Development and Validation of the Attentional Control of Deep Concentration (ACDC) Scale

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Background

ADHD & Hyperfocus: ADHD is marked by a spectrum of attention-regulation difficulties, including *hyperfocus*, which is defined as a temporary state of deeply focused attention that is out of one's control[1]

Existing Measures Limitation: The two existing measures[2,3]
tend to measure the consequences of hyperfocus rather than the construct itself, insufficiently addressing the aspect of attentional control

Hyperfocus vs. Flow: While hyperfocus and flow both involve intense engagement, hyperfocus is distinguished by a lack of voluntary control, whereas flow is often defined by controlled immersion[4]

Aims

To develop a novel self-report measure – the **Attentional Control of Deep Concentration scale (ACDC)** – targeting the attentional control characteristic of hyperfocus to better distinguish this element of hyperfocus from similar attentional states such as flow. This was approached across two phases with two independent non-clinical samples

Phase One:
- Development and evaluation of an initial item pool and evaluate its validity

Phase Two:
- Revision of item pool and initial validation via correlations with related measures

Conclusion

- Findings are in line with the developing theory that hyperfocus may be best understood as a unique attentional state distinguished by involuntary engagement and control difficulties[1]
- There is still room for improvement in the model fit indices of the ACDC scale's fit. Therefore, further refinement is required

Measures

Hyperfocus: Attentional Control of Deep Concentration Scale (ACDC); Hyperfocusing Scale (HFS)[2]; Dispositional Hyperfocus subscale of the Adult Hyperfocus Questionnaire (AHFQ)[3]
Flow: Deep Effortless Concentration External (DEC-E) and Internal scales (DEC-I)[4]

ADHD symptoms: Adult ADHD Self-Report Scale Screener (ASRS-S)[5]

Control: Brief Self-Control Scale (BSCS)[6]

Participants

	Phase One (n = 133)	Phase Two (n = 108)
Age (years)	M = 25.5 , SD = 3.1	M = 20.34 , SD = 3.1
Gender	53% Female; 47% Male	73% Female; 25% Male; 2% Other
Collection Pool	Prolific	SONA

Procedure

1. **Literature Review** — Centering on personal accounts of hyperfocus experiences
2. **Initial Item Pool** — Developing initial 28 items
3. **Initial Evaluation** — Internal consistency reliability (Cronbach's α), confirmatory and exploratory factor analyses

Phase One

4. **Item Revision** — Revising dimensionality and scale items
5. **Revised Evaluation** — Examining validity of revised scale with an independent sample
6. **Correlations** — Evaluating convergent and divergent validity by correlating with other scales

Phase Two

Phase One Results

3. Initial Evaluation

- An Exploratory Factor Analysis (EFA) using Principal Components Analysis (PCA) revealed a two-factor structure with suboptimal fit
- Item refinements were made for clarity and theoretical coherence
- Confirmatory factor analysis (CFA) confirmed a two-factor structure, demonstrating high factor loadings (.46 to .90), a moderate positive correlation between the two factors (r = .68, p < .001), and a promising but suboptimal model fit

Model	χ^2	df	χ^2/df	CFI	RMSEA [90% CI]
Standard cutoffs[7,8]	-	-	≤ 2	≥ .9	≤ .08
EFA 2-factor	598.82	323	1.85	.87	.08[.07, .09]
CFA 2-factor	299.92	151	1.99	.90	.09[.07, .1]

Factor 1 - 'Experiential Characteristics': Reflects the immediate impact and experiences of intense focus within the state
Factor 2 - 'Predictability': Addresses the unpredictability and challenges of entering and maintaining hyperfocus states

Phase One's suboptimal fit necessitates Phase Two's refinement towards a singular factor measure encompassing both intense focus and attentional control abilities.

Phase Two Results

4. Item Revision

- Refinement focused on isolating the attentional control aspect of hyperfocus within the scale items by selecting items that coherently measure both control and focus

5. Revised Evaluation

- An EFA revealed a single-structure model that demonstrated high factor loadings (.43 to .90), but fit indices still suggested room for improvement

Model	χ^2	Df	χ^2/df	CFI	RMSEA [90% CI]
Standard cutoffs[7,8]	-	-	≤ 2	≥ .9	≤ .08
EFA 1-factor	125.60	44	2.85	.84	.13[.11, 16]

6. Correlations With Other Measures

	Hyperfocus		Flow		ADHD	Control
	HFS	AHFQ	DEC-E	DEC-I	ASRS-S	BSCS
ACDC (attentional control of deep concentration)	.72***	.69***	.01	.09	.57***	-.29**

Note: ** p < .01, *** p < .001

- Correlation results demonstrated the ACDC scale's convergent validity with existing hyperfocus and self-control measures, discriminant validity from flow measures, and positive correlation with ADHD symptomatology

References

[1] Ayers-Glassey, S., & Smilek, D. (2023). The relations between hyperfocus and similar attentional states, adult ADHD symptoms, and affective dysfunction. *Current Psychology.* Advance online publication. https://doi.org/10.1007/s12144-023-05235-3 **[2]** Hupfeld, K. E., Abagis, T. R., & Shah, P. (2019). Living in the zone: Hyperfocus in adult ADHD. *ADHD Attention Deficit and Hyperactivity Disorders, 11*(2), 191–208. https://doi.org/10.1007/s12402-018-0272-y **[3]** Ozel-Kizil, E. T., Kokurcan, A., Aksoy, U. M., Kanat, B. B., Sakarya, D., Bastug, G., Colak, B., Altunoz, U., Kirici, S., Demirbas, H., & Oncu, B. (2016). Hyperfocusing as a dimension of adult attention deficit hyperactivity disorder. *Research in Developmental Disabilities*, 59, 351–358. https://doi.org/10.1016/j.ridd.2016.09.016 **[4]** Marty-Dugas, J., & Smilek, D. (2019). Deep, effortless concentration: Re-examining the flow concept and exploring relations with inattention, absorption, and personality. *Psychological Research, 83*(8), 1760–1777. https://doi.org/10.1007/s00426-018-1031-6 **[5]** Kessler, R. C., Adler, L., Ames, M., Demler, O., Faraone, S., Hiripi, E., Howes, M. J., Jin, R., Secnik, K., Spencer, T., Ustun, T. B., & Walters, E. E. (2005). The World Health Organization adult ADHD self-report scale (ASRS): A short screening scale for use in the general population. *Psychological Medicine, 35*(2), 245–256 https://doi.org/10.1017/S0033291704002892 **[6]** Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271–324. https://doi.org/10.1111/j.0022- 3506.2004.00263.x **[7]** Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of Consulting and Clinical Psychology, 55*(4), 584–594. https://doi.org/10.1037/0022-006X.55.4.584 **[8]** Brown, T. A. (2015). *Confirmatory factor analysis for applied research*, (2nd ed., pp. xvii, 462). The Guilford Press.