Responds positively to peers ^b	-.35* (.09)
Verbalizes emotions	-.66* (.06)
Empathetic/caring	-.60* (.06)
AD-Exuberance	
Can modulate excitement in high-energy situations	.81* (.04)
Prone to exuberant/disruptive outbursts of emotions	.96* (.02)
Overly exuberant when engaging others to play	.70* (.05)
Displays exuberance others find intrusive	.81* (.03)
Residual correlations	
a	.67*
b	.70*

Note. SE = standard error. AD = affective dysregulation.

* = $p < .001$.

^{a,b} Residuals of these items were allowed to correlate.

Table S4

Standardized Factor Loadings (Standard Error) for the Unidimensional Model (Uni), the First-Order Correlated Factor Model (CFO) and Original Standardized Factor Loadings for the Second-Order Correlated Factor Model (SOF) before the Schmid-Leiman Transformation

Item	Uni	CFO	SOF
AD- Irritability/Emotional Impulsivity			
Exhibits mood swings	.86* (.02)	.89* (.02)	.89* (.02)
Switches easily between activities	.59* (.03)	.63* (.04)	.62* (.04)
Calms down after being angry ^a	.61* (.03)	.65* (.04)	.65* (.04)
Easily frustrated	.79* (.02)	.82* (.02)	.82* (.02)
Can wait for good things	.71* (.03)	.75* (.03)	.75* (.03)
Angry about limit-setting	.80* (.02)	.83* (.02)	.83* (.02)
Impulsive	.79* (.02)	.83* (.02)	.83* (.02)
Demands must be met immediately	.77* (.03)	.80* (.03)	.80* (.03)
Often irritable	.94* (.01)	.96* (.01)	.96* (.01)
Often offended	.90* (.01)	.92* (.01)	.92* (.01)
Prolonged verbally aggressive tantrums	.81* (.02)	.84* (.02)	.84* (.02)
Prolonged physically aggressive tantrums	.65* (.03)	.69* (.03)	.69* (.03)
Chronically irritable mood	.71* (.03)	.75* (.03)	.75* (.03)
Easily annoyed by others	.81* (.02)	.84* (.02)	.84* (.02)
Often loses temper	.91* (.01)	.94* (.01)	.94* (.01)
Stays angry ^a	.70* (.03)	.74* (.03)	.74* (.03)
Is mostly angry	.74* (.03)	.78* (.03)	.78* (.03)
Irritability causes problems	.85* (.02)	.89* (.02)	.89* (.02)
AD-Positive Emotionality			
Is a happy child	-.56* (.04)	.81* (.04)	.81* (.04)
Responds positively to adults ^b	-.31* (.05)	.46* (.07)	.46* (.07)
Responds positively to peers ^b	-.30* (.05)	.46* (.07)	.45* (.07)
Verbalizes emotions	-.50* (.04)	.71* (.05)	.72* (.05)
Empathetic/caring	-.44* (.04)	.63* (.05)	.63* (.05)
AD-Exuberance			
Can modulate excitement in high-energy situations	.72* (.03)	.83* (.03)	.83* (.03)
Prone to exuberant/disruptive outbursts of emotions	.82* (.02)	.94* (.02)	.95* (.02)
Overly exuberant when engaging others to play	.58* (.04)	.66* (.04)	.65* (.04)
Displays exuberance others find intrusive	.68* (.03)	.78* (.03)	.77* (.03)
ADHD-Inattention			
Overlooks details	.72* (.03)	.82* (.02)	.81* (.02)
Sustained attention	.81* (.02)	.90* (.02)	.90* (.02)
Does not listen	.72* (.03)	.82* (.03)	.82* (.03)
Incomplete execution of tasks	.82* (.02)	.91* (.02)	.91* (.02)
Difficulties with organization	.77* (.02)	.86* (.02)	.86* (.02)
Aversion to cognitive effort	.80* (.02)	.90* (.02)	.90* (.02)
Loses things	.65* (.03)	.75* (.03)	.75* (.03)

Easily distracted	.83*(.02)	.92* (.02)	.93* (.02)
Forgetful	.74* (.03)	.83* (.02)	.83* (.02)
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ADHD-Hyperactivity/Impulsivity			
Fidgets/squirms	.73* (.03)	.80* (.02)	.80* (.03)
Gets up	.72* (.03)	.79* (.03)	.79* (.03)
Walks/climbs	.80* (.03)	.86* (.02)	.86* (.02)
Inner restlessness	.69* (.04)	.77* (.04)	.77* (.04)
Difficulties playing quietly	.79* (.03)	.87* (.02)	.87* (.02)
Extreme agitation	.86* (.02)	.92* (.02)	.93* (.02)
Frequently on the go	.80* (.03)	.87* (.02)	.87* (.02)
Blurts	.73* (.03)	.81* (.03)	.81* (.03)
Difficulties waiting for own turn	.78* (.02)	.87* (.02)	.87* (.02)
Interrupts/disturbs	.81* (.02)	.91* (.02)	.91* (.02)
Talks a lot	.62* (.03)	.70* (.04)	.70* (.04)
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ODD-D			
Argues with adults	.76* (.02)	.86* (.02)	.86* (.02)
Does not follow rules	.81* (.02)	.91* (.02)	.92* (.02)
Annoys others	.71* (.03)	.81* (.03)	.81* (.03)
Accuses others	.75* (.02)	.86* (.02)	.87* (.02)
Spiteful/vindictive	.61* (.04)	.70* (.04)	.69* (.04)
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Residual correlations			
a	.68*	.65*	.65*
b	.73*	.69*	.70*

Note. CFO = first-order correlated factor model, SOF = second-order correlated factor model,

AD = affective dysregulation, ADHD = attention-deficit/hyperactivity disorder, ODD-D = oppositional defiant disorder – only defiant dimension.

* = $p < .001$.

^{a,b} Residuals of these items were allowed to correlate.

Table S5

Standardized Factor Loadings (Standard Error) of the First-Order Factors on the Second-Order Factor and Residual Variances (Standard Error) for the Second-Order Correlated Factor Model (SFO)

Dimension	Factor Loading on Second-Order Factor	Residual Variance
External		
AD-Irritability/Emotional Impulsivity	.90* (.01)	.20* (.03)
AD-Positive Emotionality	-.70* (.04)	.51* (.05)
AD-Exuberance	.91* (.02)	.18* (.04)
ADHD-Inattention	.81* (.02)	.34* (.04)
ADHD-Hyperactivity/Impulsivity	.86* (.02)	.27* (.03)
ODD-D	.89* (.02)	.20* (.03)

Note. AD = affective dysregulation, ADHD = attention-deficit/hyperactivity disorder, ODD-

D = oppositional defiant disorder – only defiant dimension.

* = $p < .001$.

Table S6

Standardized Factor Loadings as Obtained by Applying the Schmid-Leiman Transformation to the Second-Order Factor Model

Item	Item Loading on 2 nd -order factor (g)	Item Loading on 1 st -order factor (s)
AD- Irritability/Emotional Impulsivity		
Exhibits mood swings	.79	.39
Switches easily between activities	.56	.28
Calms down after being angry ^a	.58	.29
Easily frustrated	.73	.36
Can wait for good things	.67	.33
Angry about limit-setting	.75	.37
Impulsive	.74	.37
Demands must be met immediately	.72	.36
Often irritable	.86	.43
Often offended	.82	.41
Prolonged verbally aggressive tantrums	.75	.37
Prolonged physically aggressive tantrums	.62	.31
Chronically irritable mood	.67	.33
Easily annoyed by others	.75	.37
Often loses temper	.84	.42
Stays angry ^a	.66	.33
Is mostly angry	.70	.35
Irritability causes problems	.79	.39
M (SD)	.72 (.08)	.36 (.04)
Ratio (g/s)		2.01
AD-Positive Emotionality		
Is a happy child	-.57	.57
Responds positively to adults ^b	-.32	.33
Responds positively to peers ^b	-.31	.32
Verbalizes emotions	-.50	.51
Empathetic/caring	-.44	.45
M (SD)	-.43 (.11)	.44 (.11)
Ratio (g/s)		-.98
AD-Exuberance		
Can modulate excitement in high-energy situations	.75	.35
Prone to exuberant/disruptive outbursts of emotions	.86	.40
Overly exuberant when engaging others to play	.59	.28
Displays exuberance others find intrusive	.70	.32
M (SD)	.73 (.11)	.34 (.05)
Ratio (g/s)		2.16
ADHD-Inattention		
Overlooks details	.66	.47
Sustained attention	.73	.52
Does not listen	.67	.48
Incomplete execution of tasks	.74	.53
Difficulties with organization	.70	.50
Aversion to cognitive effort	.73	.52
Loses things	.61	.43
Easily distracted	.75	.54
Forgetful	.67	.48

M (<i>SD</i>)	.70 (.05)	.50 (.04)
Ratio (g/s)		1.40
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ADHD-Hyperactivity/Impulsivity		
Fidgets/squirms	.69	.41
Gets up	.68	.41
Walks/climbs	.74	.45
Inner restlessness	.66	.40
Difficulties playing quietly	.75	.44
Extreme agitation	.79	.48
Frequently on the go	.75	.45
Blurts	.70	.42
Difficulties waiting for own turn	.75	.45
Interrupts/disturbs	.78	.47
Talks a lot	.60	.36
M (<i>SD</i>)	.72 (.06)	.43 (.03)
Ratio (g/s)		1.66
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ODD-D		
Argues with adults	.74	.37
Does not follow rules	.82	.41
Annoys others	.72	.36
Accuses others	.77	.39
Spiteful/vindictive	.62	.31
M (<i>SD</i>)	.73 (.07)	.37 (.04)
Ratio (g/s)		1.99
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Total M(<i>SD</i>)	.61 (.35)	.30 (.07)

Note. M = mean, *SD* = standard deviation, AD = affective dysregulation, ADHD = attention-

deficit/hyperactivity disorder, ODD-D = oppositional defiant disorder – only defiant dimension.

^{a,b} Residuals of these items were allowed to correlate.

Table S7

Standardized Factor Loadings (Standard Error), Omega Statistics and Explained Common Variance for the Bifactor Model (BI)

Item	G External	S AD-II	S AD-PE	S AD-EX	S ADHD-IN	S ADHD-HI	S ODD-D
AD-Irritability/Emotional Impulsivity							
Exhibits mood swings	.77* (.03)	.46* (.04)					
Switches easily between activities	.58* (.04)	.21* (.06)					
Calms down after being angry ^a	.56* (.04)	.38* (.05)					
Easily frustrated	.75* (.03)	.31* (.04)					
Can wait for good things	.73* (.03)	.09 (.06)					
Angry about limit-setting	.79* (.03)	.21* (.04)					
Impulsive	.79* (.02)	.18* (.05)					
Demands must be met immediately	.75* (.03)	.23* (.05)					
Often irritable	.85* (.02)	.45* (.04)					
Often offended	.80* (.02)	.47* (.04)					
Prolonged verbally aggressive tantrums	.69* (.03)	.56* (.04)					
Prolonged physically aggressive tantrums	.56* (.04)	.49* (.06)					
Chronically irritable mood	.60* (.04)	.55* (.05)					
Easily annoyed by others	.77* (.03)	.31* (.04)					
Often loses temper	.84* (.02)	.40* (.04)					
Stays angry ^a	.58* (.04)	.57* (.04)					
Is mostly angry	.60* (.04)	.64* (.06)					
Irritability causes problems	.84* (.02)	.22* (.04)					
AD-Positive Emotionality							
Is a happy child	-.57* (.04)		.46* (.06)				
Responds positively to adults ^b	-.32* (.06)		.46* (.07)				
Responds positively to peers ^b	-.30* (.06)		.55* (.07)				
Verbalizes emotions	-.51* (.04)		.39* (.06)				

Empathetic/caring	-.44* (.05)	.54* (.06)	
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AD-Exuberance			
Can modulate excitement in high-energy situations	.76* (.03)	.10 (.06)	
Prone to exuberant/disruptive outbursts of emotions	.86* (.02)	.17* (.05)	
Overly exuberant when engaging others to play	.58* (.04)	.45* (.09)	
Displays exuberance others find intrusive	.69* (.04)	.81* (.15)	
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ADHD-Inattention			
Overlooks details	.65* (.03)	.53* (.04)	
Sustained attention	.74* (.03)	.49* (.04)	
Does not listen	.68* (.04)	.41* (.04)	
Incomplete execution of tasks	.74* (.03)	.52* (.04)	
Difficulties with organization	.67* (.03)	.60* (.04)	
Aversion to cognitive effort	.76* (.03)	.40* (.04)	
Loses things	.56* (.04)	.59* (.04)	
Easily distracted	.78* (.03)	.45* (.04)	
Forgetful	.64* (.03)	.58* (.04)	
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ADHD-Hyperactivity/Impulsivity			
Fidgets/squirms	.66* (.03)	.52* (.04)	
Gets up	.66* (.04)	.47* (.05)	
Walks/climbs	.70* (.04)	.56* (.05)	
Inner restlessness	.65* (.04)	.43* (.06)	
Difficulties playing quietly	.74* (.03)	.45* (.04)	
Extreme agitation	.77* (.03)	.54* (.04)	
Frequently on the go	.72* (.03)	.53* (.04)	
Blurts	.72* (.03)	.35* (.05)	
Difficulties waiting for own turn	.79* (.03)	.27* (.05)	
Interrupts/disturbs	.82* (.02)	.25* (.04)	
Talks a lot	.61* (.04)	.31* (.05)	
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ODD-Defiant Dimension			
Argues with adults	.77* (.03)		.41* (.04)

Does not follow rules	.82* (.02)						.44* (.05)
Annoys others	.72* (.03)						.46* (.06)
Accuses others	.78* (.03)						.20* (.05)
Spiteful/vindictive	.62* (.05)						.38* (.08)
ω	.99	.98	.78	.92	.97	.96	.92
ω H/ ω HS	.89	.21	.44	.20	.32	.25	.19
ECV	.71	.08	.03	.03	.07	.06	.02

Note. G = general factor, S = specific factor, AD = affective dysregulation, Π = irritability/emotional impulsivity, PE = positive emotionality, EX = exuberance, ADHD = attention-deficit/hyperactivity disorder, ODD-D = oppositional defiant disorder – only defiant dimension, ω = omega (amount of variance accounted for by the g- and s-factors taken together), ω H = omega hierarchical (amount of variance accounted for by the g-factor), ω HS = omega hierarchical subscale (amount of variance accounted for by the s-factors), ECV = explained common variance (proportion of all common variance explained by that factor; for specific factors, the ECV computes the strength of a specific factor relative to all explained variance only of all items, even those not loading on the specific factor).

* = $p < .001$.

^{a,b} Residuals of these items were allowed to correlate.

Table S8*Standardized Factor Loadings (Standard Error) for the Bifactor S-1 Model (BI S-1) with AD-II as Reference Factor*

Item	Reference AD-II	S AD-PE	S AD-EX	S ADHD-IN	S ADHD-HI	S ODD-D
AD-Irritability/Emotional Impulsivity						
Exhibits mood swings	.89* (.02)					
Switches easily between activities	.63* (.04)					
Calms down after being angry ^a	.65* (.04)					
Easily frustrated	.82* (.02)					
Can wait for good things	.75* (.03)					
Angry about limit-setting	.83* (.02)					
Impulsive	.83* (.02)					
Demands must be met immediately	.80* (.03)					
Often irritable	.96* (.01)					
Often offended	.92* (.01)					
Prolonged verbally aggressive tantrums	.84* (.02)					
Prolonged physically aggressive tantrums	.69* (.03)					
Chronically irritable mood	.74* (.03)					
Easily annoyed by others	.84* (.02)					
Often loses temper	.93* (.01)					
Stays angry ^a	.74* (.03)					
Is mostly angry	.78* (.03)					
Irritability causes problems	.89* (.02)					
AD-Positive Emotionality						
Is a happy child	-.59* (.04)	.49* (.06)				
Responds positively to adults ^b	-.33* (.06)	.45* (.07)				
Responds positively to peers ^b	-.32* (.06)	.56* (.07)				
Verbalizes emotions	-.52* (.04)	.33* (.07)				

Empathetic/caring	-.45* (.05)	.49* (.07)	
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AD-Exuberance			
Can modulate excitement in high-energy situations	.72* (.03)		.31* (.06)
Prone to exuberant/disruptive outbursts of emotions	.82* (.02)		.30* (.05)
Overly exuberant when engaging others to play	.50* (.05)		.59* (.05)
Displays exuberance others find intrusive	.57* (.04)		.77* (.05)
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ADHD-Inattention			
Overlooks details	.57* (.04)		.60* (.04)
Sustained attention	.63* (.04)		.65* (.03)
Does not listen	.59* (.04)		.55* (.04)
Incomplete execution of tasks	.64* (.03)		.65* (.03)
Difficulties with organization	.56* (.04)		.69* (.03)
Aversion to cognitive effort	.68* (.03)		.52* (.03)
Loses things	.47* (.04)		.63* (.04)
Easily distracted	.68* (.03)		.59* (.03)
Forgetful	.54* (.04)		.67* (.03)
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ADHD-Hyperactivity/Impulsivity			
Fidgets/squirms	.54* (.04)		.63* (.03)
Gets up	.54* (.04)		.63* (.04)
Walks/climbs	.57* (.04)		.71* (.03)
Inner restlessness	.55* (.04)		.54* (.05)
Difficulties playing quietly	.62* (.04)		.61* (.04)
Extreme agitation	.66* (.03)		.65* (.03)
Frequently on the go	.61* (.04)		.64* (.04)
Blurts	.61* (.04)		.53* (.04)
Difficulties waiting for own turn	.70* (.03)		.45* (.04)
Interrupts/disturbs	.72* (.03)		.49* (.04)
Talks a lot	.52* (.04)		.47* (.05)
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ODD-Defiant Dimension			
Argues with adults	.73* (.03)		.45* (.04)

Does not follow rules	.78* (.02)	.51* (.05)
Annoys others	.68* (.03)	.49* (.05)
Accuses others	.75* (.03)	.33* (.05)
Spiteful/vindictive	.60* (.04)	.39* (.07)

Note. S = specific factor, AD = affective dysregulation, II = irritability/emotional impulsivity, PE = positive emotionality, EX = exuberance, ADHD = attention-deficit/hyperactivity disorder, IN = inattention, HI = hyperactivity/impulsivity, ODD-D = oppositional defiant disorder – only defiant dimension.

* = $p < .001$.

^{a,b} Residuals of these items were allowed to correlate.

Table S9*Residual Correlations in the Bifactor S-1 Model (BI S-1) with AD-II as Reference Factor*

Variable	1	2	3	4	5	6
1. AD-II	–					
2. AD-PE	n/a	–				
3. AD-EX	n/a	.16	–			
4. ADHD-IN	n/a	-.05	.27*	–		
5. ADHD-HI	n/a	.13	.56*	.58*	–	
6. ODD-D	n/a	-.08	.09	.19*	.25*	–

Note. AD = affective dysregulation, II = irritability/emotional impulsivity, PE = positive emotionality, EX = exuberance, ADHD = attention-deficit/hyperactivity disorder, IN = inattention, HI = hyperactivity/impulsivity, ODD-D = oppositional defiant disorder – only defiant dimension.

* = $p < .05$.

n/a = not applicable, as correlations between the reference factor and the specific factors were restrained to 0.

Table S10

(Residual) Correlations of the Bifactor S-1 Model (BI S-1) Factors with AD-II as Reference Factor with External Correlates

Factor BI S-1 model	PROMIS	FRUST-A	FRUST-M
AD-II (Reference factor)	.90*	-.71*	.82*
AD-PE	.08*	.46*	-.11*
AD-EX	-.09*	.10	-.18*
ADHD-IN	-.11*	-.05	-.08*
ADHD-HI	-.14*	.02	-.10*
ODD-D	-.04	.00	.09*
PROMIS		-.59*	.74*
FRUST-A			-.77*

Note. AD = affective dysregulation, II = irritability/emotional impulsivity, PE = positive emotionality, EX = exuberance, ADHD = attention-deficit/hyperactivity disorder, IN = inattention, HI = hyperactivity/impulsivity, ODD-D = oppositional defiant disorder – only defiant dimension.

* = $p < .05$. PROMIS = Patient-Reported Outcomes Measurement Information System – Parent Proxy Anger Scale, A = adaptive, M = maladaptive

Table S11

Standardized Factor Loadings (Standard Error) for the Bifactor S-1 Model (BI S-1; ODD-D) with ODD-D as Reference Factor

Item	Reference ODD-D	S AD-II	S AD-PE	S AD-EX	S ADHD-IN	S ADHD-HI
AD-Irritability/Emotional Impulsivity						
Exhibits mood swings	.82* (.03)	.36* (.05)				
Switches easily between activities	.59* (.04)	.22* (.06)				
Calms down after being angry ^a	.59* (.04)	.36* (.06)				
Easily frustrated	.79* (.03)	.19* (.06)				
Can wait for good things	.76* (.03)	-.05 (.07)				
Angry about limit-setting	.81* (.03)	.12 (.05)				
Impulsive	.83* (.02)	-.01 (.06)				
Demands must be met immediately	.79* (.03)	.10 (.06)				
Often irritable	.90* (.02)	.33* (.04)				
Often offended	.86* (.02)	.36* (.04)				
Prolonged verbally aggressive tantrums	.76* (.03)	.44* (.05)				
Prolonged physically aggressive tantrums	.62* (.04)	.39* (.07)				
Chronically irritable mood	.65* (.04)	.55* (.05)				
Easily annoyed by others	.81* (.03)	.17* (.06)				
Often loses temper	.89* (.02)	.26* (.05)				
Stays angry ^a	.64* (.04)	.53* (.05)				
Is mostly angry	.66* (.04)	.57* (.06)				
Irritability causes problems	.88* (.02)	.07 (.05)				
AD-Positive Emotionality						
Is a happy child	-.55* (.04)		.74* (.08)			
Responds positively to adults ^b	-.31* (.06)		.39* (.07)			
Responds positively to peers ^b	-.30* (.06)		.49* (.08)			
Verbalizes emotions	-.51* (.04)		.27* (.07)			

Empathetic/caring	-.44* (.05)	.34* (.07)
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AD-Exuberance		
Can modulate excitement in high-energy situations	.74* (.03)	.20* (.07)
Prone to exuberant/disruptive outbursts of emotions	.84* (.02)	.19* (.05)
Overly exuberant when engaging others to play	.53* (.05)	.56* (.06)
Displays exuberance others find intrusive	.62* (.04)	.79* (.08)
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ADHD-Inattention		
Overlooks details	.60* (.04)	.56* (.04)
Sustained attention	.67* (.03)	.60* (.04)
Does not listen	.63* (.04)	.49* (.04)
Incomplete execution of tasks	.68* (.03)	.60* (.03)
Difficulties with organization	.61* (.04)	.66* (.03)
Aversion to cognitive effort	.72* (.03)	.47* (.04)
Loses things	.51* (.04)	.61* (.04)
Easily distracted	.72* (.03)	.54* (.03)
Forgetful	.58* (.04)	.63* (.04)
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ADHD-Hyperactivity/Impulsivity		
Fidgets/squirms	.61* (.04)	.57* (.04)
Gets up	.60* (.04)	.57* (.04)
Walks/climbs	.64* (.04)	.64* (.04)
Inner restlessness	.61* (.04)	.47* (.05)
Difficulties playing quietly	.69* (.04)	.53* (.04)
Extreme agitation	.73* (.03)	.57* (.04)
Frequently on the go	.68* (.04)	.57* (.04)
Blurts	.67* (.04)	.46* (.04)
Difficulties waiting for own turn	.75* (.03)	.36* (.04)
Interrupts/disturbs	.78* (.03)	.39* (.04)
Talks a lot	.57* (.04)	.40* (.05)
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ODD-Defiant Dimension		

Argues with adults	.80* (.02)
Does not follow rules	.85* (.02)
Annoys others	.75* (.03)
Accuses others	.79* (.02)
Spiteful/vindictive	.65* (.04)

Note. S = specific factor, ODD-D = oppositional defiant disorder – only defiant dimension, AD = affective dysregulation, II = irritability/emotional impulsivity,

PE = positive emotionality, EX = exuberance, ADHD = attention-deficit/hyperactivity disorder, IN = inattention, HI = hyperactivity/impulsivity.

* = $p < .001$.

^{a,b} Residuals of these items were allowed to correlate.

Table S12

Standardized Factor Loadings (Standard Error) for the Bifactor S-1 Model (BI S-1; ADHD-IN) with ADHD-IN as Reference Factor

Item	Reference ADHD-IN	S AD-II	S AD-PE	S AD-EX	S ADHD-HI	S ODD-D
AD-Irritability/Emotional Impulsivity						
Exhibits mood swings	.60* (.04)	.66* (.03)				
Switches easily between activities	.47* (.04)	.41* (.05)				
Calms down after being angry ^a	.41* (.05)	.54* (.04)				
Easily frustrated	.63* (.04)	.51* (.04)				
Can wait for good things	.64* (.04)	.36* (.04)				
Angry about limit-setting	.63* (.04)	.54* (.04)				
Impulsive	.67* (.04)	.46* (.04)				
Demands must be met immediately	.59* (.04)	.53* (.04)				
Often irritable	.68* (.03)	.68* (.03)				
Often offended	.63* (.04)	.68* (.03)				
Prolonged verbally aggressive tantrums	.50* (.04)	.71* (.03)				
Prolonged physically aggressive tantrums	.41* (.05)	.60* (.05)				
Chronically irritable mood	.39* (.05)	.71* (.04)				
Easily annoyed by others	.64* (.04)	.53* (.04)				
Often loses temper	.67* (.03)	.65* (.03)				
Stays angry ^a	.37* (.05)	.72* (.03)				
Is mostly angry	.38* (.06)	.78* (.04)				
Irritability causes problems	.72* (.03)	.50* (.04)				
AD-Positive Emotionality						
Is a happy child	-.39* (.05)		.83* (.06)			
Responds positively to adults ^b	-.24* (.06)		.43* (.06)			
Responds positively to peers ^b	-.20* (.06)		.50* (.07)			
Verbalizes emotions	-.46* (.05)		.48* (.06)			

Empathetic/caring	-.39* (.05)	.51* (.06)
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AD-Exuberance		
Can modulate excitement in high-energy situations	.66* (.04)	.44* (.05)
Prone to exuberant/disruptive outbursts of emotions	.61* (.04)	.81* (.05)
Overly exuberant when engaging others to play	.46* (.05)	.48* (.06)
Displays exuberance others find intrusive	.57* (.05)	.51* (.05)
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ADHD-Inattention		
Overlooks details	.81* (.02)	
Sustained attention	.89* (.02)	
Does not listen	.81* (.03)	
Incomplete execution of tasks	.90* (.02)	
Difficulties with organization	.85* (.02)	
Aversion to cognitive effort	.89* (.02)	
Loses things	.74* (.03)	
Easily distracted	.92* (.02)	
Forgetful	.82* (.02)	
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ADHD-Hyperactivity/Impulsivity		
Fidgets/squirms	.64* (.03)	.48* (.04)
Gets up	.66* (.04)	.42* (.05)
Walks/climbs	.69* (.04)	.53* (.04)
Inner restlessness	.58* (.05)	.53* (.05)
Difficulties playing quietly	.71* (.04)	.48* (.04)
Extreme agitation	.70* (.04)	.64* (.04)
Frequently on the go	.67* (.04)	.58* (.04)
Blurts	.65* (.04)	.50* (.04)
Difficulties waiting for own turn	.74* (.03)	.44* (.04)
Interrupts/disturbs	.78* (.03)	.42* (.04)
Talks a lot	.53* (.04)	.50* (.04)
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ODD-Defiant Dimension		

Argues with adults	.56* (.04)	.67* (.04)
Does not follow rules	.63* (.04)	.66* (.04)
Annoys others	.54* (.05)	.62* (.05)
Accuses others	.64* (.04)	.54* (.04)
Spiteful/vindictive	.42* (.06)	.62* (.07)

Note. S = specific factor, ADHD = attention-deficit/hyperactivity disorder, IN = inattention, AD = affective dysregulation, II = irritability/emotional impulsivity,

PE = positive emotionality, EX = exuberance, HI = hyperactivity/impulsivity, ODD-D = oppositional defiant disorder – only defiant dimension.

* = $p < .001$.

^{a,b} Residuals of these items were allowed to correlate.

Table S13

Standardized Factor Loadings (Standard Error) for the Bifactor S-1 Model (BI S-1; ADHD-HI) with ADHD-HI as Reference Factor

Item	Reference ADHD-HI	S AD-II	S AD-PE	S AD-EX	S ADHD-IN	S ODD-D
AD-Irritability/Emotional Impulsivity						
Exhibits mood swings	.61* (.04)	.66* (.03)				
Switches easily between activities	.44* (.04)	.45* (.05)				
Calms down after being angry ^a	.40* (.05)	.56* (.04)				
Easily frustrated	.63* (.04)	.51* (.04)				
Can wait for good things	.66* (.03)	.32* (.04)				
Angry about limit-setting	.64* (.04)	.52* (.04)				
Impulsive	.71* (.03)	.39* (.04)				
Demands must be met immediately	.63* (.04)	.48* (.04)				
Often irritable	.69* (.03)	.67* (.03)				
Often offended	.64* (.04)	.67* (.03)				
Prolonged verbally aggressive tantrums	.53* (.05)	.70* (.04)				
Prolonged physically aggressive tantrums	.44* (.05)	.58* (.05)				
Chronically irritable mood	.40* (.05)	.73* (.04)				
Easily annoyed by others	.65* (.03)	.51* (.03)				
Often loses temper	.70* (.03)	.62* (.03)				
Stays angry ^a	.40* (.05)	.71* (.03)				
Is mostly angry	.42* (.06)	.74* (.04)				
Irritability causes problems	.74* (.03)	.46* (.04)				
AD-Positive Emotionality						
Is a happy child	-.32* (.05)		.86* (.06)			
Responds positively to adults ^b	-.19* (.06)		.46* (.06)			
Responds positively to peers ^b	-.15* (.06)		.54* (.07)			

Verbalizes emotions	-.41* (.05)	.45* (.05)
Empathetic/caring	-.34* (.05)	.44* (.05)
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AD-Exuberance		
Can modulate excitement in high-energy situations	.70* (.04)	.39* (.06)
Prone to exuberant/disruptive outbursts of emotions	.72* (.03)	.65* (.06)
Overly exuberant when engaging others to play	.60* (.04)	.17* (.07)
Displays exuberance others find intrusive	.71* (.04)	.18* (.06)
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ADHD-Inattention		
Overlooks details	.63* (.04)	.56* (.03)
Sustained attention	.74* (.03)	.48* (.04)
Does not listen	.68* (.04)	.43* (.04)
Incomplete execution of tasks	.73* (.03)	.54* (.04)
Difficulties with organization	.65* (.04)	.61* (.03)
Aversion to cognitive effort	.74* (.03)	.46* (.04)
Loses things	.52* (.05)	.62* (.04)
Easily distracted	.77* (.03)	.49* (.04)
Forgetful	.62* (.04)	.59* (.04)
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ADHD-Hyperactivity/Impulsivity		
Fidgets/squirms	.80* (.02)	
Gets up	.79* (.03)	
Walks/climbs	.86* (.02)	
Inner restlessness	.76* (.04)	
Difficulties playing quietly	.86* (.02)	
Extreme agitation	.92* (.02)	
Frequently on the go	.87* (.02)	
Blurts	.81* (.03)	
Difficulties waiting for own turn	.87* (.02)	
Interrupts/disturbs	.91* (.02)	
Talks a lot	.70* (.03)	
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ODD-Defiant Dimension		
Argues with adults	.61* (.04)	.62* (.04)
Does not follow rules	.65* (.04)	.65* (.04)
Annoys others	.57* (.05)	.58* (.05)
Accuses others	.65* (.03)	.54* (.04)
Spiteful/vindictive	.49* (.06)	.53* (.07)

Note. S = specific factor, ADHD = attention-deficit/hyperactivity disorder, HI = hyperactivity/impulsivity, AD = affective dysregulation, II = irritability/emotional impulsivity, PE = positive emotionality, EX = exuberance, ODD-D = oppositional defiant disorder – only defiant dimension.

* = $p < .001$.

^{a,b} Residuals of these items were allowed to correlate