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Emotional self-efficacy, conduct problems, and academic attainment: Developmental cascade effects in early adolescence

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20 **Abstract**

21

22 The study is amongst the first of its kind to utilise developmental cascade

23 modelling in order to examine the inter-relations between emotional self-

24 efficacy, conduct problems, and attainment in a large, nationally

25 representative sample of English adolescents (n = 2,414, aged 11 years).

26 Using a 3-wave, longitudinal, cross lagged-design, we tested three cascading

27 hypotheses: adjustment erosion, adjustment fortification, and academic

28 incompetence. A fourth hypothesis considered the role of shared risk.

29 Results supported small effects consistent with the cascade hypotheses, and

30 a small but significant effect was found for shared risk. Strengths and limits of

31 the study are considered alongside a discussion of the implications for these

32 findings.

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37 Keywords: emotional self-efficacy; conduct problems; attainment;

38 developmental cascade

Introduction

Developmental cascades are, "the cumulative consequences for development of the many interactions and transactions occurring in developing systems that result in spreading effects across different levels, among domains at the same level, and across different systems or generations" (Masten & Cicchetti, 2010, p.491). Drawing on ecological and developmental systems theories (e.g. Bronfenbrenner, 2005; Lerner & Castellino, 2002), the body of work in this area predicts that functioning in different domains, levels, or systems are developmentally related. Namely, successful accomplishment of developmental tasks in a given domain provides a scaffold for later functioning in the same and other domains; equally, failures in these tasks can trigger negative cascade effects. In this paper we use a developmental cascade model to examine longitudinal inter-relationships between emotional self-efficacy, behaviour problems, and academic attainment in early adolescence. The model is used to test three key hypotheses in the study of developmental cascades – adjustment erosion, academic competence, and shared risk (Moilanen, Shaw, & Maxwell, 2010) – and a fourth prediction drawing on the positive youth development perspective (Lewin-Bizan, Bowers, & Lerner, 2010), which we term 'adjustment fortification'.

Developmental cascades in adolescence

63   Our focus on adolescence is driven by the fact that this period is

64   marked by major physical, psychological, behavioural, and contextual

65   changes, including the onset of puberty, the transition to secondary school,

66   and substantial neurological reorganisation (Coleman, 2011). Adolescence is

67   a captivating, critical life stage that has important repercussions for later life

68   (Hagell, Coleman & Brooks, 2013). This is particularly true of the domains of

69   functioning that we examine in the current study. For example, we know that

70   up to 50% of adult mental health problems have their first onset in

71   adolescence (Belfer, 2008). Similarly, academic competence in adolescence

72   predicts future academic success and transition to the workplace (Ek, Sovio,

73   Remes & Jarvelin, 2005). What is less known currently is the nature of inter-

74   relationships between these domains during this important period. We also

75   know relatively little about the potential role played by adolescents' emotional

76   self-efficacy in interrupting symptom-driven pathways and promoting positive

77   adjustment.

78

79   Extant research on developmental cascades typically tests one or more

80   of three key hypotheses. First, the *adjustment erosion* model predicts that

81   mental health problems lead to later academic difficulties (Moilanen et al.,

82   2010). For example, aggressive and disruptive behaviour can undermine

83   academic progress because of its effect on relationships with school staff and

84   peer acceptance. This is particularly salient in early adolescence because of

85   the increased emphasis on academic ability and reduced tolerance for

86   disruption seen in secondary education (Humphrey & Ainscow, 2006).

87   Research by Moilanen et al (2010) offers support for this hypothesis, with high

88   levels of externalising difficulties in middle childhood predicting low academic

89   competence in early adolescence.   Second, the *academic incompetence*

90   model suggests that difficulties relating to academic competence can trigger

91   or exacerbate mental health problems (Moilanen et al., 2010). Youth who are

92   less academically able may experience considerable frustration and

93   disaffection that eventually manifests as aggressive and disruptive behaviour.

94   As above, this is a particularly critical consideration in adolescence given the

95   increasingly high stakes nature of academic assessments in secondary

96   education. By way of illustration, Vaillancourt, Brittain, McDougall, and Duku's

97   (2013) recent study evidenced clear cascade effects of low academic grade

98   point average on later externalising behaviour problems in the late childhood-

99   early adolescence period.   Finally, the *shared risk* model stipulates that

100   cascade effects such as those outlined above are a function of other variables

101   that affect multiple domains of development more generally.   For instance,

102   economic disadvantage (often categorised in education research as eligibility

103   for free school meals (Gorard, 2012)) is a well-known risk factor for lower

104   academic attainment (Department for Education, 2015) and higher social-

105   emotional difficulties (Bradley & Corwyn, 2002). This has been attributed to a

106   number of factors including a lack of ease or unwillingness to access

107   resources and associated parental beliefs and behaviours around education

108   (Davis-Kean, 2005). Also, research consistently demonstrates that being

109   identified as having special educational needs (an expanse term in education,

110   denoting particular needs or disabilities beyond a school's resource

111   capabilities) puts a child at risk of experiencing significantly worse academic

112   and psychosocial outcomes through the course of schooling (e.g. Department

113 for Education, 2013, Van Cleave & Davis, 2006). This is attributable to a

114 number of causes, including an over-representation as victims of bullying

115 (Monchy et al., 2004; Van Cleave & Davis, 2006) and poor social relationships

116 (Frostad & Pijl, 2007, Pijl et al., 2008; Valäs, 1999). These outcomes are, of

117 course, deeply inter-related (Frederickson & Furnham, 2004; Kaukiainen et al.,

118 2002). However, these factors have not been fully explored within a

119 developmental cascades framework.   Deighton et al.'s (under review) recent

120 study provides some confirmatory evidence, demonstrating that pathways

121 from academic attainment to later internalising and externalising problems

122 were rendered insignificant once socio-economic and disability status was

123 taken into account in their late childhood sample, warranting further

124 investigation.

125

126   The aim of the current study was to extend understanding of

127 developmental cascade processes by addressing several gaps, limitations,

128 and inconsistencies in the existing evidence base. First, sample sizes are

129 often modest (e.g. n =85 in Bornstein, Hahn, & Suwalsky, 2013b) and drawn

130 from highly specified populations (e.g. McCarty et al.'s (2008) study of

131 adolescent girls from low-income households). This reduces test sensitivity

132 (Masten et al., 2005) and limits generalizability and comparability of findings

133 (Deighton et al., under review). Hence, we drew upon a large, representative

134 sample of adolescents. Second, most studies in this area have been carried

135 out in North America. Transferability of findings cannot be assumed because

136 the cultural context is a primary component of the developmental eco-system.

137 For example, socialisation practices relating to emergent behaviour problems

138 can vary across countries and cultures (Chen, Huang, Chang, Wang, & Li,

139 2010). The current study is among the first of its kind in England. Third,

140 following Deighton et al (under review), we took the opportunity to extend

141 assessment of shared risk to include disability status, which has been

142 neglected in previous research despite its associations with both academic

143 achievement (Department for Education, 2013) and conduct problems (Green,

144 McGinnity, Meltzer, Ford, & Goodman, 2005). Fourth, developmental

145 cascade research has traditionally focused on symptom-driven pathways, with

146 less attention paid to the potential fortifying effects of positive adjustment in

147 key developmental domains (Lewin-Bizan et al., 2010). Thus, we sought to

148 integrate a positive youth development perspective by assessing the cascade

149 pathways emanating from and to adolescent emotional self-efficacy.

150 Emotional self-efficacy as a positive adjustment marker caries considerable

151 intuitive appeal; emotion regulation and social problem-solving skills are likely

152 to influence both behaviour and learning in the school context (Qualter,

153 Gardner, Pope, Hutchinson, & Whiteley, 2012; Qualter, Dacre-Pool, Gardner,

154 Ashley-Kot, Wise, & Wols, 2015). Accordingly, emotional self-efficacy forms a

155 key aspect of many non-cognitive school based interventions (Durlak,

156 Weissberg, Dymicki, Taylor, & Schellinger, 2011; Sklad, Diekstra, Ritter, &

157 Ben, 2012; Wigelsworth et al., in press). Both its hypothetical presence and

158 empirical measurement have typically assumed a linear development (as

159 proposed above), but our understanding of this relationship is incomplete with

160 further consideration of the potential inter-relations within a cascade model.

161 For instance, to what extent do conduct problems mediate the relationship

162 between emotional self-efficacy and academic attainment across time?

163

164   Finally and critically, research findings pertaining to the adjustment

165 erosion, academic incompetence and shared risk hypotheses have been

166 inconsistent. For example, in contrast to the findings of Moilanen et al. (2010)

167 outlined above, Romano, Babchishin, Pagani, and Kohen (2010) found no

168 significant links between behaviour problems and later attainment. Thus, the

169 current study confers an opportunity to provide further clarification of the

170 nature and magnitude of developmental cascade effects.

171

172   **Aims and objectives**

173

174   The primary aim of the current study was to examine the longitudinal inter-

175 relationships between emotional self-efficacy, behaviour problems and

176 academic attainment in early adolescence. To achieve this aim, we sought to

177 test four hypotheses, as follows:

178

179   1. **Adjustment erosion** – early behaviour problems will lead to later

180   academic difficulties (H1a) and lower emotional self-efficacy (H1b).

181   2. **Adjustment fortification** – early emotional self-efficacy will lead to

182   enhanced academic attainment (H2a) and reduced behaviour problems

183   (H2b).

184   3. **Academic incompetence** – early academic difficulties will lead to later

185   behaviour problems (H3a) and lower emotional self-efficacy (H3b).

186   4. **Shared risk** – cascading effects in H1-3 above are attributable to

187   common cause risk markers, specifically socio-economic and disability

188   status.

189

190   In each of the above hypotheses, we examine cross-time cascading

191   effects, whilst controlling for cross-time, within-domain stability, and within-

192   time, cross-domain co-variance (see 'analytical strategy').

193

194   **Method**

195

196   The study utilizes secondary analysis of data from a government-

197   funded evaluation of a universal social-emotional learning intervention in

198   English secondary schools (Humphrey, Lendrum, & Wigelsworth, 2010).

199   Here we make use of a longitudinal, cross-lagged panel design with 3 annual

200   waves of measurement – T1, T2 and T3 (T1 and T3 only for academic

201   attainment – see below).

202

203   *Participants*

204

205   The final sample was made up single cohort of 2,414 children. All

206   children were in their first year of secondary education (year 7, aged 11 years)

207   at T1, drawn from 41 geographically diverse secondary schools in England.

208   One sample *t*-tests confirmed that the study sample mirrored national norms

209   in terms of attainment, attendance, proportion of children eligible for free

210   school meals (FSM) (as a proxy for socio-economic status) and proportion of

211 children with special educational needs (SEN) (as a proxy for disability status)

212 at the school level, and sex, ethnicity, FSM eligibility and SEN status at the

213 child level. Study schools were shown to be slightly larger than is seen

214 nationally.

215

216 Approximately 53.5% (*N*=1291) of the study sample were female,

217 82.6% (*N*=1994) were classified as 'White British', 9.9% (*N*=239) were

218 identified as eligible for FSM, and 12.9% (*N*=312) were identified with SEN.

219

220 **Measures**

221

222 *Conduct problems*

223

224 Conduct problems (CP) were assessed using the relevant subscale in

225 the self-report version of the Strengths and Difficulties Questionnaire (SDQ)

226 (Goodman, 1997). This 25-item (5 items in the CP subscale) behavioural

227 screening measure requires respondents to endorse a series of descriptive

228 statements (e.g. 'I get very angry and lose my temper') on a three-point scale

229 (0 = not true, 1 = somewhat true, and 2 = certainly true). The SDQ has robust

230 psychometric characteristics (Goodman, 2001) and is amongst the most

231 widely used measures of its kind (Johnston & Gowers, 2005). In the current

232 sample, α ranged between .611 - .633 across each year the subscale was

233 used. This is approximately consistent to a reported alpha value of .60 for the

234 conduct problems subscale in a community sample of 5-15 year olds

235 (Goodman, 2001).

236

Emotional self-efficacy

238

239   Emotional self-efficacy (ESE) was measured using the Emotional

240 Literacy Assessment and Intervention (ELAI) instrument (Southampton

241 Psychology Service, 2003). This is a 25-item self-report survey that assesses

242 emotion-related dispositions and self-perceptions, producing a single,

243 broadband indicator. Traditionally this has been branded 'trait emotional

244 intelligence' but ESE is an increasingly used synonym (Petrides, Furnham, &

245 Mavroveli, 2007). Respondents endorse descriptive statements (e.g., 'I am

246 aware of my own strengths and weaknesses') using a 25-point scale. The

247 ELAI has acceptable psychometric properties (Southampton Psychology

248 Service, 2003). α ranged between .752-.762 across each year the scale was

249 used.

250

Academic attainment

252

253 Measures of academic attainment were extracted from a governmental

254 database (the National Pupil Database – NPD) and represented compulsory

255 academic testing at the end of Key Stages of education[1]. Key Stage

256 assessments record children's attainment in the core curriculum subjects of

257 English, Math, and Science. These were aggregated in the current study. We

258 utilised children's Key Stage 2 (KS2) and Key Stage 3 (KS3) attainment

259 scores, which aligned with T1 and T3 (but use different scoring scales). No

---

[1]

260 compulsory testing occurred at T2 – hence, this is absent from the panel

261 design.

262

263 *Shared risk*

264

265 Additional data extracted from the NPD provided indices of socio-economic

266 and disability status. For the former, we used the Income Deprivation

267 Affecting Children Index (IDACI). This gives the deprivation ranking of the

268 neighbourhood in which a child lives; the score represents the proportion of

269 children under 16 in that area who live in a low-income household. Scoring is

270 from 0 to 1, with higher scores representing increased deprivation. For the

271 latter, we drew on information recorded about the nature of any special

272 educational provision made for a given child (known as Special Educational

273 Needs – SEN), and this was used to operationalise a categorical variable as

274 follows: (i) no additional provision (coded 0); (ii) School Action – reasonable

275 adjustments to normal teaching practice (coded 1); (iii) School Action Plus –

276 additional support provided by an external professional (e.g., speech and

277 language therapist) (coded 2); and (iv) Statement of special educational need

278 (coded 3)– a multi-professional assessment provides the foundation of a legal

279 document outlining support needs and securing financial support for

280 appropriate provision.

281

282 **Procedure**

283

284   For each wave of data collection participating schools administered paper

285   surveys using a standardised instruction sheet. Survey completion was

286   conducted on a whole-year or whole-class basis. School staff supported any

287   students with literacy difficulties to enable them to access the measures.

288   Completed measures were collected, delivered, scored and input by

289   independent companies. The first author conducted checks on the integrity of

290   the data to ensure accuracy of scoring. Responses were tracked through

291   each wave of data collection and matched to NPD data through the use of a

292   unique reference number. This information was used solely for accurate data

293   matching and was destroyed shortly thereafter.

294

295   ***Analytical strategy***

296

297   Tabulated pattern analysis showed that less than 1% of missing cases across

298   all three time points were attributable to any of the socio-demographic factors

299   included in the analysis, indicating no discernible pattern to missing data.

300   Therefore, incomplete cases were removed on a list wise basis and analyses

301   were conducted for all complete cases.

302

303   Cascade and shared risk effects were tested using manifest structural

304   equation models in MPLus version 7 (Muthen & Muthen, 2012). Consistent

305   with previous work in this area (e.g. Moilanen et al, 2010), we first tested a

306   simple cascade model that assessed cascade pathways across domains over

307   time while accounting for temporal stability and within-time co-variance. A

308   second model was then constructed in which the shared risk variables were

309   added as predictors of each domain at each time point. These steps are

310   diagrammed in Figure 1. In both instances, model fit was assessed using χ^2

311   goodness of fit, Comparative Fit Indices (CFI), the Tucker-Lewis Index (TLI)

312   and Root Mean Square Error of Approximation (RMSEA) (including 90%

313   Confidence intervals). Model fit was considered to be acceptable if CFI and

314   TLI were above .95, RMSEA was below .05 (Bollen & Curran, 2006) and

315   SRMR was below .08 (Hu & Bentler, 1999).

316

317   **<< FIGURE 1 >>**

318

319   **Results**

320

321   ***Descriptive statistics***

322

323   Table 1 presents descriptives and correlations for all of the study variables.

324   Skew and Kurtosis were seen to be within acceptable range ±1.5 (Tabachnick

325   & Fidell, 2013), omitting a very minor violation for IDACI. Almost all variables

326   were at least moderately correlated, with the highest correlations being

327   consistent with a priori expectations (i.e., correlations of the same measure

328   between time points).

329   ***** TABLE 1 ******

330

331   ***Cascades Analyses***

332

14

333   All pathways in the model were tested, but in the interests of clarity, only

334   significant pathways are included in Figures 2 and 3. Given the limitations

335   associated with significance testing (Hubbard & Lindsay, 2008), we highlight

336   pathways with a co-efficient of at least .10 in bold; this corresponds to the oft-

337   cited conventions for the smallest effect of interest, deemed to be, "not so

338   small as to be trivial" (Cohen, 1992, p.156). RMSEA and TLI fell below the

339   established thresholds for both models described in the analytical strategy. A

340   partial explanation is offered by the combination of relatively high size of

341   correlations in a longitudinal model over such a short time period and the

342   large sample size. This is supported by a marginal improvement in model fit

343   for the second model (see Figures 2 & 3), supporting the inclusion of IDACI

344   and SEN.   However, overall fit is sub-optimal, possibly suggesting the

345   presence of exogenous variables not accounted for in the current model.

346   *****FIGURE 2*****

347   Figure 2 shows the developmental cascade modelled to address hypotheses

348   1 & 2, specifically including the cross lagged pathways across all time points

349   for emotional self-efficacy, conduct problems, and academic attainment (after

350   accounting for temporal stability and concurrent correlations). Aside from the

351   pathways controlling for stability across time, the largest effects were seen

352   between T1 conduct problems predicting T2 emotional self-efficacy, and

353   subsequent T2 emotional self-efficacy predicting T3 conduct problems. This

354   is suggestive of a cascading relationship between these constructs.

355   Regarding hypotheses 1 and 2, there is evidence to support the presence of

356   both adjustment erosion and academic incompetence. Adjustment erosion is

357   indicated by the significant pathway between T1 conduct problems and T3

358   academic attainment, which although significant and in the direction

359   hypothesised (a rise in conduct problems is associated with a reduction in

360   academic attainment), the resulting effect is comparatively small (-.030) in

361   relation to other pathways in the model. There is arguably a slightly stronger

362   case for the presence of academic incompetence, because the relevant

363   pathway (T1 academic attainment to T3 conduct problems) is significant, in

364   the direction hypothesised (lower academic attainment is associated with a

365   rise in conduct problems), and is of relatively large effect (-.107) in relation to

366   the other pathways in the model. A similar pattern is shown between T1

367   academic attainment and T2 conduct problems, but to a lesser magnitude (-

368   .073).

369   *****FIGURE 3*****

370   In order to test for the effect of shared risk variables on the cascade effects

371   identified in the model above, SEN and IDACI were regressed onto each

372   factor, shown in Figure 3. Results showed a significant contribution of shared

373   risk factors for the majority regressed pathways, across all time points.

374   However, given the established associations of SEN and IDACI with both

375   mental health (Green et al, 2005) and academic achievement (Department for

376   Education, 2011), further significant pathways may have been expected. For

377   instance, there is no significant pathway between SEN and T3 academic

378   attainment. Similarly, associated effect sizes are relatively small, with only T1

379   shared risk pathways surpassing Cohen's effect of .1.

380   Regarding the effects of the previously identified pathways in Figure 2, there

381   is an almost identical pattern of findings, with only minor changes to the

382   academic pathways (T1 academic attainment to T2 conduct problems

383   reduced in strength, T1 academic attainment to emotional self-efficacy

384   increased in strength). This provides partial support for hypothesis 3.

385

386   **Discussion**

387   The current study sought to examine the development of children's conduct

388   problems, and its association with academic attainment, in order to better

389   understand the cumulative effects over time and interactions across

390   developing systems. We integrated emotional self-efficacy into the

391   developmental cascades model to examine emotional self-efficacy as a

392   process that might explain the relationship between children's conduct

393   problems and academic attainment. Disability and socio-economic status

394   were also examined as shared risk factors. We also used a large, nationally

395   representative dataset in the current study, enhancing the confidence by

396   which results can be generalised to the wider school-based population. Three

397   hypotheses were examined, consistent with developmental cascade theory,

398   especially examination of evidence for adjustment erosion, academic

399   incompetence, and shared risk. We examined adjustment fortification and

400   hypothesized that early high levels of emotional self-efficacy will lead to

401   enhanced academic attainment and reduced behaviour problems.

402

403   Consistent with *adjustment erosion* and *academic incompetence* models,

404   there was some evidence to suggest that developmental cascade effects

405   were in effect. Path models suggested that higher levels of conduct problems

406   at age 11 (Time 1) were associated with poorer academic competence at age

407   13 (Time 3). In turn, poor academic competence at age 11 was related to

408   higher levels of conduct problems at ages 12 and 13. Higher levels of conduct

409   problems at age 11 were also linked to lower levels of emotional self-efficacy

410   at age 12, which then predicted increased conduct problems at age 13. High

411   levels of conduct problems around the time of entry to High school (age 11)

412   were predictive of lower levels of emotional self-efficacy at age 12 and lower

413   levels of academic attainment at age 13. Finally, the *shared risk* analyses

414   suggested that socio-economic adversity and special educational need status

415   played a small role in the link between early externalizing problems and

416   academic competence in middle childhood. The current pattern of results

417   support previous research, which showed path links from conduct (i.e.

418   externalised) problems to academic incompetence in early to middle

419   childhood (e.g. Campbell et al., 2006; Capaldi, 1992; Chen et al., 1997;

420   Moilanen, Shaw, & Maxwell, 2010; Morgan et al., 2008). The inclusion of

421   shared risk variables did little to alter the magnitude or statistical significance

422   of any of the established pathways, suggesting that findings pertain to

423   different groups of academic attainment, including those across a socio-

424   economic spectrum and for those pupils identified with SEND. However,

425   practical limitations prevent a more detailed investigation of these groups

426   (SEND in particular), as the data were restricted to school-based provision.

427   Therefore, in future work, there is an opportunity to examine whether the

428   same patterns of effects can be found for those at the extremely high end of

429   youth externalizing problems, and those with other clinical problems. It is

430   noteworthy that all significant paths emerged after accounting for

431   autoregressive effects of each domain, which were moderately high in

432 magnitude in all three domains of child adjustment. This is indicative of the

433 comparatively short time scale of the measurements, in comparison to

434 broader developmental cascade literature, which can span up to 20 years (e.g.

435 Masten et al., 2005).

436 There was evidence to support the adjustment fortification model, with higher

437 levels of emotional self-efficacy at T1 and T2 predicting lower levels of

438 conduct problems at T2 and T3 respectively, and higher academic attainment

439 at T3. These findings support previous work that shows poor emotional

440 competence in adolescence predicts school difficulties associated with

441 subsequent academic underachievement (e.g. school drop-out and persistent

442 antisocial behaviour) (Gagnon, Craig, Tremblay, Zhou, & Vitaro, 1995;

443 Haapasalo & Tremblay, 1994; Kochenderfer & Ladd, 1996; Petrides et al.,

444 2004; Qualter et al., 2012; Vidal Rodeiro, Bell, & Emery, 2009). Our work

445 extends those findings and is the first to highlight the importance of emotional

446 self-efficacy in developmental cascades of conduct problems and academic

447 achievement.

448

449 Those findings are in line with Bandura's theoretical model (1986, 1999, 2001)

450 that argues that emotional self-efficacy is likely to influence whether

451 adolescents think in an enabling way when considering social engagement

452 and academic performance. It also affects how much effort adolescents will

453 invest in a particular revision or social strategy, how they persevere in the

454 face of social and academic difficulties, and how resilient they are to social

455 and academic stressors. Our findings provide support for the idea that lower

456 perceived emotional self-efficacy predicts higher levels of externalizing

457   problems and poor academic attainment. The finding that emotional self-

458   efficacy influences the developmental sequence between conduct problems

459   and academic attainment further supports the thesis that self-efficacies are an

460   indicator of successful development during adolescents and intervention

461   might be well suitable to the targeting of that domain.

462

463   **Strengths, Limitations, and Future Study**

464   A particular strength of the current study is the use of a large community

465   based sample that is representative of the general population. Also,

466   contrasting previous studies, we used national standardized test scores as

467   our measure of academic attainment at Time 1 and Time 3. These are

468   relatively free from reporter bias when compared to concurrent adolescent

469   self-reported attainment scores (Pataley, Deighton, Fonagy, & Wolpert, 2015).

470   Additionally, the use of standardized test scores permits the results in a

471   national context and supports future attempts at replication of our results.

472

473   Regarding limitations: First, the use of self-reported conduct problems by

474   young people could not be avoided in the current study. While the 'gold

475   standard' is to source multiple reporters (De Los Reyes, 2013), it was not

476   practical in this large community based longitudinal studies. Second, the

477   multi-level structure of the data (i.e. children clustered into schools) was not

478   accounted for in the analysis because the group level sample size (41) was

479   below minimal recommendations for analyses of this type (Hox & Maas, 2001).

480   However, mental health outcomes typically feature very small inter-cluster

481   correlations (typically around .02% (Hale et al., 2014)). Third, resultant model

482 fit was seen to be sub optimal. Although some explanation is likely to be

483 attributable to sample size and the strength of the within-domain correlations,

484 further consideration is required. Failure to capture idiosyncratic or even

485 systemic exogenous variables may be accountable, though this is difficult to

486 substantiate in the current design. We welcome further exploration in this

487 field (both theoretical and empirical) to establish a more accurate

488 representation of the apparent cascade effects.

489 Fourth, given the established paucity of the application of developmental

490 cascade theory in the current context (i.e. psychosocial and academic

491 measures within relatively short time period), there is a difficulty in

492 establishing 'benchmark' figures for effect sizes. Available literature indicates

493 effects are likely to be small. E.g. Deighton et al. (in press) report comparable

494 effects, however as this study was also conducted over a two-year period, this

495 may also be an artefact of the stability of the within domain correlations. A

496 future direction therefore, is to consider capturing a longer time period,

497 encapsulating more of a child's educational career.

498 Despite these limitations, the current paper is an early step in demonstrating

499 the usefulness and contribution of developmental cascade theory for

500 understanding the prospective associations between conduct problems,

501 emotional self-efficacy, and academic attainment, and in establishing

502 expectations for relative effects in the field.

503 This study represents a rigorous test of cascade effects of conduct problems,

504 emotional self-efficacy, and academic attainment in early adolescence. In

505 future cascade studies, it will be important to consider the developmental

506 timing of these effects. It is possible that there will be differences in the

507 pattern of effects based on the developmental timing of these events. For

508 example, in our sample, emotional self-efficacy contributed to how the

509 adolescents transitioned into High School, but it may become more important

510 during later stages of adolescents when adolescents will have to deal more

511 with peer pressure and also manage the conflicting desire to engage with

512 peers compared to revision. Thus, as peer relations become a more salient

513 domain of social adjustment, the association between academic attainment

514 and emotional self-efficacy is likely to become stronger. Further study is

515 needed to examine changes in the patterns over time and how those can be

516 accounted for by the changing social and academic environments.

517

518 **Conclusion**

519

520 The current study offers a valuable contribution to the emergent literature on

521 developmental cascades examining self-efficacy, conduct problems, and

522 academic attainment in an educational setting. Of particular note is the use of

523 a large, representative sample of English adolescents, demonstrating an

524 inclusiveness and rigour currently lacking in the field. Accordingly, new (but

525 tentative) benchmarks are provided for future research.

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704   Footnote

705   [1] The Key Stages in the English education system are ages 5-7 (Key Stage 1), 7-11 (Key

706   Stage 2), 11-14 (Key Stage 3), and 14-16 (Key Stage 4).