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Developmental pathways linking childhood and adolescent internalizing, externalizing, academic competence, and adolescent depression



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ABSTRACT

This study examined longitudinal pathways through three domains of adaptation from ages 4–5 to 14–15 (internalizing problems, externalizing problems, and academic competence) towards depressive symptoms at age 16–17. Participants were 6425 Canadian children followed bi-annually as part of the National Longitudinal Study of Children and Youth. Within-domain (i.e., stability) effects were moderate in strength. We found longitudinal cross-domain effects across one time point (i.e., one-lag cascades) between internalizing and externalizing in early childhood (positive associations), and between academic competence and externalizing in later childhood and adolescence (negative associations). We also found cascade effects over multiple time points (i.e., multi-lag cascades); lower academic competence at age 4–5 and greater internalizing at age 6–7 predicted greater age 12–13 externalizing, and greater age 6–7 externalizing predicted greater age 16–17 depression. Important pathways towards adolescent depression include a stability path through childhood and adolescent internalizing, as well as a number of potential paths involving all domains of adaptation, highlighting the multifactorial nature of adolescent depression.

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Recent research in developmental psychopathology suggests that three general domains of adaptation are of particular importance in understanding child and adolescent adjustment: internalizing problems (or *internalizing*; i.e., anxiety, depression), externalizing problems (or *externalizing*; i.e., conduct problems, aggression), and *academic competence* (e.g., school grades, test scores) (Bornstein, Hahn, & Suwalsky, 2013; Burt & Roisman, 2010; Masten et al., 2005; Moilanen, Shaw, & Maxwell, 2010; Obradovic, Burt, & Masten, 2010; Vaillancourt, Brittain, McDougall, & Duku, 2013). Problems in one domain of

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adaptation may beget problems in other domains (Masten, 2006), potentially starting a chain reaction of subsequent problems—a set of processes referred to most commonly as *developmental cascades* (Masten & Cicchetti, 2010).

The associations among internalizing, externalizing, and academic competence may be particularly important for understanding the development of depression, which typically has its earliest onset in mid-to-late adolescence (Kessler & Bromet, 2013) and represents one of the most common psychiatric problems experienced during this age period (Thapar, Collishaw, Pine, & Thapar, 2012). Indeed, prospective studies have positively linked internalizing (Reinherz, Paradis, Giaconia, Stashwick, & Fitzmaurice, 2003) and externalizing (Chronis-Tuscano et al., 2010) in childhood with adolescent depression. Other research suggests a negative association between school grades and depression in adolescence (Frojd et al., 2008) and protective effects of higher IQ in childhood against adolescent depression (Glaser et al., 2011; Harpur, Polek, & van Harmelen, 2015).

Therefore, adolescent depression may be seen as a natural extension of the co-development of internalizing, externalizing, and academic competence. Nevertheless, although a number of studies have examined the longitudinal inter-associations among these domains of adaptation, both within domains (i.e., *continuity* effects) and across domains (i.e., *cascade* effects) (Bornstein et al., 2013; Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradovic et al., 2010; Vaillancourt et al., 2013), no studies have examined adolescent depressive symptoms as an outcome in developmental cascades models. Previous research has also focused on *one-lag* cascade effects (i.e., cascade effects separated by only one time point). However, it may also be important to test higher-order (i.e., multi-lag) effects in order to examine the unique contribution of early adjustment on later adjustment. Indeed, socio-emotional adjustment early in life has been shown to have a significant impact on adolescent adjustment, including adolescent depression (Chronis-Tuscano et al., 2010).

Previous findings

The existing research suggests the relationships among internalizing, externalizing, and academic competence are complex, involving bidirectional and transactional effects over time. It has been suggested that externalizing interferes with academic competence, which in turn may lead to greater internalizing (Patterson & Capaldi, 1990). Indeed, a handful of developmental cascades studies have found evidence in favor of this pattern (Masten et al., 2005; Moilanen et al., 2010; Obradovic et al., 2010; van Lier et al., 2012). However, in addition to externalizing, Moilanen et al. (2010) have argued that internalizing may interfere with academic competence, which then can negatively impact other domains of adaptation. Indeed, some research has shown associations from early internalizing to subsequent externalizing (Englund & Siebenbruner, 2012) as well as subsequent math and reading ability (Grover, Ginsburg, & Jalongo, 2007). Lower academic competence may also undermine subsequent externalizing problems, in that students showing lower performance may be placed in classrooms with more problem behaviors, which could increase their own externalizing behaviors (Moilanen et al., 2010). In fact, there is evidence of negative cascade effects from standardized test scores to subsequent externalizing (Burt & Roisman, 2010; Englund & Siebenbruner, 2012; Moilanen et al., 2010; Vaillancourt et al., 2013).

Limitations of existing cascades research

Developmental cascade modeling is a robust and conservative approach, allowing for specific cascade effects while controlling for cross-sectional correlations between domains and continuity effects within domains (Bornstein, Hahn, & Haynes, 2010). However, there are several limitations in the existing literature. First and foremost, developmental cascades research typically includes relatively small samples, typically with fewer than 300 participants (Masten et al., 2005), and no such studies have included samples that are representative of the larger population. Thus, the use of population surveys can greatly enhance the generalizability of findings and overcome the limitations of using small, highly variable, and unrepresentative samples.

Second, in order to understand the complex developmental pathways among these domains over time, it is important to examine cascade effects from childhood through to adolescence with the inclusion of multiple time points. However, studies using time points in close proximity have included only three or four time points and age ranges of three or four years during either childhood (van Lier et al., 2012) or early adolescence (Vaillancourt et al., 2013). Moreover, research following children through adolescence and into adulthood has included only four time points that are seven, three, and ten years apart (Masten et al., 2005; Obradovic et al., 2010). Such large gaps between time points suggest that continuity effects may be under-controlled in modeling.

Third, research suggests boys exhibit greater externalizing (Baillargeon et al., 2007) while girls exhibit greater internalizing (Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998) as well as higher rates of adolescent depression (Wade, Cairney, & Pevalin, 2002). However, existing studies have either not examined gender (Moilanen et al., 2010) or have only tested overall gender invariance of cascade models rather than examining gender invariance of specific longitudinal effects (Burt & Roisman, 2010; Masten et al., 2005; Vaillancourt et al., 2013). In fact, overall gender invariance between models does not preclude gender non-invariance of particular pathways, which may have important research implications.

Finally, it is important to determine whether associations observed among domains of adaptation are robust to the inclusion of possible confounders. However, developmental cascade studies have typically examined only a small number of additional covariates, most commonly child IQ/cognitive function, parenting factors, and socio-economic status (Bornstein et al., 2010; Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010), while others have not examined any control

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