Mother knows best? A methodological note on the impact of informant identities for psychometric response scores in Growing Up in Scotland birth cohort data

UK Health Studies User Conference

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Who I am...

- PhD student in Social Policy at the University of Edinburgh
- Primary project: "Investigating the impact of critical events in children's lives on their social and emotional development"

Why I am here...

I got stuck in a rabbit hole along the way:
  How can I incorporate more youth self-reported data into my analysis?

And, where self-reported and/or multiple-perspective data is unavailable:
  Can I better characterise potential bias and information gaps present in single-reporter data? ***Whose perspectives are we missing?***

Mother knows best? A method-ological note on the impact of informant identities for psycho-metric response scores in Growing Up in Scotland birth cohort data

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1. Dataset and Goodman's Strengths and Difficulties Questionnaire (SDQ) overview
2. Why reporter disagreement matters
3. Methods
4. Preliminary findings from parent-teacher and parent-adolescent discrepancies
5. Highlight methodological limitations and research gaps
6. Open floor to discussion:

   How can we, as a community of health studies data users, accommodate divergent perspectives in children's mental health assessments?

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Data overview

Growing Up in Scotland (GUS) is a nationally representative birth cohort dataset generating a diverse range of information from children and their families.

Birth Cohort 1

- 5,217 children, born in Scotland in 2004/05

Sweeps in this study:

- Sweep 8 (2014/15)
  - Including Primary 6 teacher reports. Age 10.
  - n = 1,833
- Sweep 10 (2019/20)
  - Age 14
  - This study excludes data collected after March 2020.
  - n = 2,943

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Applying LDS to Growing Up in Scotland

Thank you!

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Goodman's (1997) Strengths and Difficulties Questionnaire (SDQ)

- 25-item psychometric screening scale of **internalising** (emotional and peer problems), **externalising** (hyperactivity and conduct problems) and **pro-social** behaviours
- Written for ages 4 to 16
- Completed by: teachers, parents and adolescent self-reports.
  - However, much data (and therefore research) is from mother's reports alone
- Omnipresent in UK datasets (MCS, GUS, UKHLS, MHCYP, REACH, ALSPAC, BiB, DASH... and more!)
- Wide adaptation raises the stakes for us to understand its biases and potential missing perspectives

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Why do multiple informant perspectives matter?

- Qualitative research identified parent and teacher unease with being the "solo" authority (Kersten et al 2016; White et al 2013).
- Informant divergence shapes research conclusions:
  - Statistical significance and effect size of the health-income impact varies depending on whether parental, teacher, child or psychiatric reporter data is used (Johnston et al 2010)
- Ignoring self-reports enacts "epistemic injustice" (Fricker 2007) against children's agency (Carel and Györffy 2014).
- Patterned informant group discrepancies may reflect substantively important perspective differences.

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Descriptive correlations

- Children tend to self-report fewer strengths and greater difficulties than adults (Goodman et al 2010).
- Low correlation between informant types is widely identified but under-accounted for in applied research

SDQ inter-reporter correlations GUS (survey weighted)

	Total	Emotion	Peer	Conduct	Hyper	Pro-social
parent-child (age 14)	0.48	0.43	0.41	0.47	0.39	0.27
parent-teacher (age 10)	0.48	0.35	0.47	0.34	0.49	0.22

- However, correlations alone do not predict **how** and **why** results diverge.

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Method 1: Observed Difference Scores (ODS)

$$\text{difference} = \text{score}_A - \text{score}_B$$

$$\text{difference} = \beta_0 + \beta_1 X_1 + ... \beta_k X_k.. + \epsilon \ ,$$

$X_1 =$ gender, $X_2 =$ parental education, $X_3 =$ parental mental health, X_4 housing type, $\ldots$ etc.

Criticisms of ODS:

1. Conflates informant-discrepancy effects with main effects (Laird and De Los Reyes 2013).

2. Assumes the cause of inter-informant differences has equal weight on all groups (Edwards 2002).

3. Does not evaluate inter-group metric variance.

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Method 2: Latent difference score (LDS) models

One answer to ODS limitations is to model differences in the latent factor directly, not observed scores.

Latent difference score (LDS) methods were developed by de Haan et al (2018), adapting from latent change scores (LCS) (McArdle 2009, and applied to SDQ adolescent-parent rater pairs in Booth et al (2023).

Booth *et al.*
Child and Adolescent Psychiatry and Mental Health   (2023) 17:57
https://doi.org/10.1186/s13034-023-00605-y

Child and Adolescent Psychiatry and Mental Health

RESEARCH   **Open Access**

Parent-adolescent informant discrepancy on the Strengths and Difficulties Questionnaire in the UK Millennium Cohort Study

Charlotte Booth[1*], Dario Moreno-Agostino[1,2] and Emla Fitzsimons[1]

Conceptual equation

$$Y_{reportB} = 1 * Y_{reportA} + 1 * \Delta_{A,B}$$

Factor loadings of $Y_{reportA}$ and $\Delta_{A,B}$ are constrained to equal 1. This creates a second-order latent factor of the part of $Y_{reportB}$ that is not equal to $Y_{reportA}$.

- Compares the means of the latent factors (the underlying constructs) of the observed informant groups.
- Positive LDS means indicate reporter group B provided comparatively higher scores, relative to group A.

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Applying LDS to Growing Up in Scotland

- New sample: Growing Up in Scotland (GUS)
- Are these patterns sample and population specific?
- Investigating discrepancies in earlier adolescence (aged 14)
- Expanding informant group types
  - Including parent-teacher pairs (aged 10, during "Primary 6")
- Incorporating sociological variables and theoretical perspective (social and economic class, housing and cultural factors)

Note: my learning in these methods was helped by studying the example R code Booth et al (2023) provided in their paper. I thank them for their contribution to open and reproducible research.

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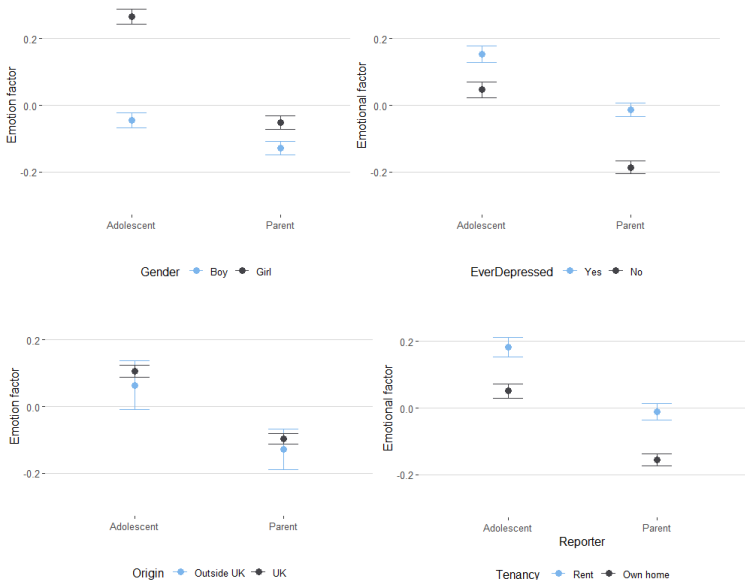scores in
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Preliminary findings

- All score discrepancies are significant and component dependent.
- Discrepancies smaller between parent-teacher pairs than parent-adolescent
- Adolescents reported fewer pro-social strengths and greater emotional difficulties
- Contrary to previous findings, parents reported greater peer problems than adolescents
- Teachers had a "middling effect", reporting fewer emotional difficulties and fewer strengths than parents
- For both pairs, higher scores related to greater levels of disagreement
- Disagreement does not map neatly onto typical markers of socio-economic disadvantage. However, many dimensions (income, region, social-occupation class) not examined yet.

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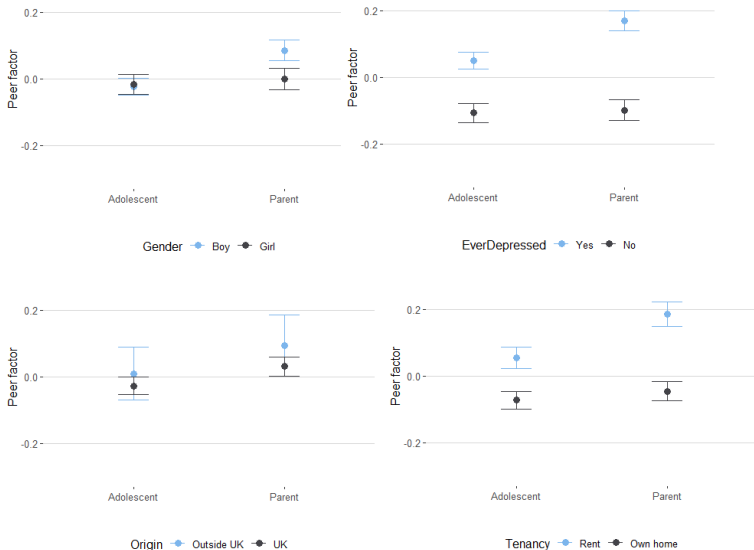
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Parent-adolescent emotion factor LDS, age 14

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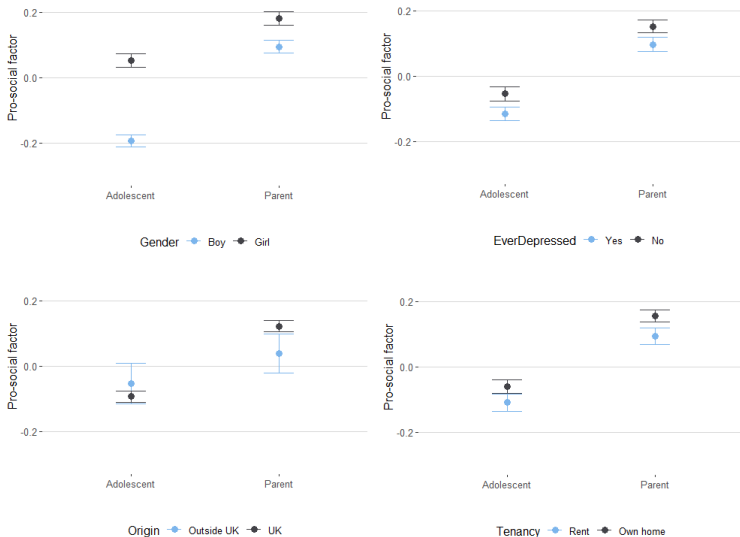in Scotland
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Parent-adolescent peer factor LDS, age 14

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Parent-adolescent pro-social LDS, age 14

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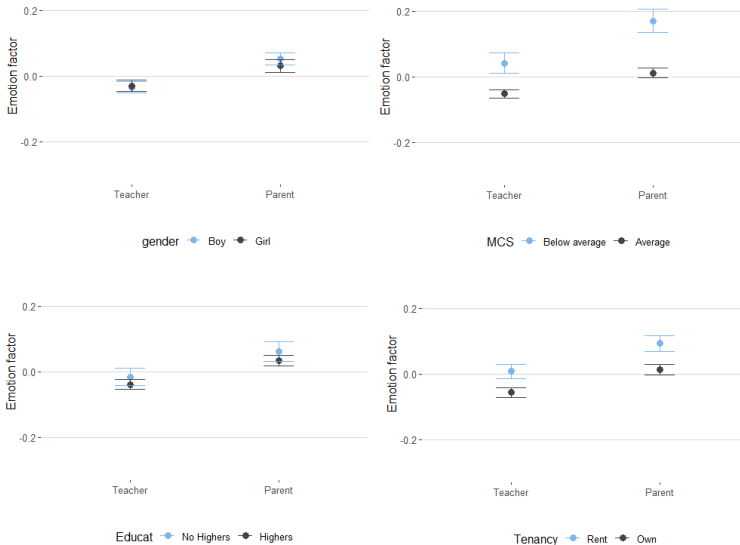
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Parent-teacher emotion factor LDS, age 10

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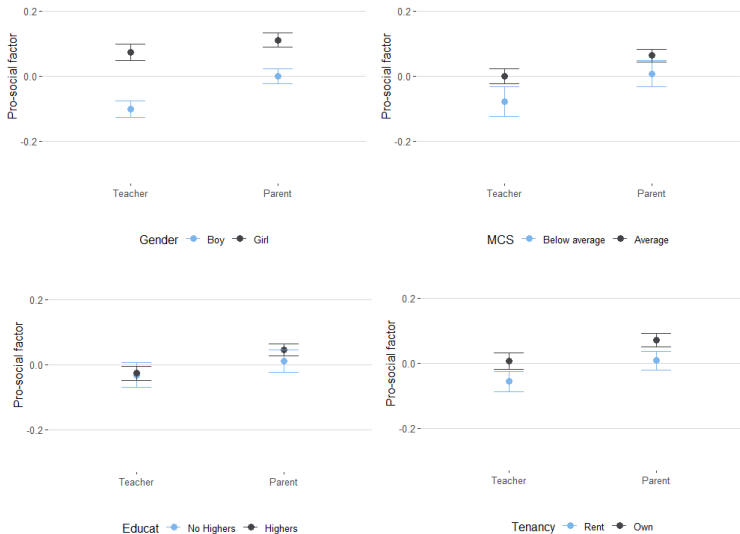scores in
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Parent-teacher pro-social LDS, age 10

Requires matched unidimensional factors

- Result: hyperactivity and conduct problems excluded.

Requires metric invariance (MI)

- Configural (same items in each factor)
- Metric (equivalent factor loadings)
  - Result: teacher-parent peer problems excluded here.
- Scalar (equivalent intercepts)
  - Only partial scalar invariance established here.

These requirements mean we "throw away" our (potentially) most divergent cases.

Configuring out "measurement error" does not tell us about different engagements with the metric itself.

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Questions and difficulties remaining

- How to investigate components failing MI?
  - Potential: multilevel structural equation modelling (Davidov 2018)
- Differences may not be time or age-invariant.

We know differences are significant. What do we *do* with this information?

- How to operationalise informant discrepancies to increase perspective heterogeneity in models?
- LDS evaluates latent psychometric qualities, not directly how the SDQ as it is used in research practice (90th percentile, "caseness", internalising/externalising scales).
  - So, do these outcomes tell us about gaps in study conclusions for the SDQ *as it is used*?

Please, share your own thoughts on these dilemmas, or others!

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