Child Psychiatry Hum Dev (2015) 46:951–966
DOI 10.1007/s10578-015-0534-2

SUBSTANTIVE/THEORETICAL REVIEW

A Developmental Psychopathology Perspective on ADHD and Comorbid Conditions: The Role of Emotion Regulation

Elizabeth A. Steinberg · Deborah A. G. Drabick

Published online: 7 February 2015

Abstract Research investigating attention-deficit/hyperactivity disorder (ADHD) and co-occurring disorders such as oppositional defiant disorder, conduct disorder, anxiety, and depression has surged in popularity; however, the developmental relations between ADHD and these comorbid conditions remain poorly understood. The current paper uses a developmental psychopathology perspective to examine conditions commonly comorbid with ADHD during late childhood through adolescence. First, we present evidence for ADHD and comorbid disorders. Next, we discuss emotion regulation and its associations with ADHD. The role of parenting behaviors in the development and maintenance of emotion regulation difficulties and comorbid disorders among children with ADHD is explored. An illustrative example of emotion regulation and parenting over the course of development is provided to demonstrate bidirectional relations among these constructs. We then present an integrated conceptual model of emotion regulation as a shared risk process that may lead to different comorbid conditions among children with ADHD. Implications and directions for future research are presented.

Keywords Attention-deficit/hyperactivity disorder · Comorbidity · Emotion regulation · Parenting · Risk factors

Attention-deficit/hyperactivity disorder (ADHD) affects an estimated 5 % of school-aged children [1]. ADHD is conceptualized as a neurodevelopmental disorder, characterized by symptoms falling into three categories: inattention, hyperactivity, and impulsivity, according to the *Diagnostic and Statistical Manual of Mental Disorders* [2]. Research on the etiology of ADHD indicates that ADHD likely results from some combination of genetic, neurobiological, psychological, and contextual risk factors [3–6]. In addition, ADHD is associated with negative correlates and outcomes among children, such as academic difficulties, peer relationship problems, and family conflict [7–11]. Children with ADHD also require specialized educational resources, and an estimated 20–40 % of children with ADHD also present with learning disabilities [12–14]. Youth with ADHD perform less well on standardized achievement tests [12, 15, 16] and have more physical injuries and automobile accidents [17, 18] than youth without ADHD. Additionally, adults with ADHD as children are more likely to exhibit antisocial behaviors, substance abuse, and difficulties in their occupational functioning [16, 19–22]. Thus, individuals with ADHD experience negative correlates and are at risk for a variety of impairing and negative sequelae.

Research also has demonstrated high rates of comorbidity or co-occurring conditions with ADHD, including mood, anxiety, oppositional defiant, and conduct disorders, with up to 44 % of children with ADHD having at least one other disorder and 43 % having two or more additional disorders in community-based samples [13, 23–26]. Although much research has focused on comorbidity of ADHD with oppositional defiant disorder (ODD) and conduct disorder (CD) [2, 13, 27–29], ADHD also is associated with internalizing conditions, such as anxiety (e.g., social anxiety, generalized anxiety) and mood (e.g., major depressive disorder, bipolar disorder) disorders [26, 30–34]. Given the heterogeneity in symptom presentation, etiology, impairment, and course among youth with ADHD, there are likely different developmental pathways

E. A. Steinberg (✉) · D. A. G. Drabick
Department of Psychology, Temple University, 1701 North 13th Street, Philadelphia, PA 19122, USA
e-mail: Elizabeth.steinberg1@temple.edu

linked to comorbid disorders based on child-specific and contextual factors [35]. However, less is known about (a) which children with ADHD are more likely to develop comorbid conditions, and (b) which comorbid conditions youth may be likely to develop. Further, little research has investigated mechanisms of developing ADHD and comorbidities. The present review first describes common comorbidities of ADHD. Then we examine emotion regulation deficits, a correlate of ADHD and comorbid disorders, which may confer risk for the development of comorbid conditions among youth with ADHD. The interplay between emotion regulation and parenting behaviors is explored among youth with ADHD. Finally, we present a conceptual model that describes developmental relations between ADHD and commonly co-occurring conditions.

ADHD and Common Comorbidities

Children who have comorbid conditions often exhibit more severe symptoms, a more enduring course of the disorders, and more negative correlates and sequelae (e.g., substance use, delinquency, antisocial personality disorder, academic and occupational problems, and interpersonal relationship problems) than children who do not have comorbid conditions [13, 36–38]. Thus, given the potential negative outcomes associated with ADHD, understanding the nature and development of comorbid conditions among youth with ADHD may be especially important [39, 40].

A developmental psychopathology framework is especially relevant for conceptualizing the development of comorbid conditions. First, this framework allows the examination of multiple levels of analysis and multiple domains of risk and resilience [41–43]. We propose child-specific and contextual factors that promote risk or resilience for the development of comorbid conditions among youth with ADHD [39]. Specifically, emotion regulation skills and parenting style are two potential interrelated candidate processes that may lead children with ADHD to develop comorbid conditions [8, 44–46]. Second, in terms of developmental pathways, we consider both equifinality, which refers to the idea that diverse pathways may lead to the same outcome, and multifinality, which indicates that one pathway may result in multiple outcomes depending on other relevant factors (e.g., contextual influences) [47]. Although ADHD is comorbid with many other psychiatric conditions [13, 23, 24], consistent with multifinality, there is less known regarding how these various pathways to comorbid conditions develop in the context of ADHD and which children are more susceptible to comorbidities. Further, some children with ADHD evidence desistance of symptoms over time, although the factors that contribute to this desistance are also less understood [48]. Indeed, ADHD may manifest differently among children over time, as suggested by the concepts of heterotypic and homotypic continuity [23, 48–51]. Whereas homotypic continuity refers to stability in symptoms or presentation of a disorder, heterotypic continuity refers to changes in behaviors or symptoms over time and/or over the developmental course [50, 51].

Researchers have provided various models and explanations that help to conceptualize comorbidity among children [23, 52–54]. The present review will focus on three potential explanations as it is likely that multiple explanations account for comorbidity with ADHD. First, ADHD may confer risk for additional disorders given that ADHD typically develops early in childhood. Second, shared risk factors among conditions may account for the co-occurrence of ADHD and comorbidities. A third explanation, which has not been examined systematically but warrants further attention, considers the idea that correlates or sequelae of ADHD confer risk for additional conditions [39].

Children with ADHD are approximately 11 times more likely to develop comorbid disruptive behavior disorders than children without ADHD [23] and ADHD co-occurs with ODD and CD in 30–50 % of cases in epidemiologic samples [23, 26, 55]. Children with comorbid ADHD and ODD or CD demonstrate more severe and frequent symptoms and overall impairment, as well as more difficult temperament; increased aggressive, inattentive, and destructive behaviors; and problematic parent–child relations compared to children with ADHD alone [8, 56]. Further, children with ADHD who exhibit symptoms of ODD and aggressiveness between the ages of 7 and 10 years old are more likely to develop serious CD, criminal offending, and substance abuse [57–61]. ODD typically develops by the age of 8, whereas ADHD is typically evident by age 12 according to *DSM-5*, though symptoms may develop before age 12. Thus, the age of onset of ADHD and ODD may be similar. Although symptoms of ADHD may be present before ODD, consistent with the explanation that ADHD confers risk for ODD, the similar timing of their onset suggests that shared risk factors may precede and contribute to the co-occurrence of ADHD and ODD among children who experience this comorbid condition during childhood [62]. CD typically has a later age of onset (i.e., after age 10 and during adolescence, though childhood-onset CD requires onset of at least one symptom before age 10). Although ADHD and CD may share certain temperamental features, the later onset of CD suggests that correlates of ADHD may predispose to or confer risk for CD. Indeed, some research suggests that ADHD that persists into adolescence and aggression among children with ADHD are associated with greater risk of developing comorbid CD [60, 63, 64]. Thus, in terms of developmental

timing, CD typically onsets after ADHD, suggesting that ADHD may predispose children to CD or that the two disorders may share certain risk factors in addition to these negative correlates [62, 65].

Though research consistently has shown high associations between ADHD and ODD/CD (e.g., [23, 26]), internalizing disorders also commonly co-occur with ADHD (for reviews, see [28, 66–68]). It has been estimated that up to one-third of children with ADHD have comorbid anxiety disorders [30, 56, 69], with median odds-ratio estimates of 3.0 (95 % CI 2.1–4.3) [23]. Results from the NIMH Collaborative Multisite Multimodal Treatment Study of Children with ADHD (MTA) demonstrated that children with ADHD and comorbid anxiety disorders responded worse to treatment and had lower scores on measures of academic achievement before treatment than children without comorbid anxiety [70]. The onset of anxiety disorders varies based on disorder, with separation anxiety disorder typically developing by the age of 7.5 years and occurring among younger children, generalized anxiety disorder occurring between ages 10 and 14, social anxiety disorder developing around age 11, and specific phobias developing across childhood and adolescence [2]. Given these different ages of onset, multiple explanations might account for the co-occurrence of ADHD and anxiety disorders: ADHD might predict later developing anxiety disorders (e.g., social anxiety or generalized anxiety disorders), or symptoms or correlates of ADHD may confer risk for anxiety disorders (e.g., inattention, academic or interpersonal difficulties may contribute to anxiety among youth with ADHD) [39, 66].

ADHD also commonly co-occurs with mood disorders [23, 26, 33, 56]. Based on a meta-analysis of 21 epidemiological studies, the median odds ratio of co-occurring ADHD and depression is 5.5 (95 % CI 3.5–8.4) [23]. Children with ADHD have higher rates of continuous depressive symptoms (as opposed to isolated major depressive episodes) [71–73] and are more likely to develop depressive disorders later in childhood and adolescence [62, 74, 75] than children without ADHD. Although there may be familial risk factors that predispose children to both ADHD and depression [76], there is little research regarding mediators of the link between depression and ADHD [77]. Some research suggests that shared risk factors (e.g., emotion regulation difficulties) contribute to the co-occurrence of ADHD and depression [75]. However, depression tends to have a later onset than ADHD, with prevalence rates increasing with age [77, 78]. Because ADHD typically precedes the developmental onset of major depressive disorder among children and adolescents when these disorders co-occur, there also may be correlates of ADHD that contribute to the development of depression. For example, children with ADHD often experience problems with academic functioning, social relationships, and parental interactions, which may contribute to increased depressive symptoms and episodes [39, 77, 79, 80]. Thus, similar to the other co-morbid conditions considered thus far, negative correlates of ADHD may be risk factors or mechanisms contributing to the development of depression. Although a variety of risk factors may contribute to the development of comorbidity among youth with ADHD, we consider the role of child emotion regulation and its interactions with parenting behaviors in the development of comorbid conditions among youth with ADHD. Before considering these processes in the context of ADHD and comorbid conditions, however, it is necessary to examine the construct of emotion regulation and the interplay between emotion regulation skills and parenting in typical and atypical development.

Emotion Regulation and Temperament

Although children with emotion regulation deficits are at risk for externalizing and internalizing disorders (for a review, see [81]), differences in the operationalization of emotion regulation in the literature have led to difficulties researching this construct (for a review, see [82]). Research has focused on various aspects of emotion regulation, such as changes (a) in the activated emotion and (b) that result from the activated emotion [83]. Researchers generally agree that emotion regulation concerns internal processes related to manipulation of physiological, subjective, and/or behavioral components of emotional responding [84]. Much of the debate centers on the idea of emotion regulation as a voluntary or involuntary process and whether and to what extent it is internal or affected by external stimuli. Additionally, investigators have yet to reach agreement on whether to focus on the processes involved in emotion regulation rather than the amount of emotion expressed [81]. To frame the discussion of emotion regulation throughout this paper, we adopt the following definition of emotion regulation [81]:

> The process of initiating, avoiding, inhibiting, maintaining, or modulating the occurrence, form, intensity, or duration of internal feeling states, emotion-related physiological, attentional processes, motivational states, and/or the behavioral concomitants of emotion in the service of accomplishing affect-related biological or social adaptation or achieving individual goals. (p. 338)

Temperament as an Index of Emotion Regulation

In addition to the challenges in defining and conceptualizing emotion regulation, researchers do not agree on the most useful method to measure this construct. Various

tasks and procedures have been used to tap emotion regulation, including questionnaires, observations, and laboratory tasks [83]. Temperament, which may be an especially useful index of emotion regulation, similarly has been defined in various ways. The conceptualization we will use is "biologically rooted individual differences in behavior tendencies that are present early in life and are relatively stable across various kinds of situations and over the course of time" (p. 1101) [85]. Temperament provides the foundation upon which emotion development and emotion regulation are built and interacts with contextual factors to predict a range of youth outcomes [86].

One aspect of temperament that may be especially relevant in terms of emotion regulation is effortful control [84]. Effortful control is the "voluntary" branch of temperament and emotion regulation and refers to the ability to inhibit dominant responses and/or activate a subdominant response by voluntarily modifying one's own attention and behavior [87, 88]. Inhibitory control (a facet of effortful control) is how well a child is able to control or suppress impulses and inappropriate approach responses when the context demands it, such as in a new situation or if an adult has given the child instructions to inhibit responses. Inhibitory control is correlated with not just behavioral regulation, but also emotional regulation [81]. Effortful control and inhibitory control are especially pertinent with regard to children with ADHD, who exhibit impulsivity as one of the core deficits of ADHD [89–92].

Eisenberg and Fabes's [93] model describes how children's temperaments may be characterized as under-controlled, highly inhibited, or optimally regulated. Optimally regulated children typically display greater flexibility, use effective emotion coping, and are more socially successful. Conversely, under-controlled children tend to be low in emotion regulation, reactively aggressive, and impulsive. Highly inhibited children may be withdrawn, sad, anxious, and lacking flexibility [93, 94]. Thus, child-specific temperamental features, such as effortful control, contribute to the development of emotion regulation. Further, research has demonstrated that certain difficult temperamental styles are associated with psychopathological symptoms [95], and that this link is not merely tautological [96]. The range of temperamental profiles suggests that examination of emotion regulation among children with ADHD is important to illustrate how their profiles may act as shared risk factors for other disorders.

Emotion Regulation Deficits Among Children with ADHD

Many children with ADHD exhibit emotion regulation deficits [13, 89, 90, 92, 97, 98], though there is much debate regarding the exact nature of these deficits [98]. Among youth with ADHD, 38 % of a community-based population sample and 24–50 % of a clinic-based sample exhibited emotion regulation deficits ([99], see [100] for a review, [101]). In terms of temperament, children with ADHD generally are highly reactive and exhibit low effortful control and high negative emotionality; however, they also exhibit extraversion and the capacity for overly reactive positive emotionality [102, 103]. Additional emotion regulation deficits may include low inhibitory control, low attentional control, and high activity level [104].

Barkley's [105] model posits that emotion dysregulation in ADHD is due to an executive inhibition deficit, which includes difficulties with temperamental regulation and effortful control processes and may involve anterior fronto-striatal attentional networks, resulting in extreme positive approach [106, 107]. Subsequent reviews and research support and extend this model and indicate that youth with ADHD exhibit executive dysfunctions, such as abnormalities in reward circuitry, temporal processing, problem solving, and working memory, as well as delay aversion [108–111]. A review by Shaw et al. [100] describes abnormalities in the amygdala, ventral striatum, and orbitofrontal cortex contributing to emotion regulation deficits in ADHD. One issue that has not been resolved is whether ADHD with and without emotion dysregulation represent distinct conditions in terms of associated neurocognitive deficits [100]. These temperamental profiles and emotion regulation deficits among children with ADHD may play a contributing role in the development of comorbid psychopathology [104], a point to which we return later. However, consistent with a developmental psychopathology framework, contextual factors, such as parenting behaviors, likely interact with and impact a child's emotion regulation and functioning across developmental periods and thus are considered next.

Parental Influences on Emotion Regulation and ADHD

Parenting factors may have important consequences for a child's emotion regulation competencies, exacerbate children's ADHD symptoms, and/or confer risk for comorbid conditions. Emotion socialization, which typically begins at an early age, is the manner in which parents teach, coach, and model appropriate emotional responses and is related to a child's emotion regulation skill development [112]. Though many parenting dimensions play a role in child outcomes, parental coping with a child's negative emotions is a particularly important facet of emotion socialization, and therefore emotion regulation. Consistent with Buck's [113] model, parental use of non-supportive strategies intended to control children's negative emotions may coerce children to

suppress future negative emotions. By suppressing these emotions, children's negative emotional arousal and anxiety may increase, essentially held internally until a similar situation elicits negative emotions, and initiating a cycle of increasingly intense and dysregulated negative emotions [81, 113]. Furthermore, lack of adaptive and appropriate emotional expressive responses may increase the likelihood of using other less adaptive behavioral responses [114]. Therefore, parents' abilities to model effective emotion regulation skills and to teach children about negative emotions are compromised if parents display non-supportive reactions to children's negative emotions.

Although parents sometimes may use non-supportive responses to their children's emotions, children still may demonstrate appropriate and adaptive emotion regulation. Alternatively, even if parents do provide supportive responses to their children's negative emotions, children may have problems with emotion regulation or develop psychological disorders. Thus, parenting may act as a risk or resilience factor as it interacts with child emotion regulation in predicting co-occurring conditions among children with ADHD.

Beyond their impact on emotion regulation, parenting behaviors are associated with comorbid conditions among children with ADHD. Johnston and Mash [10] provided support for a transactional model of ADHD and family functioning, such that children with ADHD may influence parenting behaviors, while family and parenting factors simultaneously influence the child's behavior. However, there are inconsistencies in the literature regarding parenting and family factors among youth with ADHD. Some studies report more stressful, conflicted family environments; poorer parenting practices; and fewer authoritative parenting beliefs among families of children with ADHD compared to families of children without ADHD [115, 116]. Additionally, the Multimodal Treatment Study for ADHD showed that negative/ineffective discipline mediates the success of ADHD treatment [117]. However, other studies suggest family problems are associated with comorbid ODD or CD, rather than specific to ADHD alone [57, 118]. Indeed, negative parenting during the school-aged period contributes to the development of oppositional and conduct problems among children with ADHD symptoms [8, 10, 119, 120], and child disruptive behaviors likely influence parenting more than ADHD symptoms alone [121]. These findings suggest that temperamental features of ODD/CD may contribute to coercive family interactional patterns and that comorbid behavior problems may add difficulties for parenting above and beyond those associated with ADHD alone.

Nevertheless, social processes (e.g., parental consistency, family routine) may attenuate the presentation of ADHD symptoms [122]. In addition, positive parenting may act as a protective factor against the development of conduct problems among children with ADHD [123]. Thus, children with ADHD may be especially susceptible to harsh or non-supportive parenting styles, leading to the development of comorbid conditions, and the type of comorbidity that develops in addition to ADHD may be especially influenced by contextual factors [5, 10, 120, 124]. However, it is unclear based on the extant literature which children with ADHD develop which specific comorbid conditions, indicating that other factors, such as child emotion regulation abilities, are important to consider in explanatory models of comorbidity. Before turning to such models, we present a review of emotion regulation and interactions with parenting behaviors over the course of development to illustrate how these factors may be associated with ADHD and comorbid conditions.

Emotion Regulation During the Course of Typical and Atypical Development

Consistent with a developmental psychopathology perspective, child temperament moderates parental behaviors in the prediction of a variety of outcomes and core aspects of temperament may manifest in different behaviors over time, evidencing heterotypic continuity [125–127]. Given these potential differences related to temperamental features and contextual influences over time, it is important to consider emotion regulation across developmental periods. Such knowledge of typical and atypical development can facilitate understanding of a range of multifinality and equifinality in outcomes, highlight potential pathways to risk or resilience, illustrate how emotion regulation and parenting may serve as shared risk factors for or correlates of co-occurring psychological disorders among youth with ADHD, and inform prevention and intervention efforts that may be indicated for different developmental periods.

Infancy Through 3 Years Old

Infant emotion regulation may develop as a result of several factors. At this stage, inborn, temperamental factors are especially important and these biological or neuroregulatory mechanisms may predispose an infant to behave in a certain manner [128]. For example, genetics have been implicated in influencing certain aspects of temperament, such as reactivity or effortful control [129]. These aspects of temperament are conceptualized as more inborn, stable, and generalizable to a range of situations. At this point in development, social interactions with caregivers, such as the social smile, begin to train infants to regulate arousal

[130, 131]. Though infants primarily rely on caregivers for soothing and to help them to regulate their emotions, they gradually learn to self-soothe and calm themselves during infancy and as toddlers [81]. Infants also demonstrate regulatory strategies, such as gaze aversion, which help them control anger and frustration, though they may be less successful at regulating and decreasing fear responses [83]. Thus, at this age, infants learn that they can change activated negative emotions with regulatory strategies.

Aspects of effortful control, such as inhibitory control, come online around 24–36 months, permitting toddlers to evidence certain emerging regulatory capacities [81]. Thus, impulsive or dysregulated behavior, crying, and temper tantrums are common among children of this age group and can be considered developmentally normative because the child is still learning to regulate basic arousal and control anger. Toddlers also demonstrate these behaviors as an effort to gain autonomy, test limits, and practice social skills [132]. As children gain an understanding of their social environment, parents' strategies begin to shape emotion regulation capacities through emotion socialization (i.e., modeling of emotions by the parent). In addition, caregivers' supportive and sensitive responses to toddlers' positive and negative emotions may shape toddlers' regulatory abilities, rather than the parents' simply regulating their children's emotions for them as in the infancy period [112, 133]. Thus, parental supportive responding and socialization of emotions may facilitate children's emotion regulation capabilities.

During the early years of a child's life, parent–child relations are especially critical for cultivating emotion regulation given that an infant with a difficult temperament may be especially challenging for parents. Consistent with temperamental features among children with ADHD, high levels of negative emotionality, such as continual crying, inability to self-soothe, or intolerance of frustration during infancy and the toddler years, may be markers of emotion dysregulation. These children may be at risk for conduct problems and aggression in later childhood and adolescence [35]. In addition, irritability, temperamental emotionality, and high activity level in the first few years of life are associated with comorbid ADHD and internalizing or externalizing disorders [101, 134–136]. These child behaviors may elicit harsh, inconsistent parenting, which can further exacerbate parent–child conflict and may in turn provoke further child noncompliance, aggression, and emotion dysregulation. Thus, deficits in emotion regulation during the first few years of life, given that emotion regulation is critical for forming basic regulatory abilities, might put the child on a trajectory for further dysregulation, exacerbation of ADHD symptoms, and the development of comorbid conditions, especially in the context of other risk factors such as harsh parenting.

Preschool and Early Childhood

As children move into the preschool and early childhood period, they demonstrate more sophisticated self-initiated emotion regulation because of advances in cognitive, motor, and language development [130]. At these ages, children improve on measures of effortful control as executive functioning skills also improve [137]. Thus, executive control of attention, action, and emotion develop simultaneously during the preschool and early childhood periods. Emotion regulation might be optimal when inhibition level is intermediate, suggesting that children who are over- or under-inhibited may be at risk for poorer emotion regulation [94] and the ability to regulate emotions enables the child to respond to life experiences in a socially acceptable and flexible manner [35]. Additionally, as children become more fluent in language and display more executive attention abilities during the preschool years, self-regulation continues to develop [138]. Among children with ADHD, different temperamental features might lead to distinct patterns of comorbidity however. For example, temperamental emotionality at age 3 predicts comorbid ADHD and internalizing disorders at age 7, whereas activity level at age 3 predicts comorbid ADHD and ODD at age 7 [136].

Children who continue to exhibit challenging temperamental styles and dysregulated emotions may elicit more negative, unresponsive, and/or punitive reactions from parents during this age period especially [139]. However, parental influences continue to interact with the child's developing emotion regulation abilities. Thus, although children typically evidence a range of negative emotional responses to situations, such as feeling sad, angry, upset, or otherwise distressed, parents may provide non-supportive (e.g., harsh, insensitive) responses to these emotions, contributing to poor emotion regulation [140] and increases in aggression, impulsivity, and negative affect. These outcomes may be particularly likely among children with high levels of approach tendencies, high negative emotionality, and lower effortful control, consistent with the temperamental profiles of youth with ADHD [35, 103, 125, 141–144]. Thus, parenting strategies may operate as risk or resilience factors in the development of comorbid disorders among children with ADHD, depending on a child's temperament and emotion regulation abilities.

Later Childhood and Adolescence

The majority of research on emotion regulation focuses on infancy, preschool, and early childhood as crucial periods of development [145]. However, emotion regulation skills may continue to develop throughout childhood and adolescence, developmental periods that are critical for the

acquisition of cognitive, social, and emotional skills [145]. Typical and healthy development of emotion regulation during later childhood and adolescence includes incorporating emotion regulation skills into one's emotion-related framework [81, 146]. Children begin to consider other people's perspectives in relation to their own or others' displays of emotions. Emotion regulation during these ages presents as a more multi-dimensional process than during earlier ages, as youth begin to learn more adaptive coping strategies for negative emotions such as cognitive reappraisal, positive refocusing, seeking help (e.g., from peers, parents, or other important relationship figures), and behavior diverting [147]. Normatively, as children enter late childhood and early adolescence, they tend to use suppression less frequently as they develop enhanced emotion regulation skills [147]. Children learn to internalize the explicit and implicit evaluations of their emotions by significant others. When parents validate and support children's emotional reactions, children evince greater emotion regulation and social competence [145], which are crucial for this age period, particularly as peer relationships play an increasingly important role [148].

Children with inhibited temperaments, including higher fear response or attention to negative or threatening stimuli, may be predisposed to internalizing symptoms during these developmental periods; moreover, this effect may be pronounced among children with lower attentional control because these children have difficulty attending to more positive or neutral stimuli [149]. These youth also may exhibit dysregulation in the form of withdrawal from emotionally evocative stimuli, further exacerbating internalizing symptoms. Among children who are predisposed to depression, low effortful control and self-regulation might contribute to depressive symptoms as a result of difficulty with approach motivation [150, 151]. Thus, children's temperamental features that are consistent with the ADHD profile (e.g., difficulties with self-control, emotion regulation) in early childhood may predict internalizing and externalizing behaviors in later childhood [125, 141].

We may see some of the effects of earlier temperament × environment (specifically, parenting strategy) interactions during the late childhood period as well. For example, negative parenting reactions during early childhood interact with restrictive parenting style to predict later externalizing behavior disorders [125]. Additionally, if the child has demonstrated emotion dysregulation and the parent in turn has displayed increasingly harsh and insensitive parenting, it is likely that the parent and youth will exhibit a cycle of coercive interactional patterns that may continue through late childhood and adolescence [152]. In particular, children and adolescents with low inhibitory control, consistent with temperamental features of children with ADHD, may demonstrate both internalizing and externalizing problems. For instance, if a child is prone to negative affect and exhibits low inhibitory control, he/she may have difficulty attenuating negative thoughts (e.g., rumination), and may exhibit negative withdrawal, possibly predisposing him/her to depression [153]. If this child has a parent who responds with anger or negative inferential feedback, the child's risk for depression is further exacerbated [154]. Alternatively, to cope with negative emotions and thoughts, a youth with poor self-regulation might display CD and impulsive behaviors [35]. These externalizing behaviors could further elicit harsh, inconsistent, or disengaged parenting behaviors if the parent believes the adolescent is too challenging to discipline or monitor.

Further, parents exert relatively less influence on their adolescents than during earlier periods as teenagers become socialized by peers [148]. Children with ADHD are more prone to associations with deviant peers than children without ADHD, putting them at further risk for developing conduct problems; in addition, peer difficulties among children with ADHD may lead to depression or anxiety during adolescence [155]. Thus, a child's basic temperament and emotion regulation abilities, as well as the foundation the parent has provided for emotion socialization, may predict the degree to which adolescents are influenced by peers and other environmental factors during adolescence, which consequently may contribute to or exacerbate different co-occurring conditions, consistent with multifinality.

In summary, previous research provides a foundation for a more integrated model of relations among child emotion regulation and contextual influences in the development of comorbid conditions among youth with ADHD. Consistent with the developmental psychopathology framework, the model also considers transactional relations between parents and children. In general, emotion regulation maps onto a diverse range of children's behavioral and psychological functioning and may act as a shared risk factor for the development of co-occurring disorders, such as anxiety, depression, ODD, and CD, among children with ADHD. Temperament, especially effortful control, is an early marker of emotion regulation, and is consequently an important construct to consider among children with ADHD. As illustrated previously, emotion regulation skills develop from infancy through adolescence (and beyond), interacting with parenting behaviors and potentially protecting against or predisposing youth with ADHD to internalizing and externalizing problems. With these points in mind, we next present one potential model that focuses on the role of emotion regulation and its interrelations with parenting behaviors in the development of comorbid conditions among youth with ADHD.

A Conceptual Model for the Development of Comorbid Conditions Among Youth with ADHD

Although emotion regulation deficits and parenting behaviors (especially the way a parent fosters the development of emotion regulation) likely interact to predispose children with ADHD to other comorbid conditions [100, 136, 156, 157], there is a dearth of literature investigating emotion regulation deficits among children with ADHD and comorbid conditions [86]. To address this gap, evidence for specific deficits and interactional patterns among children with ADHD and comorbid conditions is reviewed below. As noted previously, certain emotion regulation deficits are associated with ADHD and comorbid disorders, suggesting that a shared risk factor explanation might account for disorder co-occurrence. An examination of the specific deficits associated with each comorbid condition considered in the present paper is important for understanding the potential emotion regulation profiles that may lead to one comorbidity rather than another. The specific profiles and associated deficits are presented in Table 1.

Children with behavioral disorders typically display negative temperamental styles and have difficulty regulating anger, aggression, and negative emotions; indeed, emotion regulation problems are particularly associated with aggressive symptoms among children with ADHD [35, 90, 98]. Further, children with ADHD who display negative affect and reactivity (as in Derryberry and Rothbart's [149] model) often elicit harsher parenting reactions, further exacerbating child oppositional and behavioral problems [10, 62, 105, 123, 158]. Thus, given that ODD is associated with negative emotionality [102], one would expect that children with ADHD who also exhibit emotion regulation difficulties such as susceptibility to negative, angry, and aggressive behaviors might develop symptoms consistent with ODD, especially in the context of harsh, inconsistent, and non-supportive parenting strategies [10, 62, 123, 158].

Alternatively, because some research suggests that emotion regulation problems may be more linked to ODD than ADHD symptoms [98], emotional lability instead may be a risk factor for ODD, particularly among youth who exhibit ADHD. Thus, it is possible that emotional lability instead mediates the relation between ADHD and co-occurring ODD and aggression. In sum, among children with ADHD, co-occurring emotion regulation deficits, specifically negative emotionality [159], poor reactive control, low agreeableness, high irritability, and high approach tendencies [44], may contribute to the development of co-occurring ODD. Thus, these children are expected to be characterized by emotion regulation profiles of under-regulation (i.e., high lability; see Table 1).

CD is also characterized by lower levels of emotion regulation, though it has been examined less frequently in terms of emotion regulation dysfunction [160]. Children with CD are grouped into childhood-onset and adolescent-onset subtypes. The CD category recently included another specifier in *DSM-5* intended to decrease heterogeneity among youth with CD; specifically, youth can be diagnosed based on the presence or absence of callous-unemotional (CU) traits (i.e., "with low prosocial emotions") [2]. Little is known regarding the specific emotion dysregulation problems within these subtypes, though some research shows that it is likely that children with and without CU traits differ on emotion regulation profiles (for a review, see [161]). Overall, children with CD without CU traits likely evidence marked reactivity and executive functioning deficits, which may be manifested in reactive aggression [42, 162]. This subgroup may be more likely to be

Table 1 Potential temperament and emotion regulation profiles for comorbid conditions among children with ADHD

Comorbid condition	Temperament profile	Emotion regulation profile
ODD	Low effortful control, high negative emotionality, low agreeableness, high irritability/anger, high emotional lability	Under-regulation; high reactivity, low inhibition, high approach/aggression
CD—without callous-unemotional traits	Low effortful control, high negative emotionality, low agreeableness, high anger/irritability, high activity level, high fear	Under-regulation; high approach/reactive aggression, low inhibitory control, executive functioning deficits
CD—with callous-unemotional traits	Low fear and anxiety, low emotional distress, low anger/irritability, low neuroticism, low prosocial emotions, low agreeableness, low conscientiousness, high activity level	Age-appropriate regulation in general, but under-regulation with reward; high proactive aggression, high effortful control, low fearful inhibition, fewer executive functioning deficits, low arousal to punishment
Anxiety	Low effortful control, high social inhibition, high neuroticism, high fear, high positive emotionality	Over-regulation; high avoidance and withdrawal, high social inhibition, low attentional control, high attentional bias to threat, low regulation of threat-related affect and arousal
Depression	Low effortful control, high neuroticism, low positive emotionality, high need for affiliation	Over-regulation; high avoidance, overregulated emotional expression; low attentional control

comorbid with ADHD, given their problems related to inhibition and impulsivity [42, 44, 162, 163].

Compared to youth with CD without CU traits, children with CD with CU traits may have fewer executive functioning deficits, lower physiological arousal to punishment cues, lower anxiety, and higher levels of proactive aggression [161, 164–168]. Additionally, children with CD and CU traits typically demonstrate fearlessness, sensation seeking, and disinhibition of aggression [160, 161]. Thus, we propose that there are two groups of children with ADHD and CD: (a) children with CD without CU traits, characterized by under-regulation, low effortful control, high reactive aggression, increased fear, and executive functioning deficits; and (b) children with CD with CU traits, characterized by low agreeableness, low conscientiousness, decreased fear/empathy, low effortful control, and proactive aggression (see Table 1). Regardless of subtype, children with both ADHD and CD likely demonstrate a poorer prognosis and deficient emotion regulation abilities relative to youth with ADHD only [169–171].

Children with internalizing problems generally exhibit decreased effortful control and high avoidance [149]. Specifically, children with anxiety tend to avoid events and situations that produce emotional arousal [172], experience emotions more intensely, exhibit dysregulated expressions and less adaptive coping, and evidence decreased ability to improve their mood relative to non-anxious children [86, 173]. Findings related to response inhibition among children with anxiety disorders have been mixed, with some research demonstrating increased response inhibition and other research failing to support this finding (for a review, see [28]). However, these mixed findings may be a function of the type of ADHD symptoms exhibited by youth. Children with anxiety disorders and both inattentive and hyperactive-impulsive symptoms of ADHD likely have certain executive functioning deficits (e.g., decreased attentional control, increased attentional biases to threat, low effortful control); high negative withdrawal; and low hostility compared to children with ADHD alone [5]. Those with predominantly inattentive symptoms of ADHD might exhibit anxious impulsivity, overarousal, and inattentiveness, but lower levels of impaired executive functioning relative to youth with both inattentive and hyperactive-impulsive symptoms [115, 174]. Thus, ADHD and anxiety might be characterized by poor regulation of both attention and affect, leading to both increased attention to negative stimuli and decreased regulation of accompanying affect [175] (see Table 1). However, the pattern of findings likely differs based on types of ADHD symptoms and the type of anxiety disorder experienced by youth, suggesting that further research into the specific emotion regulation deficits occurring among youth with comorbid ADHD and anxiety is needed.

Emotion regulation deficits among children with depression include negative emotionality and increased intensity of sadness, decreased positive emotions, emotional lability, and poor effortful control [88, 153, 176–179]. Thus, children with both ADHD and depression would likely exhibit increased emotional lability, low effortful control, increased negative emotions, and decreased positive emotions, relative to children with ADHD or depression only. These children are characterized by over-regulation of emotional expression and low attentional control, especially with regard to disengaging from negative thoughts (see Table 1). Moreover, because emotion regulation deficits mediate the link between ADHD and depression symptoms among children, even when controlling for ODD/CD [75], emotion regulation deficits may be conceptualized as correlates of ADHD and depressive symptoms or shared risk processes that contribute to the symptoms of both conditions during different developmental periods. Additionally, emotion regulation deficits may act as mediators or risk factors for depression among youth with ADHD. Nevertheless, as reviewed earlier, it is important to consider the developmental periods during which these various comorbidities are likely to develop among youth with ADHD given typical age of onset of these comorbid conditions and the frequency and quality of risk and resilience processes (e.g., emotion regulation, parenting behaviors) during various developmental periods. Thus, the current model considers the development of comorbid conditions through adolescence to capture the range of heterogeneity, multifinality, and equifinality in individual outcomes.

Additional Gaps in the Current Literature

Although there is a large literature on inter-relations among components of the proposed model, there is little research jointly investigating relations among these constructs in an integrated model. Much of the literature to date has focused on elaborating the nature of ADHD and comorbid conditions (i.e., prevalence rates, symptom profiles) or has focused on risk factors for one particular disorder (e.g., ODD and/or CD) that co-occurs with ADHD, investigating comorbidity in isolation [e.g., 22, 62, 65, 75, 80, 120, 158]. However, there is a dearth of research examining correlates, sequelae, and/or mechanisms that may act as shared risk factors for ADHD and comorbid conditions. In particular, little research has investigated emotion regulation deficits in ADHD and comorbid conditions; additionally, research on bidirectional relations between children and parents in the context of ADHD and emotion regulation deficits is mixed [8, 44]. Further, there is a dearth of literature investigating mechanisms involved in the

development of comorbid internalizing, as opposed to externalizing, disorders among children with ADHD [8]. Sex differences also warrant examination with regard to the current model, as the prevalence rate for ADHD among boys is higher than girls [1, 2]. Boys also may have fewer emotion regulation strategies and may display more negative emotions than girls, whereas girls may internalize symptoms, predisposing them to depression in adolescence [83]. Additionally, there may be sex differences that emerge in late childhood or adolescence, as boys might tend towards externalizing, substance use, or delinquent behavior compared to girls [26].

There is a paucity of longitudinal studies that evaluate the development of comorbid conditions among children with ADHD. According to Deault's [8] meta-analysis of 22 studies examining ADHD, comorbidities, and parenting, only three studies utilized longitudinal designs. As described above, one of these studies found that parenting during early childhood predicted the developmental course of conduct problems among children with ADHD [123]; moreover, Burke et al. [159] found that child ODD and CD influenced parenting more than parenting influenced child symptoms, and that ADHD symptoms did not predict parenting. The direction of effects among parenting, ADHD, and comorbid conditions, despite the longitudinal design, remains unclear [8, 26].

The current model addresses these gaps by utilizing a developmental approach and considering processes that may be correlates of ADHD and/or risk factors for the development of comorbid conditions. Much of the existing research on comorbidity considers explanations that focus on developmental timing, such as ADHD precedes and/or confers risk for other disorders (see [23, 53] for overviews), though the mechanisms that confer risk for subsequent comorbid conditions have received little attention in the literature. Thus, investigations of shared risk processes and mechanisms, such as child emotion regulation, parenting, and other contextual factors, can allow a more nuanced test of the development of comorbid conditions among youth with ADHD from a developmental psychopathology perspective that takes into account multifinality and equifinality.

Implications and Future Directions

Given myriad negative outcomes associated with ADHD and comorbid conditions, clearer understanding of processes through which ADHD confers risk for other disorders has important clinical implications. Empirical investigations of the proposed model may afford specificity in identification of youth at risk for the development of comorbid conditions, as well as indicate targets and developmental points of prevention and intervention efforts aimed at child emotion regulation and associated parenting practices among youth with ADHD.

Research on emotion regulation and parenting among youth with ADHD could inform modifications to existing treatments and the development of tailored interventions. At present, although youth with comorbid conditions are included in prevention and intervention studies, children in the community are often more heterogeneous in presentation and comorbidity than youth who are typically included in randomized controlled trials [180]. Thus, assessments should include information regarding the quality and frequency of emotion regulation deficits among children with ADHD and comorbid conditions so that these processes could be targeted in treatment. Further, parent training may be especially useful among parents of youth with comorbid conditions for management of ADHD behaviors, teaching appropriate emotion regulation skills, and addressing other comorbidities [181]. Additionally, sex differences in temperamental styles and emotion regulation abilities among boys and girls should be incorporated into etiological and intervention models [44]. For example, girls who exhibit aggression or anger often do not express these feelings as overtly as boys [82], and parenting behaviors and child × parenting interactions may differ by child sex [e.g., 182]. Future research should examine how these mechanisms operate among boys and girls, which can inform whether treatment should address presenting issues among boys and girls differently.

A more modular treatment approach may benefit children with comorbidities and emotion regulation deficits, requiring an analysis of specific deficits before treatment [183]. Psychoeducation for emotion regulation skills typically has not been a target of treatments that have been deemed effective among youth with ADHD [86, 184, 185]. However, there is promising research on several preventive interventions for emotion regulation skills (e.g., PATHS—Promoting Alternative Thinking Strategies; [186] and EC—Emotions Course; [187]), as well as intervention models (ECBT—Emotion-focused Cognitive–Behavioral Therapy; [188] and CERT—Contextual Emotion-Regulation Therapy; [189]), each of which requires further evaluation among youth with ADHD.

Similarly, parent involvement in treatment has been deemed important among parents of children with ADHD, with behavior therapy as the only well-established evidence-based psychosocial treatment for child and adolescent ADHD (e.g., behavioral parent training, behavioral classroom management, and behavioral peer interventions) [181]. Thus, including child emotion regulation and signs or markers for the development of comorbid conditions among youth with ADHD would be useful adjuncts to parent training. Because emotion regulation and parenting

are likely mediators, mechanisms, or shared processes for ADHD and comorbid conditions, they could serve as risk or protective factors, indicating areas to consider for prevention and intervention. Future research will be necessary to test the viability of targeting these processes in interventions and whether the addition of these variables to models of the development of comorbid conditions among youth with ADHD will facilitate improved understanding of multifinality among youth with ADHD.

Although the model presented focuses on emotion regulation as a shared process for the development of comorbid conditions among children with ADHD, there are additional factors that have received relatively less attention but also likely play a role. For example, academic or other learning difficulties [190, 191], peer factors [56, 192], perinatal problems [193], and broader family level processes [194] are associated with ADHD and may serve as more distal or proximal risk factors for comorbid psychological conditions. Future research should focus on these additional factors in addition to the parenting practices discussed earlier, and consider these processes within a developmental framework. For example, during childhood, peer rejection, parental discipline, and difficulty in school might set the stage for comorbid conditions among children with ADHD. During adolescence, deviant peer involvement and lack of parental monitoring might contribute to additional disorders that are more likely to onset during this developmental period. In the present paper, we focused on parenting behaviors related to emotion regulation because they are early-emerging processes that are crucial for the formation of important skills for future developmental periods and may buffer children against risk. Additionally, parenting practices and emotion regulation are potentially amenable to interventions as proximal influences and clear correlates of ADHD and co-occurring disorders. Thus, future research should explore these child-specific and contextual factors across development to determine their roles in the development or attenuation of co-occurring difficulties and whether these factors influence treatment outcomes among youth with ADHD.

Summary

The current paper considered developmental relations between ADHD and commonly co-occurring conditions using a developmental psychopathology perspective. Emotion regulation capabilities were discussed as potential shared risk processes of ADHD and co-occurring conditions, and in terms of bidirectional and transactional relations with parenting behaviors. A model linking temperament and emotion regulation processes to specific disorders was presented to illustrate potential different developmental pathways and multifinality among youth with ADHD. Future research in this area would inform prevention and specific interventions that target emotion regulation or parenting, emphasizing fit of intervention with the child's emotion regulation, ADHD symptoms, and/or co-occurring conditions.

References

1. Centers for Disease Control and Prevention (2013) Attention-deficit/hyperactivity disorder. Retrieved from http://www.cdc.gov/ncbddd/adhd
2. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders, 5th edn. Author, Arlington, VA
3. Coghill D, Nigg J, Rothenberger A, Sonuga-Barke E, Tannock R (2008) Whither causal models in the neuroscience of ADHD. Dev Sci 8:105–114
4. Mick E, Faraone SV (2008) Genetics of attention deficit hyperactivity disorder. Child Adolesc Psychiatr Clin N Am 17:261–284
5. Nigg JT (2007) Temperament and developmental psychopathology. J Child Psychol Psychiatry 47:395–422
6. Thapar A, Langley K, Asherson P, Gill M (2007) Gene–environment interplay in attention-deficit hyperactivity disorder and the importance of a developmental perspective. Br J Psychiatry 190:1–3
7. Barbearesi W, Katusic S, Colligan R, Weaver A, Jacobsen S (2007) Long-term school outcomes for children with attention-deficit/hyperactivity disorder: a population-based perspective. J Dev Behav Pediatr 28:265–273
8. Deault L (2010) A systematic review of parenting in relation to the development of comorbidities and functional impairments in children with attention-deficit/hyperactivity disorder (ADHD). Child Psychiatry Hum Dev 41:168–192
9. Hinshaw S, Lee S (2003) Conduct and oppositional defiant disorders. In: Mash EJ, Barkley RA (eds) Child psychopathology. Guilford, New York, pp 144–198
10. Johnston C, Mash E (2001) Families of children with attention-deficit/hyperactivity disorder: review and recommendations for future research. Clin Child Fam Psychol Rev 4:183–207
11. Mrug S, Hoza B, Gerdes A (2001) Children with attention-deficit/hyperactivity disorder: peer relationships and peer-oriented interventions. In: Nangle DW, Erdley CA (eds) The role of friendship in psychological adjustment. Jossey-Bass, San Francisco, pp 51–77
12. Barkley R (1998) Attention deficit hyperactivity disorder: a handbook for diagnosis and treatment, 2nd edn. Guilford, New York
13. Barkley R (2006) Attention-deficit/hyperactivity disorder: a handbook for diagnosis and management, 3rd edn. Guilford, New York
14. DuPaul G, Gormley M, Laracy S (2013) Comorbidity of LD and ADHD: implications of DSM-5 for assessment and treatment. J Learn Disabil 46:43–51
15. Loe I, Feldman H (2007) Academic and educational outcomes of children with ADHD. J Pediatr Psychol 32:643–654
16. Weiss G, Hechtman L (1993) Hyperactive children grown up: ADHD in children, adolescents, and adults. Guilford, New York
17. Barkley R, Cox D (2007) A review of driving risks and impairments associated with attention-deficit/hyperactivity disorder and the effects of stimulant medication on driving performance. J Saf Res 38:113–128

18. DiScala C, Lescohier I, Barthel M, Li G (1998) Injuries to children with attention deficit hyperactivity disorder. Pediatrics 102:1415–1421
19. Barkley RA, Murphy KR, Fischer M (2008) ADHD in adults: what the science says. Guildford, New York
20. Charach A, Yeung E, Climans T, Lillie E (2011) Childhood attention-deficit/hyperactivity disorder and future substance use disorders: comparative meta-analysis. J Am Acad Child Adolesc Psychiatry 50:9–21
21. Gudjonsson G, Sigurdsson J, Sigfusdottir I, Young S (2012) An epidemiological study of ADHD symptoms among young persons and the relationship with cigarette smoking, alcohol consumption and illicit drug use. J Child Psychol Psychiatry 53:304–312
22. Herpertz S, Wenning B, Mueller B, Qunaibi M, Sass H, Herpertz-Dahlmann B et al (2001) Psychophysiological responses in ADHD boys with and without conduct disorder: implications for adult antisocial behavior. J Am Acad Child Adolesc Psychiatry 40:1222–1230
23. Angold A, Costello E, Erkanli A (1999) Comorbidity. J Child Psychol Psychiatry 40:57–87
24. Brown R, Freeman W, Perrin J, Stein M, Amler R, Feldman H et al (2001) Prevalence and assessment of attention-deficit/hyperactivity disorder in primary care settings. Pediatrics 107:e43
25. Cantwell DP (1996) Attention deficit disorder: a review of the past 10 years. J Am Acad Child Adolesc Psychiatry 35:978–987
26. Costello E, Mustillo S, Erkanli A, Keeler G, Angold A (2003) Prevalence and development of psychiatric disorders in childhood and adolescence. Arch Gen Psychiatry 60:837–844
27. Gillberg C, Gillberg I, Rasmussen P, Kadesjö B, Söderström H, Råstam M et al (2004) Co-existing disorders in ADHD: implications for diagnosis and intervention. Eur Child Adolesc Psychiatry 13:i80–i92
28. Jarrett M, Ollendick T (2008) A conceptual review of the comorbidity of attention-deficit/hyperactivity disorder and anxiety: implications for future research and practice. Clin Psychol Rev 28:1266–1280
29. Waschbusch D (2002) A meta-analytic examination of comorbid hyperactive–impulsive-attention problems and conduct problems. Psychol Bull 128:118–150
30. Blackman G, Ostrander R, Herman K (2005) Children with ADHD and depression: a multisource, multimethod assessment of clinical, social, and academic functioning. J Atten Disord 8:195–207
31. Chronis-Tuscano A, Degnan K, Pine D, Perez-Edgar K, Henderson H, Diaz Y et al (2009) Stable early maternal report of behavioral inhibition predicts lifetime social anxiety disorder in adolescence. J Am Acad Child Adolesc Psychiatry 48:928–935
32. Faraone SV, Biederman J (1997) Do attention deficit hyperactivity disorder and major depression share familial risk factors? J Nerv Ment Dis 185:533–541
33. Spencer T, Biederman J, Mick E (2007) Attention-deficit/hyperactivity disorder: diagnosis, lifespan, comorbidities, and neurobiology. Ambul Pediatr 7:73–81
34. Youngstrom E, Arnold L, Frazier T (2010) Bipolar and ADHD comorbidity: both artifact and outgrowth of shared mechanisms. Clin Psychol Sci Pract 17:350–359
35. Frick P, Morris A (2004) Temperament and developmental pathways to conduct problems. J Clin Child Adolesc Psychol 33:54–68
36. Booster G, DuPaul G, Eiraldi R, Power T (2012) Functional impairments in children with ADHD: unique effects of age and comorbid status. J Atten Disord 16:179–189
37. Connor D, Edwards G, Fletcher K, Baird J, Barkley R, Steingard R (2003) Correlates of comorbid psychopathology in children with ADHD. J Am Acad Child Adolesc Psychiatry 42:193–200
38. Wåhlstedt C, Thorell L, Bohlin G (2009) Heterogeneity in ADHD: neuropsychological pathways, comorbidity and symptom domains. J Abnorm Child Psychol 37:551–564
39. Drabick D, Gadow K, Sprafkin J (2006) Co-occurrence of conduct disorder and depression in a clinic-based sample of boys with ADHD. J Child Psychol Psychiatry 47:766–774
40. Lilienfeld S (2003) Comorbidity between and within childhood externalizing and internalizing disorders: reflections and directions. J Abnorm Child Psychol 31:285–291
41. Cicchetti D, Toth S (2009) The past achievements and future promises of developmental psychopathology: the coming of age of a discipline. J Child Psychol Psychiatry 50:16–25
42. Drabick D (2009) Can a developmental psychopathology perspective facilitate a paradigm shift toward a mixed categorical–dimensional classification system? Clin Psychol Sci Pract 16:41–49
43. Rutter M, Sroufe L (2000) Developmental psychopathology: concepts and challenges. Dev Psychopathol 12:265–296
44. Martel MM (2009) Research review: a new perspective on attention-deficit/hyperactivity disorder: emotion dysregulation and trait models. J Child Psychol Psychiatry 50:1042–1051
45. Musser E (2011) Emotion regulation via the autonomic nervous system in children with attention-deficit/hyperactivity disorder (ADHD). J Abnorm Child Psychol 39:841–852
46. Wehmeier P, Schacht A, Barkley R (2010) Social and emotional impairment in children and adolescents with ADHD and the impact on quality of life. J Adolesc Health 46:209–217
47. Cicchetti D, Rogosch F (1996) Equifinality and multifinality in developmental psychopathology. Dev Psychopathol 8:597–600
48. Willoughby M (2003) Developmental course of ADHD symptomatology during the transition from childhood to adolescence: a review with recommendations. J Child Psychol Psychiatry 44:88–106
49. Caspi A, Bem D (1990) Personality continuity and change across the life course. In: Pervin LA (ed) Handbook of personality: theory and research. Guilford, New York, pp 549–575
50. Kagan J (1971) Change and continuity in infancy. Wiley, New York
51. Rutter M (1989) Pathways from childhood to adult life. J Child Psychol Psychiatry 30:23–51
52. Caron C, Rutter M (1991) Comorbidity in child psychopathology: concepts, issues and research strategies. J Child Psychol Psychiatry 32:1063–1080
53. Drabick D, Kendall P (2010) Developmental psychopathology and the diagnosis of mental health problems among youth. Clin Psychol Sci Pract 17:272–280
54. Klein DN, Riso LP (1993) Psychiatric disorders: problems of boundaries and comorbidity. In: Costello CG (ed) Basic issues in psychopathology. Guilford, New York, pp 19–66
55. Yoshimasu K, Barbaresi W, Colligan RC, Voigt RG, Killian JM, Weaver AL, Katsuic SK (2012) Childhood ADHD is strongly associated with a broad range of psychiatric disorders during adolescence: a population-based birth cohort study. J Child Psychol Psychiatry 53:1036–1043
56. Jensen P, Hinshaw S, Swanson J, Greenhill L, Conners C, Arnold L et al (2001) Findings from the NIMH Multimodal Treatment Study of ADHD (MTA): Implications and applications for primary care providers. J Dev Behav Pediatr 22:60–73
57. August G, Realmuto G, MacDonald A, Nugent S, Crosby R (1996) Prevalence of ADHD and comorbid disorders among elementary school children screened for disruptive behavior. J Abnorm Child Psychol 24:571–595
58. Nagin D, Tremblay R (2005) Developmental trajectory groups: fact or a useful statistical fiction? Criminology 43:873–904
59. Odgers C, Moffitt T, Broadbent J, Dickson N, Hancox R, Harrington H (2008) Female and male antisocial trajectories: from

childhood origins to adult outcomes. Dev Psychopathol 20:673–716
60. Pardini D, Fite P (2010) Symptoms of conduct disorder, oppositional defiant disorder, attention-deficit/hyperactivity disorder, and callous-unemotional traits as unique predictors of psychosocial maladjustment in boys: advancing an evidence base for *DSM-V*. J Am Acad Child Adolesc Psychiatry 49:1134–1144
61. Rowe R, Maughan B, Pickles A, Costello E, Angold A et al (2002) The relationship between DSM-IV oppositional defiant disorder and conduct disorder: findings from the Great Smoky Mountains Study. J Child Psychol Psychiatry 43:365–373
62. Biederman J, Petty C, Faraone S, Dolan C, Hughes S, Mick E, Monuteaux MC, Faraone SV (2008) The long-term longitudinal course of oppositional defiant disorder and conduct disorder in ADHD boys: findings from a controlled 10-year prospective longitudinal follow-up study. Psychol Med 38:1027–1036
63. Christiansen H, Chen W, Oades RD, Asherson P, Taylor EA, Lasky-Su J et al (2008) Co-transmission of conduct problems with attention-deficit/hyperactivity disorder: familial evidence for a distinct disorder. J Neural Transm 115:163–175
64. Klein RG, Mannuzza S, Ramos Olazagasti MA, Roizen E, Hutchison JA, Lashua EC, Castellanos FX (2012) Clinical and functional outcome of childhood ADHD 33 years later. Arch Gen Psychiatry 69:1295–1303
65. Monuteaux M, Biederman J, Doyle A, Mick E, Faraone S (2009) Genetic risk for conduct disorder symptom subtypes in a ADHD sample: specificity to aggressive symptoms. J Am Acad Child Adolesc Psychiatry 48:757–764
66. Bubier J, Drabick DAG (2009) Co-occurring anxiety and disruptive behavior disorders: the roles of anxious symptoms, reactive aggression, and shared risk processes. Clin Psychol Rev 29:658–669
67. Ollendick TH, Seligman LD (2006) Anxiety disorders in children and adolescents. Clinician's desk book of child and adolescent psychiatry. Guilford, New York
68. Silverman WK, Ginsburg GS (1998) Anxiety disorders. In: Ollendick TH, Hersen M (eds) Handbook of child psychopathology, 3rd edn. Plenum, New York, pp 239–268
69. Tsang KLV, Wong PYH, Lo SK (2012) Assessing psychosocial well-being of adolescents: a systematic review of measuring instruments. Child Care Health Dev 38:629–646
70. MTA Cooperative Group (1999) A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. Arch Gen Psychiatry 56:1073–1086
71. Bussing R, Mason DM, Bell L, Porter P, Garvan C (2010) Adolescent outcomes of childhood attention-deficit/hyperactivity disorder in a diverse community sample. J Am Acad Child Adolesc Psychiatry 49:595–605
72. Lahey B, Hartung C, Loney J, Pelham W, Chronis A, Lee S (2007) Are there sex differences in the predictive validity of DSM-IV ADHD among younger children? J Clin Child Adolesc Psychol 36:113–126
73. Lee S, Lahey B, Owens E, Hinshaw S (2008) Few preschool boys and girls with ADHD are well-adjusted during adolescence. J Abnorm Child Psychol 36:373–383
74. Monuteaux MC, Faraone SV, Gross LM, Biederman J (2007) Predictors, clinical characteristics, and outcome of conduct disorder in girls with attention-deficit/hyperactivity disorder: a longitudinal study. Psychol Med 37:1731–1742
75. Seymour KE, Chronis-Tuscano A, Halldorsdottir T, Stupica B, Owens K, Sacks T (2010) Emotion regulation mediates the relationship between ADHD and depressive symptoms in youth. J Abnorm Child Psychol 40:595–606
76. Faraone SV, Biederman J, Monuteaux MC (2001) Attention deficit hyperactivity disorder with bipolar disorder in girls: further evidence for a familial subtype. J Affect Disord 64:19–26
77. Ostrander R, Herman KC (2006) Potential cognitive, parenting, and developmental mediators of the relationship between ADHD and depression. J Consult Clin Psychol 74:89–98
78. Kessler RC, Wang PS (2002) Epidemiology of depression. In: Gotlib I, Hammen CL (eds) Handbook of depression. Guilford, New York
79. Biederman J, Mick E, Faraone SV (1998) Depression in attention deficit hyperactivity disorder (ADHD) children. J Affect Disord 47:113–122
80. Daviss WB (2008) A review of co-morbid depression in pediatric ADHD: etiologies, phenomenology, and treatment. J Child Adolesc Psychopharmacol 18:565–571
81. Eisenberg N, Spinrad TL, Eggum ND (2010) Emotion-related self-regulation and its relation to children's maladjustment. Annu Rev Clin Psychol 6:495
82. Cole PM, Michel MK, Teti LOD (1994) The development of emotion regulation and dysregulation: a clinical perspective. Monogr Soc Res Child Dev 59:73–102
83. Cole PM, Martin SE, Dennis TA (2004) Emotion regulation as a scientific construct: methodological challenges and directions for child development research. Child Dev 75:317–333
84. Gross JJ (2013) Handbook of emotion regulation. Guilford, New York
85. Bates JE (1987) Temperament in infancy. Wiley, Oxford
86. Southam-Gerow MA, Kendall PC (2002) Emotion regulation and understanding: implications for child psychopathology and therapy. Clin Psychol Rev 22:189–222
87. Eisenberg N, Morris AS (2002) Children's emotion-related regulation. In: Kail R (ed) Advances in child development and behavior. Academic Press, Amsterdam
88. Rothbart MK, Bates JE (2006) Temperament. In: Eisenberg N, Damon W, Lerner RM (eds) Handbook of child psychology, vol 3., Social, emotional, and personality developmentWiley, Hoboken, NJ, pp 99–166
89. Maegden JW, Carlson CL (2000) Social functioning and emotional regulation in the attention deficit hyperactivity disorder subtypes. J Clin Child Psychol 29:30–42
90. Melnick SM, Hinshaw SP (2000) Emotion regulation and parenting in AD/HD and comparison boys: linkages with social behaviors and peer preference. J Abnorm Child Psychol 28:73–86
91. Samyn V, Roeyers H, Bijttebier P, Wiersema JR (2013) Attentional networks in boys with ADHD or autism spectrum disorder and the relationship with effortful control. J Atten Dis. doi:10.1177/1087054712473183
92. Walcott CM, Landau S (2004) The relation between disinhibition and emotion regulation in boys with attention deficit hyperactivity disorder. J Clin Child Adolesc Psychol 33:772–782
93. Eisenberg N, Fabes RA (1992) Emotion, regulation, and the development of social competence. Sage, Thousand Oaks, CA
94. Carlson SM, Wang TS (2007) Inhibitory control and emotion regulation in preschool children. Cogn Dev 22:489–510
95. Lengua LJ, West SG, Sandler IN (1998) Temperament as a predictor of symptomatology in children: addressing contamination of measures. Child Dev 69:164–181
96. Lemery KS, Essex MJ, Smider NA (2002) Revealing the relation between temperament and behavior problem symptoms by eliminating measurement confounding: expert ratings and factor analyses. Child Dev 73:867–882
97. Braaten EB, Rosen LA (2000) Self-regulation of affect in attention deficit-hyperactivity disorder (ADHD) and non-ADHD boys: differences in empathic responding. J Consult Clin Psychol 68:313–321

98. Sobanski E, Banaschewski T, Asherson P, Buitelaar J, Chen W, Franke B et al (2010) Emotional lability in children and adolescents with attention deficit/hyperactivity disorder (ADHD): clinical correlates and familial prevalence. J Child Psychol Psychiatry 51:915–923
99. Althoff RR, Copeland WE, Stanger C, Derks EM, Todd RD, Neuman RJ et al (2006) The latent class structure of ADHD is stable across informants. Twin Res Hum Genet 9:507–522
100. Shaw P, Stringaris A, Nigg J, Leibenluft E (2014) Emotion dysregulation in attention deficit hyperactivity disorder. Am J Psychiatry 171:176–293
101. Stringaris A, Goodman R (2009) Mood lability and psychopathology in youth. Psychol Med 39:1237–1245
102. Martel MM, Nigg JT (2006) Child ADHD and personality/temperament traits of reactive and effortful control, resiliency, and emotionality. J Child Psychol Psychiatry 47:1175–1183
103. Sanson A, Prior M (1999) Temperament and behavioral precursors to oppositional defiant disorder and conduct disorder. In: Quay HC, Hogan AE (eds) Handbook of disruptive behavior disorders. Kluwer Academic/Plenum, Dordrecht, pp 397–417
104. De Pauw SS, Mervielde I (2010) Temperament, personality and developmental psychopathology: a review based on the conceptual dimensions underlying childhood traits. Child Psychiatry Hum Dev 41:313–329
105. Barkley R (1997) Behavioral inhibition, sustained attention, and executive functions: constructing a unifying theory of ADHD. Psychol Bull 121:65–94
106. Gray JA (1991) The neuropsychology of temperament. Plenum, New York
107. Posner MI, Rothbart MK (2000) Developing mechanisms of self-regulation. Dev Psychopathol 12:427–441
108. Brown TE (2002) DSM-IV: ADHD and executive function impairments. Adv Stud Med 2:910–914
109. Castellanos FX, Tannock R (2002) Neuroscience of attention-deficit/hyperactivity disorder: the search for endophenotypes. Nat Rev Neurosci 3:617–628
110. Pennington BF, Ozonoff S (1996) Executive functions and developmental psychopathology. J Child Psychol Psychiatry 37:51–87
111. Sagvolden T, Aase H, Zeiner P, Berger D (1998) Altered reinforcement mechanisms in attention-deficit/hyperactivity disorder. Behav Brain Res 94:61–71
112. Spinrad TL, Stifter CA, Donelan-McCall N, Turner L (2004) Mothers' regulation strategies in response to toddlers' affect: links to later emotion self-regulation. Soc Dev 13:40–55
113. Buck R (1984) The communication of emotion. Guilford, New York
114. Fabes RA, Leonard SA, Kupanoff K, Martin CL (2001) Parental coping with children's negative emotions: relations with children's emotional and social responding. Child Dev 72:907–920
115. Gadow KD, Drabick DA, Loney J, Sprafkin J, Salisbury H, Azizian A, Schwartz J (2004) Comparison of ADHD symptom subtypes as source-specific syndromes. J Child Psychol Psychiatry 45:1135–1149
116. Hinshaw SP, Zupan BA, Simmel C, Nigg JT, Melnick S (1997) Peer status in boys with and without attention-deficit hyperactivity disorder: predictions from overt and covert antisocial behavior, social isolation, and authoritative parenting beliefs. Child Dev 68:880–896
117. Hinshaw S, Owens E, Wells K, Kraemer H, Abikoff H, Arnold L et al (2000) Family processes and treatment outcome in the MTA: negative/ineffective parenting practices in relation to multimodal treatment. J Abnorm Child Psychol 28:555–568
118. Johnston C, Jassy JS (2007) Attention-deficit/hyperactivity disorder and oppositional/conduct problems: links to parent-child interactions. J Can Acad Child Adolesc Psychiatry 16:74–79
119. Kashdan TB, Jacob RG, Pelham WE, Lang AR, Hoza B, Blumenthal JD et al (2004) Depression and anxiety in parents of children with ADHD and varying levels of oppositional defiant behaviors: modeling relationships with family functioning. J Clin Child Adolesc Psychol 33:169–181
120. Pfiffner LJ, McBurnett K, Rathouz PJ, Judice S (2005) Family correlates of oppositional and conduct disorders in children with attention deficit/hyperactivity disorder. J Abnorm Child Psychol 33:551–563
121. Burke JD, Pardini DA, Loeber R (2008) Reciprocal relationships between parenting behavior and disruptive psychopathology from childhood through adolescence. J Abnorm Child Psychol 36:679–692
122. Lanza HI, Drabick DA (2011) Family routine moderates the relation between child impulsivity and oppositional defiant disorder symptoms. J Abnorm Child Psychol 39:83–94
123. Chronis AM, Lahey BB, Pelham WE, Williams SH, Baumann BL, Kipp H (2007) Maternal depression and early positive parenting predict future conduct problems in young children with attention-deficit/hyperactivity disorder. Dev Psychol 43:70–82
124. Johnson JG, Cohen P, Kasen S, Smailes E, Brook JS (2001) Association of maladaptive parental behavior with psychiatric disorder among parents and their offspring. Arch Gen Psychiatry 58:453–460
125. Bates J, Pettit G, Dodge K, Ridge B (1998) Interaction of temperamental resistance to control and restrictive parenting in the development of externalizing behavior. Dev Psychol 34:982–995
126. Fox NA, Henderson HA, Rubin KH, Calkins SD, Schmidt LA (2001) Continuity and discontinuity of behavioral inhibition and exuberance: psychophysiological and behavioral influences across the first 4 years of life. Child Dev 72:1–21
127. Morris AS, Silk JS, Steinberg L, Sessa FM, Avenevoli S, Essex MJ (2002) Temperamental vulnerability and negative parenting as interacting predictors of child adjustment. J Marriage Fam 64:461–471
128. Calkins SD (1994) Origins and outcomes of individual differences in emotion regulation. Monogr Soc Res Child Dev 59:53–72
129. Graziano PA, Keane SP, Calkins SD (2010) Maternal behaviour and children's early emotion regulation skills differentially predict development of children's reactive control and later effortful control. Infant Child Dev 19:333–353
130. Kopp CB (1989) Regulation of distress and negative emotions: a developmental view. Dev Psychol 25:343–354
131. Sroufe LA (1979) Socioemotional development. In: Osofsky J (ed) Handbook of infant development. Wiley, New York
132. Campbell SB, Shaw DS, Gilliom M (2000) Early externalizing behavior problems: toddlers and preschoolers at risk for later maladjustment. Dev Psychopathol 12:467–488
133. Bocknek EL, Brophy-Herb HE, Banerjee M (2009) Effects of parental supportiveness on toddlers' emotion regulation over the first 3 years of life in a low-income African American sample. Infant Mental Health J 30:452–476
134. Goldsmith H, Lemery K, Essex M (2004) Temperament as a liability for childhood behavior disorders: the concept of liability. In: DiLalla LF (ed) Behavior genetics principles: perspectives in development, personality, and psychopathology. American Psychological Association Press, Washington, DC, pp 19–39
135. Olson SL, Bates JE, Sandy JM, Schilling EM (2002) Early developmental precursors of impulsive and inattentive behavior: from infancy to middle childhood. J Child Psychol Psychiatry 43:435–447
136. Stringaris A, Maughan B, Goodman R (2010) What's in a disruptive disorder? Temperamental antecedents of oppositional

defiant disorder: findings from the Avon Longitudinal Study. J Am Acad Child Adolesc Psychiatry 49:474–483
137. Leon-Carrion J, Garcia-Orza J, Perez-Santamaria FJ (2004) Development of the inhibitory component of the executive functions in children and adolescents. Int J Neurosci 114:1291–1311
138. Cole PM, Armstrong LM, Pemberton CK (2010) The role of language in the development of emotion regulation. In: Calkins SD, Bell MA (eds) Child development at the intersection of emotion and cognition. American Psychological Association, Washington, DC, pp 59–77
139. Carpenter JL, Drabick DA (2011) Co-occurrence of linguistic and behavioural difficulties in early childhood: a developmental psychopathology perspective. Early Child Dev Care 181:1021–1045
140. Gottman JM, Katz LF, Hooven C (1996) Parental meta-emotion philosophy and the emotional life of families: theoretical models and preliminary data. J Fam Psychol 10:243–268
141. Bradley RH, Corwyn RF (2007) Externalizing problems in fifth grade: relations with productive activity, maternal sensitivity, and harsh parenting from infancy through middle childhood. Dev Psychol 43:1390–1401
142. Scaramella LV, Conger RD (2003) Intergenerational continuity of hostile parenting and its consequences: the moderating influence of children's negative emotional reactivity. Soc Dev 12:420–439
143. Szabó N, Dekovic M, van Aken C, Verhoeven M, van Aken MAG, Junger M (2008) The relations among child negative interactive behavior, child temperament, and maternal behavior. Early Child Res Q 23:366–377
144. van Aken C, Junger M, Verhoeven M, van Aken MA, Deković M, Denissen JJA (2007) Parental personality, parenting and toddlers' externalising behaviours. Eur J Pers 21:993–1015
145. Jaffe M, Gullone E, Hughes EK (2010) The roles of temperamental dispositions and perceived parenting behaviours in the use of two emotion regulation strategies in late childhood. J Appl Dev Psychol 31:47–59
146. Zeman J, Cassano M, Perry-Parrish C, Stegall S (2006) Emotion regulation in children and adolescents. J Dev Behav Pediatr 27:155–168
147. Gullone E, Hughes EK, King NJ, Tonge B (2010) The normative development of emotion regulation strategy use in children and adolescents: a 2-year follow-up study. J Child Psychol Psychiatry 51:567–574
148. Drabick DA, Steinberg L (2011) Developmental psychopathology. In: Brown B, Prinstein M (eds) Encyclopedia of adolescence, vol 3. Academic Press, San Diego, CA, pp 136–142
149. Derryberry D, Rothbart MK (1997) Reactive and effortful processes in the organization of temperament. Dev Psychopathol 9:633–652
150. Eisenberg N, Spinrad TL (2004) Emotion-related regulation: sharpening the definition. Child Dev 75:334–339
151. Lengua LJ (2006) Growth in temperament and parenting as predictors of adjustment during children's transition to adolescence. Dev Psychol 42:819–832
152. Patterson GR (1982) Coercive family processes. Castalia, Eugene, OR
153. Yap MB, Allen NB, O'Shea M, Di Parsia P, Simmons JG, Sheeber L (2011) Early adolescents' temperament, emotion regulation during mother-child interactions, and depressive symptomatology. Dev Psychopathol 23:267–282
154. Mezulis AH, Hyde JS, Abramson LY (2006) The developmental origins of cognitive vulnerability to depression: temperament, parenting, and negative life events in childhood as contributors to negative cognitive style. Dev Psychol 42:1012–1025
155. Hoza B (2007) Peer functioning in children with ADHD. J Pediatr Psychol 32:655–663
156. Peris TS, Baker BL (2000) Applications of the expressed emotion construct to young children with externalizing behavior: stability and prediction over time. J Child Psychol Psychiatry 41:457–462
157. Taylor E (1999) Developmental neuropsychopathology of attention deficit and impulsiveness. Dev Psychopathol 11:607–628
158. August G, Realmuto G, Joyce T, Hektner J (1999) Persistence and desistance of oppositional defiant disorder in a community sample of children with ADHD. J Am Acad Child Adolesc Psychiatry 38:1262–1270
159. Burke JD, Loeber R, Birmaher B (2002) Oppositional defiant disorder and conduct disorder: a review of the past 10 years, part II. J Am Acad Child Adolesc Psychiatry 41:1275–1293
160. Cappadocia MC, Desrocher M, Pepler D, Schroeder JH (2009) Contextualizing the neurobiology of conduct disorder in an emotion dysregulation framework. Clin Psychol Rev 29:506–518
161. Frick PJ, White SF (2008) Research review: the importance of callous-unemotional traits for the developmental models of aggressive and antisocial behavior. J Child Psychol Psychiatry 49:359–375
162. Blair RJR (2004) The roles of orbital frontal cortex in the modulation of antisocial behavior. Brain Cogn 55:198–208
163. Crowe SL, Blair RJR (2008) The development of antisocial behavior: what can we learn from functional neuroimaging studies? Dev Psychopathol 20:1145–1159
164. Blair RJR (2010) Neuroimaging of psychopathy and antisocial behavior: a targeted review. Curr Psychiatry Rev 12:76–82
165. Mitchell DG, Richell RA, Leonard A, Blair RJR (2006) Emotion at the expense of cognition: psychopathic individuals outperform controls on an operant response task. J Abnorm Psychol 115:559–566
166. Nigg JT, Goldsmith HH, Sachek J (2004) Temperament and attention deficit hyperactivity disorder: the development of a multiple pathway model. J Clin Child Adolesc Psychol 33:42–53
167. Raine A (2002) Biosocial studies of antisocial and violent behavior in children and adults: a review. J Abnorm Child Psychol 30:311–326
168. Sterzer P, Stadler C, Krebs A, Kleinschmidt A, Poustka F (2005) Abnormal neural responses to emotional visual stimuli in adolescents with conduct disorder. Biol Psychiatry 57:7–15
169. Beauchaine T, Gatzke-Kopp L, Mead H (2007) Polyvagal theory and developmental psychopathology: emotion dysregulation and conduct problems from preschool to adolescence. Biol Psychol 74:174–184
170. Burt SA, Krueger RF, McGue M, Iacono WG (2001) Sources of covariation among attention-deficit/hyperactivity disorder, oppositional defiant disorder, and conduct disorder: the importance of shared environment. J Abnorm Psychol 110:516–525
171. Patterson GR, DeGarmo DS, Knutson N (2000) Hyperactive and antisocial behaviors: comorbid or two points in the same process? Dev Psychopathol 12:91–106
172. Mash EJ, Wolfe DA (2002) Abnormal child psychology. Wadsworth, Belmont, CA
173. Suveg C, Zeman J (2004) Emotion regulation in children with anxiety disorders. J Clin Child Adolesc Psychol 33:750–759
174. Chhabildas N, Pennington BF, Willcutt EG (2001) A comparison of the neuropsychological profiles of the DSM-IV subtypes of ADHD. J Abnorm Child Psych 29:529–540
175. Schatz DB, Rostain AL (2006) ADHD with comorbid anxiety: a review of the current literature. J Atten Disord 10:141–149
176. Chaplin TM, Cole PM, Zahn-Waxler C (2005) Parental socialization of emotion expression: gender differences and relations to child adjustment. Emotion 5:80–88

177. Cole PM, Teti LO, Zahn-Waxler C (2003) Mutual emotion regulation and the stability of conduct problems between preschool and early school age. Dev Psychopathol 15:1–18
178. Compas BE, Connor-Smith J, Jaser SS (2004) Temperament, stress reactivity, and coping: Implications for depression in childhood and adolescence. J Clin Child Adolesc Psychol 33:21–31
179. Silk JS, Steinberg L, Morris AS (2003) Adolescents' emotion regulation in daily life: links to depressive symptoms and problem behavior. Child Dev 74:1869–1880
180. Ollendick TH, Jarrett MA, Grills-Taquechel AE, Hovey LD, Wolff JC (2008) Comorbidity as a predictor and moderator of treatment outcome in youth with anxiety, affective, attention deficit/hyperactivity disorder, and oppositional/conduct disorders. Clin Psychol Rev 28:1447–1471
181. Pelham WE, Fabiano GA (2008) Evidence-based psychosocial treatments for attention-deficit/hyperactivity disorder. J Clin Child Adol Psychol 37:184–214
182. Lifford KJ, Harold GT, Thapar A (2009) Parent-child hostility and child ADHD symptoms: a genetically sensitive and longitudinal analysis. J Child Psychol Psychiatry 50:1468–1476
183. Weisz JR, Chorpita BF, Palinkas LA, Schoenwald SK, Miranda J, Bearman SK et al (2012) Testing standard and modular designs for psychotherapy treating depression, anxiety, and conduct problems in youth: a randomized effectiveness trial. Arch Gen Psychiatry 69:274–282
184. Hannesdottir DK, Ollendick TH (2007) The role of emotion regulation in the treatment of child anxiety disorders. Clin Child Fam Psychol Rev 10:275–293
185. Suveg C, Southam-Gerow MA, Goodman KL, Kendall PC (2007) The role of emotion theory and research in child therapy development. Clin Psychol Sci Pract 4:358–371
186. Kusche CA, Greenberg MT (1994) The PATHS curriculum. Developmental Research and Programs, Seattle, WA
187. Izard CE, Trentacosta CJ, King KA, Mostow AJ (2004) An emotion-based prevention program for Head Start children. Early Educ Dev 15:407–422
188. Suveg C, Kendall PC, Comer JS, Robin J (2006) Emotion-focused cognitive–behavioral therapy for anxious youth: a multiple-baseline evaluation. J Contemp Psychother 36:77–85
189. Kovacs M, Sherrill J, George CJ, Pollock M, Tumuluru RV, Ho V (2006) Contextual emotion-regulation therapy for childhood depression: description and pilot testing of a new intervention. J Am Acad Child Adolesc Psychiatry 45:892–903
190. Mattison RE, Mayes SD (2012) Relationship between learning disability, executive function, and psychopathology in children with ADHD. J Atten Disord 16:138–146
191. Willcutt EG, Pennington BF (2000) Comorbidity of reading disability and attention-deficit/hyperactivity disorder: differences by gender and subtype. J Learn Disabil 33:179–191
192. de Boo GM, Prins PJ (2007) Social incompetence in children with ADHD: possible moderators and mediators in social-skills training. Clin Psychol Rev 27:78–97
193. Owens EB, Hinshaw SP (2013) Perinatal problems and psychiatric comorbidity among children with ADHD. J Clin Child Adolesc Psychol 42:762–768
194. Rydell AM (2010) Family factors and children's disruptive behaviour: an investigation of links between demographic characteristics, negative life events, and symptoms of ODD and ADHD. Soc Psychiatry Psychiatr Epidemiol 45:233–244