



# ADHD & co-occurring internalising problems: exploring mechanisms

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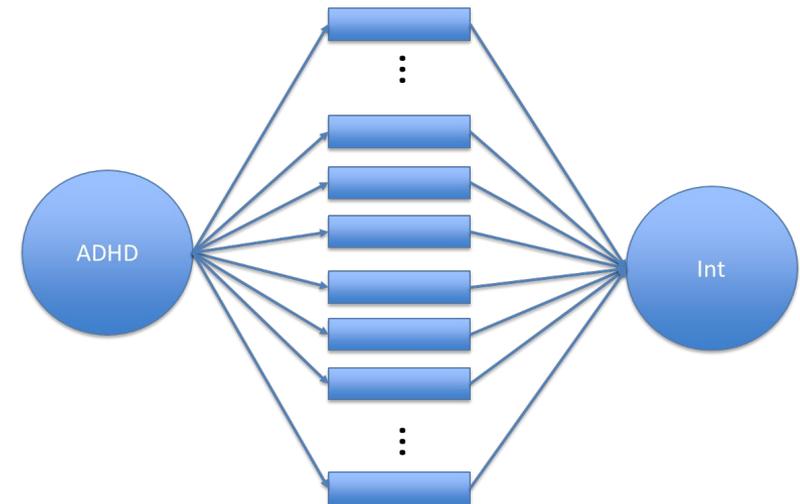
# Background

- ADHD commonly associated with internalising problems
  - ~25% anxiety disorder
  - ~30% experience depressive episode before age 30
- Understanding nature of the links important for informing interventions
  - Directionality? E.g., [Murray et al. \(2020\)](#)
  - Which symptoms? E.g., [Speyer et al. \(2021\)](#)
  - Mediating mechanisms? E.g., [Antony, Pihlajamaki et al. \(2022\)](#)
  - Implications? E.g., [Murray et al. \(2018\)](#)



# Mediating mechanisms?

- Which factors link ADHD symptoms & internalising problems?
- Many mediators of small to moderate effect (e.g., Murray et al. in prep)
- But also some key ones





# Emotion dysregulation (ED) as a key mediator

- **ED:** *‘Expression/experience of emotion excessive relative to social norms, developmental stage, context’*
- Common in ADHD (~25-45%)
- Also associated with internalising problems
- Possible mediator?
- Key limitations of previous work:
  - Lack of **longitudinal** studies
  - Lack of studies of emotion dysregulation as it manifests in the course of daily life in **‘ecological context’**

# Longitudinal evidence:

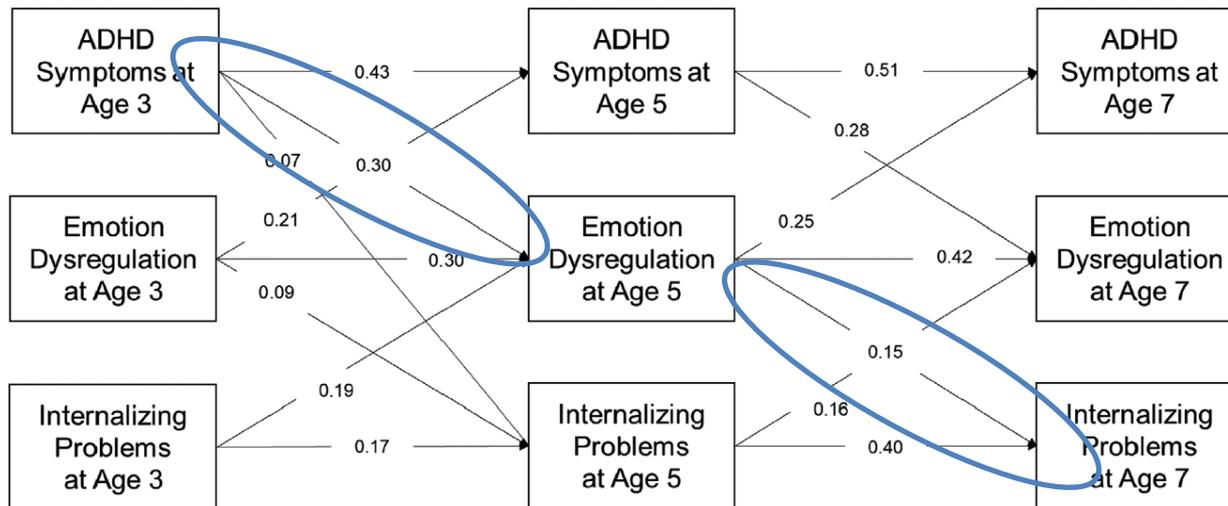


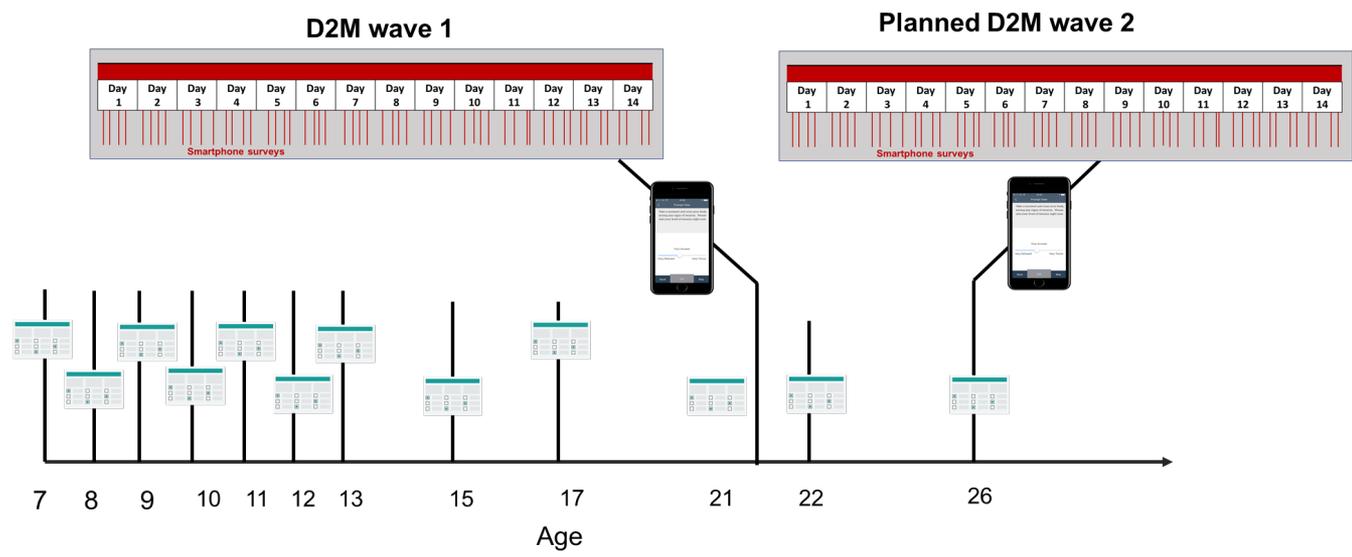
Figure 1 Unstandardized autoregressive and cross-lagged estimates from the ALT-SR fit to the male subsample. Note. Solid lines represent statistically significant paths at  $p < .05$ . Latent growth curve and covariance parameters are omitted for clarity

## [Antony, Pihlajamaki et al. \(2022\) JCPP:](#)

- ALT-SR model fit to Millennium Cohort Study ages 3,5,7 (n=9,619)
  - **Significant indirect effect** ( $b=0.04$ ; 95% CI = 0.03 -0.06)
  - No significant direct effect (full mediation)
  - Highly similar in male vs female sub-sample

# Ecological context evidence

= Main survey      = EMA survey



N= 255 convenience sample from z-proso (e.g., [Murray et al. 2022](#)):

- 4x a day for 2 weeks on own smartphones
- Measures of context, provocations, substance use, stress, negative affect, aggression

Linked to ADHD and internalising symptoms from main cohort



# Derived measures of ED\*

- **Levels**

**Negative emotion levels**

Mean negative emotion levels

- **Variability**

**Emotional lability**

Variation in negative emotion levels

- **Inertia**

**Emotional inertia**

Autoregressive effects of emotions over time

- **Coupling**

**Emotional reactivity**

Strength of relations between event and emotional reaction

**Behavioural reactivity**

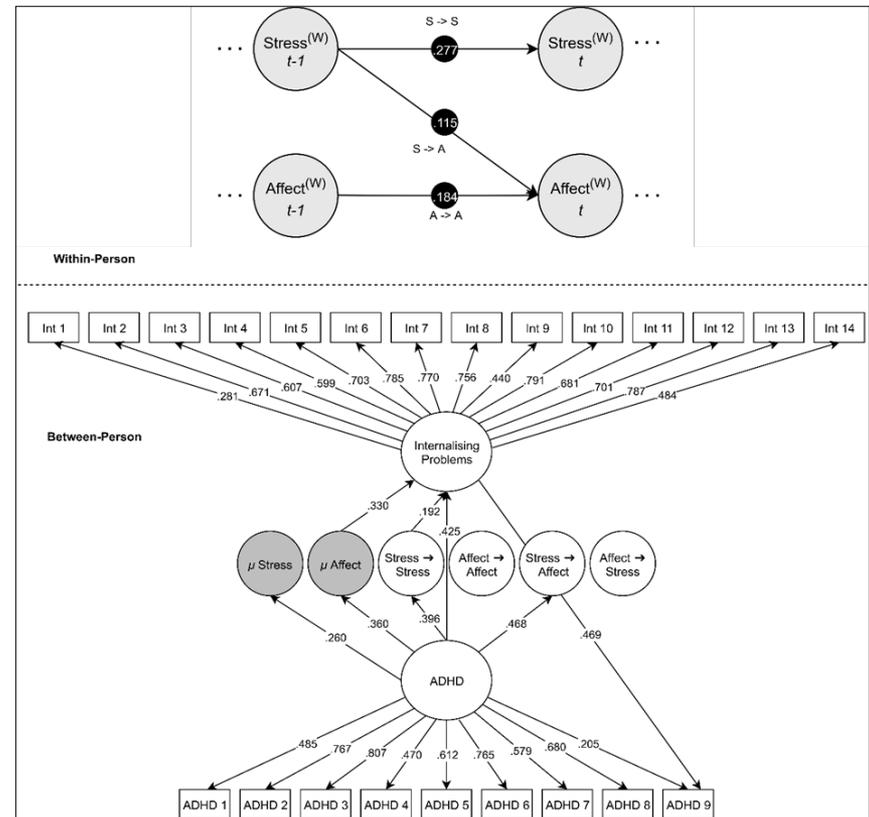
Strength of relations between event/emotion and behavioural reaction

\*using dynamic structural equation modelling (DSEM) e.g. [Zhu et al., \(2023\)](#)



# Example findings

- [Speyer et al. \(2023\) JADD](#):
- Higher ADHD:
  - Higher levels of **daily life stress**
  - Higher levels of **daily life negative affect\***
  - Stronger **persistence of stress** over time\*
  - Stronger **links** between **stress** and later **negative affect**
- \*mediated links with internalising problems





# Implications

- There are likely to **wide range of mediators**
- **Emotion regulation & stress regulation** are key targets for preventing development of secondary internalising problems
- More research needed on development/adaptation of therapeutic approaches suited for ADHD