Developmental profiles of co-occurring internalizing and externalizing problems between ages 3 to 11 in a general UK population sample

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Research Gaps

• Increasing interest in typologies of symptom development
• Most previous research focused on either internalizing or externalizing problems
• Little attention to co-morbidity
• Little attention to developmental profiles in early childhood and associate risk factors
• Little attention to gender differences
Research Objectives

- This study examines the developmental profiles of co-occurring internalizing and externalizing symptoms between ages 3-5 years in a general population sample
- Assumption of similar antecedents and risk factors:
  - Socio-demographic background
  - Family structure
  - Maternal characteristics
  - Parent-child interactions
  - Child characteristics
Definitions (Diagnostic and Statistical Manual of Mental Disorders – DSM)

• Internalizing problems
  – Tendency to experience distress inwardly
  – Comprise depression, anxiety, high levels of negative affect and distress

• Externalizing problems
  – Tendency to express distress outwardly
  – Comprises conduct problems, aggression, antisocial behaviour, hyperactivity, inattention, disinhibition and lack of behavioural control

• Assumption of a diagnostic threshold and independence of disorders

• Yet, frequent evidence of a ‘mixed disorder’ category (e.g. Rutter & Graham, 1966; Forbes et al., 2016; Krueger & Eaton, 2015)
Comorbidity

• Presence of at least two independent psychopathological syndromes

• Homotypic: disorders within one diagnostic grouping (i.e. conduct problems and hyperactivity or depression and anxiety)

• Heterotypic: interlinkages between disorders from different diagnostic groupings (such as conduct problems and depression)
The IE model

• Rates of co-occurring internalizing and externalizing disorders are high (50% overlap) (Caspi et al., 2014; Kessler et al., 2005; Newman et al., 1998)

• Categorical diagnosis does not capture underlying dimensionality of mental disorders

• Important information is lost when using a present/absent dichotomy (Angold et al., 1999; Beauchaine & McNulty, 2013; Caron & Rutter, 1991; Willner et al., 2016))

• The IE model – a cross-cutting psychopathological construct that cuts across traditional diagnostic boundaries (Achenbach & Edelbrock, 1984; Eaton et al., 2015; Krueger, 1999)
Developmental patterns

• Factor structures of the IE model are largely invariant across development, although mean levels of IE may fluctuate throughout development (Hoertel et al., 2015; Mesman et al., 2001)

• Heterogeneity in developmental trajectories (Fanti & Henrich, 2010; Sterba et al., 2007):
  – Evidence of persisting, decreasing, increasing or low levels of IE problem trajectories
Possible Explanations

• Continuity models:
  – manifestation early in life and relative stability over time

• Accumulation of symptoms:
  – symptoms of one disorder increase the risk for the development of another

• Differentiation models:
  – initially undifferentiated symptoms differentiate into specific symptoms

• Maturation models:
  – most children will grow out of initial problem behaviours as they mature
Assumed vulnerability factors

• Shared risk factors:
  – diathesis-stress framework assumes that shared environmental stressors trigger pre-disposition towards IE
  – differentiation of level of severity in risk exposure
  – less understanding of whether risk factors are similar across the two domains
  – differentiation between distal and more proximal factors
Gender Differences

• Little understanding of gender differences in cross-domain symptom development

• Inconsistent evidence:
  – boys show more externalizing problems while girls have higher rates of internalizing problems (Costello et al., 2003; Muris et al., 2000)
  – no gender differences (Hay et al., 2000; Broidy et al, 2003)
  – similar development across early to middle childhood (Flouri et al., 2018; Gutman et al., 2018; Patalay et al, 2017), followed by marked gender differences during adolescence (Patalay & Fitzsimmons, 2018)
Objectives of Present Study

1. Describe developmental patterns of IE symptoms in general population sample – identify typology
2. Identify the role of psycho-social risk factors as predictors of developmental pathways
3. Examine gender differences in pathways and potential psychosocial risk factors
Assumptions - Typology

1. Large group with continuous low-symptom profile (normative group)
2. Comorbid developmental profile which shows high levels of severity and continuity over time (continuity model)
3. Pattern of initially high externalizing problems who develop co-occurring internalizing problems (cumulative model)
4. Initial co-occurring IE symptoms differentiate into specific symptoms (differentiation model)
5. Early high levels decrease (maturation model)
6. Emerging problems
## Data: UK Millennium Cohort Study (MCS)

<table>
<thead>
<tr>
<th>Year</th>
<th>Main Respondent</th>
<th>Secondary Respondent</th>
<th>Survey Instruments</th>
<th>Linked Data</th>
<th>Response Rate</th>
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</thead>
<tbody>
<tr>
<td>2001/2</td>
<td>mother</td>
<td>father</td>
<td>assessments</td>
<td>birth records</td>
<td>18,552</td>
</tr>
<tr>
<td>2003/4</td>
<td>mother</td>
<td>father child</td>
<td>assessments</td>
<td>medical records</td>
<td>15,590</td>
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<td>father child</td>
<td>assessments</td>
<td>education records</td>
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<tr>
<td>2008/9</td>
<td>mother</td>
<td>father child</td>
<td>assessments child self-completion</td>
<td>medical records</td>
<td>13,857</td>
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<tr>
<td>2012/13</td>
<td>mother</td>
<td>father child</td>
<td>assessments child self-completion</td>
<td>medical records</td>
<td>13,287</td>
</tr>
</tbody>
</table>

- 9 months
- 3
- 5
- 7
- 11
Assessment: SDQ (maternal report)
Wave 2-5 (age 3 to 11)

• Conduct problems (fights, is disobedient, temper tantrums, lies, steals)
• Hyperactivity/Inattention (restless, fidgety, easily distracted, thinks before acting)
• Emotional problems (often unhappy, worries, fears, headaches)
• Peer problems (solitary, no friends, is picked on/bullied, not liked by others)
Early Risk Factors

• Socio-demographic factors
  – parental education, occupation, income, home ownership, crowding

• Family structure and environment
  – single parent, older siblings, quality of parent relationship (Grims)

• Maternal characteristics
  – teen mother, planned pregnancy, maternal depression

• Parenting
  – breast feeding, parent-child relationship (Pianta: warmth and conflict)

• Birth and infancy factors
  – child ethnicity, birth weight, developmental delay, early temperament (mood, adaptability, regularity), cognitive ability
Methodology - Typology

- Latent profile transition analysis (LPTA)
- Person-centred approach
- Examines patterns in intra-individual change and development over time (Lubke & Muthen, 2005)
- Decomposes co-variances to highlight relationships among individuals
- Sorts individual into groups of individuals who are similar to each other and different from those in other groups
4 Cluster Solution
Low IE (Typical Development)

Cluster 1 male - low I low E (54.0%)

Cluster 1 female - low I low E (50.4%)

Age 3 5 7 11
4 Cluster Solution
Moderate E Low I

Cluster 2 male - moderate E low I (28.2%)

Cluster 2 - females moderate E low I (28.4%)

Age 3 5 7 11 11
4 Cluster Solution
High I (declining) moderate/low E

Cluster 3 male: high I moderate E, declining (10.4%)

Cluster 3 females: High I, low E declining (12.9%)
4 Cluster Solution
High IE (Troubled)

Cluster 4 male - high I high E (7.1%)

Cluster 4 females: high IE (8.3%)

Age 3 5 7 11
### Predicting patterns (Ref: low symptoms) - 1

<table>
<thead>
<tr>
<th>Socio-demographics</th>
<th>Moderate E, Low I</th>
<th>High I, moderate E</th>
<th>High IE (troubled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low parental education</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>.26#</td>
<td>.53*</td>
<td>.19</td>
<td>.29$</td>
</tr>
<tr>
<td>Unskilled occupation</td>
<td>.34#</td>
<td>.37*</td>
<td>.50*</td>
</tr>
<tr>
<td>Low Income</td>
<td>-.21</td>
<td>-.04</td>
<td>-.20</td>
</tr>
<tr>
<td>No home ownership</td>
<td>.19</td>
<td>.52*</td>
<td>.04</td>
</tr>
<tr>
<td>Crowding</td>
<td>-.22$</td>
<td>-.21$</td>
<td>-.17</td>
</tr>
<tr>
<td>Family structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single parent</td>
<td>.03</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>Older siblings</td>
<td>-.18</td>
<td>-.19</td>
<td>-.47*</td>
</tr>
<tr>
<td>Parental relationship</td>
<td>-.04*</td>
<td>-.03#</td>
<td>-.05*</td>
</tr>
<tr>
<td>Maternal Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teen mother</td>
<td>.22</td>
<td>-.59</td>
<td>-.36</td>
</tr>
<tr>
<td>Unplanned pregnancy</td>
<td>-.03</td>
<td>.08</td>
<td>-.09</td>
</tr>
<tr>
<td>Maternal depression</td>
<td>.14*</td>
<td>.07$</td>
<td>.18*</td>
</tr>
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## Predicting patterns (Ref: low symptoms) - 2

<table>
<thead>
<tr>
<th></th>
<th>Moderate E, Low I</th>
<th>Moderate I, low E</th>
<th>High IE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Parenting</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Breast feeding</td>
<td>.23#</td>
<td>.10</td>
<td>.23#</td>
</tr>
<tr>
<td>Pianta: warmth</td>
<td>-.07#</td>
<td>-.15*</td>
<td>-.07#</td>
</tr>
<tr>
<td>Pianta: conflict</td>
<td>.18*</td>
<td>.16*</td>
<td>.18*</td>
</tr>
<tr>
<td><strong>Birth and Infancy Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>.47$</td>
<td>.46$</td>
<td>.38</td>
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<tr>
<td>Birth weight</td>
<td>-.00</td>
<td>-.34*</td>
<td>-.18</td>
</tr>
<tr>
<td>Developmental delay</td>
<td>.02</td>
<td>.03</td>
<td>.17*</td>
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<tr>
<td>Mood</td>
<td>.00</td>
<td>-.02</td>
<td>.01</td>
</tr>
<tr>
<td>Adaptability</td>
<td>.02</td>
<td>.02</td>
<td>-.08*</td>
</tr>
<tr>
<td>Regularity</td>
<td>-.04#</td>
<td>-.04#</td>
<td>-.05*</td>
</tr>
<tr>
<td>Cognitive Ability</td>
<td>-.34*</td>
<td>-.39*</td>
<td>-.21*</td>
</tr>
</tbody>
</table>

Note: * p < .000; # p < .05; $ p < .10
Summary - Typology

• Could identify 4 distinct developmental patterns for both males and females:
  – Large group with continuous low symptom profile (normative group)
  – Small group with continuous and increasing high IE symptoms (continuity model)
  – About a third show moderate externalizing problems which are increasing for males, possible spill-over effects (symptom accumulation)
  – About 1 in 10 shows initially high internalizing problems which decrease over time (maturation)
  – No evidence for differentiation models
    ➢ Homotypic comorbidity more prevalent than heterotypic
Summary – Antecedents

- Parental socio-economic resources are significant risk factors (in particular parental education, occupational status, and home ownership), in particular regarding IE symptoms
- Other key risk factors are maternal depression and perceived conflict in parent-child relationship
- Potential beneficial effects of having a older siblings, warm parent-child relationship, regularity and cognitive ability
- Differential effects regarding homotypic comorbidity: females potentially more affected by socio-economic risks than males; adaptation predicts internalizing symptoms
- Developmental delay significant risk factor for moderate I and high IE trajectory
- Girls less likely in high IE than boys, but gender does not predict higher levels of internalizing symptoms
Conclusion

• Person-centered approaches useful to identify meaningful patterns in developmental trajectories

• General risk factors include socio-economic background, maternal depression, parent-child conflict, regularity

• Other risk factors were specific to certain groups, suggesting that symptoms are sensitive to specific constellations of risk (in particular adaptability)

• Generally: proximal factors show independent effect to distal background factors
Thank you

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