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Comorbidity of Anxiety and Depression in Youth: Implications for Treatment and Prevention

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Abstract

The high level of concurrent and sequential comorbidity between anxiety and depression in children and adolescents may result from (a) substantial overlap in both the symptoms and items used to assess these putatively different disorders, (b) common etiological factors (e.g., familial risk, negative affectivity, information processing biases, neural substrates) implicated in the development of each condition, and (c) negative sequelae of anxiety conferring increased risk for the development of depression. Basic research on their various common and unique etiological mechanisms has guided the development of efficacious treatments for anxiety and depressive disorders in youth. Potential processes through which the successful treatment of childhood anxiety might prevent subsequent depression are described.

Anxiety and depression frequently co-occur both concurrently and sequentially in children and adolescents, and one often increases the risk of the other over time. The most common anxiety diagnoses in youth are separation anxiety disorder (SAD), social anxiety disorder (SOC), generalized anxiety disorder (GAD), and specific phobia (SP); depression diagnoses include major depressive disorder (MDD) and dysthymic disorder (DD). These various anxiety and depressive disorders appear together across generations, clustering strongly within families. Unpacking the whole of the internalizing comorbidity literature is beyond the scope of this paper (see Axelson & Birmaher, 2001; Brady & Kendall, 1992; Seligman & Ollendick, 1998). Rather, we address several key questions regarding comorbid anxiety and depression in youth. What is the extent of their concurrent and sequential overlap? What may account for the observed patterns of comorbidity between these disorders? What are the implications of their comorbidity for the treatment and prevention of anxiety and depression?

Extent of Concurrent and Sequential Comorbidity

Anxiety and mood symptoms and disorders in youth are distressing, impairing, and prevalent (e.g., Costello et al., 2003), interfere with interpersonal relationships and academic achievement, and increase the risk of suicide and other psychopathology (e.g., Gould et al., 1998; Rohde, Lewinsohn, & Seeley, 1994). Moreover, such negative effects may propagate forward into adulthood (Rohde et al., 1994; Weissman et al., 1999). The prognosis for comorbid anxiety and depression is worse than either condition alone, with higher risk of recurrence, longer duration, increased suicide attempts, greater impairment, less favorable response to treatment, and greater utilization of mental health services (Birmaher et al., 1996; Ezpeleta, Domenech, & Angold, 2006).

An estimated 15% to 20% of youth in the United States meet criteria for any anxiety disorder (i.e., SAD: 2.8% to 8%, SP: 10%, SOC: 7%, panic disorder: 1%–3%, GAD: 4.3%) (Beesdo, Knapp, & Pine, 2009), and approximately 1 in 5 youth will have an episode of MDD by age 18 (Lewinsohn et al., 1993). The level of comorbidity between these common problems is substantial, as evidenced by both high correlations between dimensional measures of anxious and depressive symptoms (e.g., Cole, Peeke, Martin, Truglio, & Seroczynski, 1997; Stark & Laurent, 2001) and diagnostic comorbidity rates as high as 75% in some clinical samples (Sorensen, Nissen, Mors, & Thomsen, 2005; Weersing, Gonzalez, Campo, & Lucas, 2008).

Interestingly, this high degree of comorbidity does not appear to be symmetrical. In community samples, 25% to 50% of youth with depression also meet criteria for an anxiety disorder, whereas only 10% to 15% of those with a primary anxiety disorder have a concurrent depressive disorder (Angold et al., 1999; Axelson & Birmaher, 2001; Costello et al., 2003). Thus, youth with primary depressive disorders tend to have comorbid anxiety more often than do those with primary anxiety disorders have comorbid depression (Merikangas & Avenevoli, 2002; Ollendick, Shortt, & Sander, 2005).

Several factors might explain this apparent imbalance. First, subsyndromal levels of symptoms often have not been assessed in studies of comorbidity. That is, children diagnosed with anxiety disorders may have concurrent depressive symptoms even if they do not meet full criteria for a depressive diagnosis, and these co-occurring, subthreshold symptoms may account for the apparent link between anxiety and subsequent depressive disorder in adolescence. Indeed, sub-diagnostic depressive symptoms have been found to be a more reliable predictor of subsequent depressive disorders than symptoms of either separation or social anxiety (Keenan, Feng, Hipwell, & Klostermann, 2009).

Second, anxiety disorders are quite heterogeneous; the extent of comorbidity with depression depends on which anxiety symptoms and disorders are assessed (Avenevoli, Stolar, Li, Dierker, & Merikangas, 2001; Chaplin, Gillham, & Seligman, 2009; Moffitt et al., 2007). For example, whereas panic disorder does not consistently predict subsequent depression, SOC and GAD in childhood tend to be associated with depression during adolescence (Bittner et al., 2007; Keenan et al., 2009). Thus, although there is considerable comorbidity among anxiety disorders (Angold et al., 1999), combining anxiety disorders together likely distorts the apparent strength and direction of the relation between particular anxiety disorders and depression.

Third, the degree of comorbidity varies by age and developmental period. Whereas anxiety is more prevalent during childhood, depression increases during adolescence (e.g., Cohen et al., 1993; Woodward & Fergusson, 2001). Youth with comorbid anxiety and depression tend to be older than those with either disorder alone (Brady & Kendall, 1992; Merikangas & Avenevoli, 2002). This may be due, in part, to differences in the structure and differentiation of affect across development. For example, in young children (third graders), anxiety and depression form a unified, indistinguishable construct, whereas in older children (sixth graders), a dual-factor or tripartite model is more common (Cole, Truglio, & Peeke, 1997). Thus, higher rates of comorbid anxiety and depressive disorders tend to be found in adolescents than children (Ollendick et al., 2005).

Finally, whereas concurrent comorbidity of anxiety and depressive disorders is substantial and relatively undisputed (Brady & Kendall, 1992; Karlson et al., 2006), less clear is the extent and direction of “sequential comorbidity;” that is, when one disorder reliably precedes the other (Angold et al., 1999). Comorbid anxiety and depression may have strong effects on one another such that the presence of anxiety symptoms may lead to an increase

in depressive symptoms and vice versa (Bittner et al., 2007; Goodwin, Fergusson, & Horwood, 2004); most studies of sequential comorbidity have focused on anxiety as the predictor and depression as the outcome, rather than the reverse. In general, evidence indicates that anxiety symptoms and disorders in childhood often precede the onset of depressive disorders in adolescence and young adulthood (Chorpita & Daleiden, 2002; Pine, Cohen, Gurley, Brook, & Ma, 1998), particularly for girls (Breslau, Schultz, & Peterson, 1995; Chaplin et al., 2009; Keenan & Hipwell, 2005), and may contribute to the increased risk of depression in females (Bittner et al., 2004).

Less evidence exists of depression preceding anxiety, however (e.g., Axelson & Birmaher, 2001; Orvaschel, Lewinsohn, & Seeley, 1995). Only a few balanced investigations have been conducted in which individuals with mood disorders are followed longitudinally to assess the onset of an anxiety disorder as well as the reverse (Gallerani, Garber, & Martin, 2010; Keenan et al., 2009; Pine et al., 1998). For example, Pine and colleagues (1998) reported that MDD during adolescence significantly predicted a five-fold increased risk of GAD in young adulthood.

What Accounts for Comorbidity between Anxiety and Depression

Several nonmutually exclusive explanations for the observed comorbidity between anxiety and depression have been suggested, some of which are methodological and others more substantive. We highlight here some of the most frequently suggested reasons for such comorbidity, and later discuss their implications for intervention.

Item and Symptom Overlap

One methodological explanation for the high correlation between self-report measures of anxiety and depression is that the items on these scales are quite similar or even identical. Investigations that have excluded all overlapping items, however, have found that the correlations of the abbreviated measures were still significant (r = .34) (Stark & Laurent, 2001), and that such modified versions of the self-report measures only reduced the shared variance (52%–72%) in trait constructs by about 13% (Cole, Truglio, & Peeke, l997).

A related, but more complex, reason for the observed comorbidity between anxiety and depression is that the symptoms that define these disorders are similar. For example, social avoidance can characterize both SOC and MDD, although the underlying reason for and function of the avoidance may differ. The clearest example of symptom overlap is between GAD and MDD, both of which include fatigue, sleep disturbance, concentration difficulties, and irritability (in children). The proposed revision for DSM-V eliminates these specific symptoms from the criteria that define GAD, which may be one way to reduce comorbidity. The validity of these new symptom criteria for GAD remains to be demonstrated in adults as well as children.

Underlying Negative Affectivity

An important substantive explanation for the association between anxiety and depression is that they have shared etiological influences. In particular, some of the overlap between anxious and depressive symptoms likely is due to a common underlying latent risk factor of general negative affectivity (NA) or negative emotionality (Barlow, 2000; Clark & Watson, 1991), which is related to the personality construct of neuroticism (Watson, 2000). NA represents the extent to which an individual feels distress (e.g., upset, sad, angry, guilty, worried) and not calm, relaxed, or peaceful. According to the tripartite model (Clark & Watson, 1991), high NA characterizes both anxiety and depression, whereas low positive affect (PA) and loss of interest or pleasure are unique to depression, and somatic tension and physiological hyperarousal (PH) are distinct features of anxiety. Removing variance

attributable to general NA reduces the correlation between anxiety and depression and facilitates their discrimination on the remaining unique features (i.e., PA, PH).

Support for the tripartite model has been found in clinical and nonclinical samples of children and adolescents (Laurent & Ettelson, 2001). Particularly robust is the finding that general NA accounts for much of the variance shared by depression and anxiety in youth (Chorpita, Daleiden, Moffitt, Yim, & Umemoto, 2000; Tully, Zajac & Venning, 2009). Evidence for the physiological arousal component has been more mixed, however (e.g., Chorpita, 2002; Jacques & Mash, 2004; Lonigan, Hooe, David, & Kistner, 1999). Watson (2005) proposed a reconfiguration of mood and anxiety disorders into "distress" and "fear" factors, which together comprise a higher order internalizing factor (Slade & Watson, 2006). Accordingly, GAD, MDD, DD, and post-traumatic stress disorder (PTSD) cluster with the distress disorders, whereas panic disorder, SOC, and SPs comprise the fear disorders. Some evidence that GAD is more closely linked with depression as compared to anxiety has been found in children (Higa-McMillan, Smith, Chorpita & Hayashi, 2008; Lahey et al., 2008), although evidence that GAD is more closely aligned with other anxiety disorders than to depression also has been reported (e.g., Beesdo, Pine, Lieb, & Wittchen, 2010).

Shared Familial Risk

Family studies consistently reveal that offspring of depressed parents are at high risk for developing early-onset anxiety disorders as well as depression, and offspring of anxious parents are at risk to develop early-onset depression (Warner, Mufson, Weissman, 1995; Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997). Familial risk may be a marker for genetic and/or shared environmental mechanisms.

Twin studies indicate that a common genetic influence likely accounts for some of the covariation between anxious and depressive symptoms (Hudziak, Rudiger, Neale, Heath, & Todd, 2000; Thapar & McGuffin, 1997). An endophenotype common to both pediatric anxiety and depression may be "temperament" such as negative affectivity (as discussed earlier), stress reactivity, affect dysregulation, behavioral inhibition, and harm avoidance (e.g., Caspi, Moffitt, Newman, & Silva, 1996; Kelvin, Goodyer, & Altham, 1996). Moreover, consistent with the notion of heterotypic continuity, the shared genetic liability may be differentially expressed as anxiety earlier and depression later in development (Eaves, Silberg, & Erkanli, 2003). In particular, the common genetic/biological diathesis may result in anxiety or depression depending on the timing of the environmental events. In genetically vulnerable children, stressors that occur in childhood may produce anxiety, whereas those occurring during adolescence may lead to depression. The developmental progression from anxiety to depression may reflect a "readiness" (Kovacs & Devlin, 1998; p. 54) to show certain physiological aspects of anxiety (e.g., agitation, hyperarousal) earlier in development, and certain other physiological (e.g., vegetative symptoms) and cognitive (e.g., rumination) aspects of depression later.

Although genes likely play a significant role in the etiology and comorbidity of anxiety and depression, copious evidence also implicates parenting behaviors in the intergenerational transmission of anxiety and depression (e.g., McLeod, Weisz, & Wood, 2007; McLeod, Wood, & Weisz, 2007). For example, parental rejection and control are positively correlated with both anxiety and depression in children, with rejection being more strongly associated with depression and control more associated with anxiety (Rapee, 1997). Such parenting behaviors have been found to characterize both anxious and depressed mothers who tend to exhibit less warmth and more controlling behaviors toward their children (e.g., Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Whaley, Pinto, & Sigman, 1999). In addition, insecure attachment early in childhood has been linked with both anxiety and depression later (Davila, Ramsay, Stroud, & Steinberg, 2005).

Similar Information Processing Biases and Neural Substrates

Negative cognitions and information processing errors such as catastrophizing, rumination, and worry characterize both anxiety and depression (Dozios & Beck, 2008; Martin & Tesser, 1996). Maladaptive interpretations of negative social events in particular are cognitive biases associated with both social anxiety and depression (Wilson & Rapee, 2005). Similar to depressed individuals, people high in social anxiety tend to make internal, stable, and global attributions for failures in interpersonal situations (Alfano, Joiner, & Perry, 1994; Hope, Gansler, & Heimberg, 1989), although negative inferential style interacts with stress to specifically predict depression and not anxiety in adolescents (Hankin, 2008).

Data from performance-based studies indicate that anxious and depressed youth also share information-processing biases in attention toward threat and interpretation of ambiguous situations as negative or threatening (e.g., Bogels & Zigterman, 2000; Ladouceur et al., 2005). The cognitive processes of individuals with anxiety and depression tend to be primed to attend more quickly and readily to threat (Coles, Turk, & Heimberg, 2007; Gotlib, Krasnoperova, Neubauer, Joorman, 2004). Attention toward and interpretation of threat is assumed to worsen symptoms of internalizing psychopathology (Dalgleish et al., 2003; Lonigan, Vasey, Phillips, & Hazen, 2004), and in turn, cognitive symptoms of anxiety and depression presumably then worsen attention to and interpretation of negative stimuli (Brozovich & Heimberg, 2008).

Finally, similar neural-circuitry dysfunction related to emotional modulation of perception and behavior has been found in individuals with either anxiety or depressive disorders (e.g., Phillips, Drevets, Rauch, & Lane, 2003; Thomas et al., 2001). For example, adolescents with anxiety or mood disorders have been found to exhibit both common and distinct functional neural correlates (i.e., amygdala responses) during face processing, depending on the specific attention and emotion states engaged (Beesdo et al., 2009). In particular, Beesdo and colleagues reported that both anxious and depressed youth showed greater amygdala activation than healthy controls when viewing fearful faces, whereas disorder specificity emerged during passive viewing of emotional stimuli. Thus, anxiety and depressive disorders in youth involve many complex commonalities, as well as distinguishable amygdala-related biases, information processing patterns, temperaments, family environments, and genetic vulnerabilities.

Anxiety as a Risk for Depression

As noted earlier, anxiety and depression show substantial sequential comorbidity, with anxiety symptoms and disorders often preceding the onset of mood disorders (e.g., Avenevoli et al. 2001; Kim-Cohen et al., 2003; Pine et al. 1998). Accordingly, anxiety itself may be a causal risk factor (Kraemer et al., 1997) for the development of depression (Bittner et al., 2004; Wittchen, Beesdo, Bittner, & Goodwin, 2003), and the experience of childhood anxiety may be both the source of high sequential comorbidity over development and of elevated rates of concurrent anxiety and depression in adolescence.

Childhood anxiety may have depressogenic effects through a variety of mechanisms. For example, social anxiety likely increases individuals' affiliative behaviors as well as their attempts to avoid negative evaluations from others (e.g., Alden & Taylor, 2004; Leary & Kowalski, 1995). This may result in dysfunctional social behaviors that are intended to be protective, but actually end up increasing the likelihood of the very rejection they are trying to avoid. Anxiety-driven social withdrawal and isolation can intensify peer rejection, resulting in feelings of loneliness, low self-worth, and sadness (Gazelle & Ladd, 2003), particularly for girls for whom interpersonal relationships are especially important (Rose & Rudolph, 2006). Similarly, avoidance of expressing emotions due to fears of rejection and

humiliation has been found to mediate the relation between social anxiety and changes in depressive symptoms (Grant, Beck, Farrow, & Davila, 2007). Socially anxious individuals who inhibit their expression of negative emotions may feel devalued, sad, and resentful, and over time, become depressed. Furthermore, individuals with social anxiety tend to make negative inferences about the meaning of adverse social events for their future and self-worth (Stopa & Clark, 2000), which have been identified as cognitive vulnerabilities to depression (Abramson, Metalsky, & Alloy, 1989).

Summary

The high level of comorbidity between anxiety and depression in youth may be the result of three non-exclusive factors: (a) substantial overlap in both the symptoms and items used to assess these putatively different disorders, (b) common etiological factors implicated in the development of each condition, and (c) negative sequelae of anxiety conferring increased risk for the development of depression. The first explanation has important implications for the nosology of disorders, creation of valid assessments, and the design and conduct of research with internalizing youth. The second and third explanations may guide the development of treatments for youth with internalizing problems and the prevention of depression in adolescents and adults.

Implications for Intervention

Treatment

Evidence-based treatments are typically designed to target the precipitating and maintaining factors of disorders to bring about symptom remission and functional improvement. To the extent that anxiety and depression in youth share common etiological underpinnings, the efficacious treatments developed for these disorders likely share common features and mechanisms of action. Examination of the intervention literature indicates that this is largely what appears to have transpired. For both depression and anxiety, the best practice pharmacotherapy is with selective serotonin reuptake inhibitors (SSRIs) (e.g., TADS, 2004; Walkup et al., 2008). Generally, higher doses of SSRIs are required for therapeutic effects on depression than anxiety (with the notable exception of dosing for obsessive compulsive disorder). The same agents, however, appear to have similar benefits and adverse event profiles across youth with anxiety or depression (Bridge et al., 2007).

The primary psychosocial intervention for both anxiety and depression is cognitive behavioral therapy (CBT; see Compton et al., 2004; Kendall, 2010), with positive effects for CBT reported across the anxiety disorders and for mild to moderate levels of depressive disorder (for severe depression, the combination of CBT and SSRI may be warranted, see Brent et al., 2008). The CBT interventions that treat these conditions contain similar elements, although the programs differ in their complexity and number of strategies employed. For example, various CBT manuals for anxiety and depression include problem solving, assertiveness training, cognitive restructuring, family communication skills training, relaxation, exposure, pleasant activity scheduling, and behavioral activation (Weersing, 2004). Across all these techniques, the different CBT manuals share a core focus on (a) the interplay between thoughts, feelings, and behaviors, and (b) within this framework, teaching adaptive responses to stress and coping with negative emotionality.

In addition to the surface similarity of effective interventions for anxious and depressed youth, interventions for one condition may have beneficial spill-over effects on comorbid symptoms of the other disorder. Several randomized controlled trials examining the effects of individual, group, and family CBT and exposure-based treatments for anxiety disorders in children have found significant reductions in self-reported depressive symptoms as well

(Barrett Dadds, & Rapee, 1996; Kendall et al., 1997; Kendall et al 2008; Kendall, Safford, Flannery-Schroeder, & Webb, 2004; Manassis et al., 2002; Silverman et al., 1999). A comprehensive meta-analysis of the effects of psychological therapy for depression in children and adolescents examined whether such treatments affected other conditions also (Weisz, McCarty, & Valeri, 2006). To examine this specificity question, Weisz and colleagues compared the effect sizes (ES) for measures of depression with those for anxiety symptoms across ten studies that had assessed both. They found that depression treatments produced a significant reduction in anxiety symptoms (ES = 0.39) that was only marginally lower than that found for depressive symptoms (ES = 0.57). Thus, finding that anxiety treatments reduce depressive symptoms and depression treatments beneficially affect anxiety is consistent with the view that anxiety and depression in youth are closely associated empirically (e.g., Achenbach & Rescorla, 2001) and likely share common risk factors such as negative affectivity (e.g., Clark & Watson, 1991; Laurent & Ettelson, 2001).

The presence of one disorder, however, sometimes reduces the efficacy of the treatment of the other. If they were essentially the same condition, then why wouldn't the interventions affect the comorbid disorder as well? Some depression treatment studies have found that comorbid anxiety predicts a worse outcome (Curry et al., 2006; Emslie et al., 1998; Vostanis, Feehan, & Grattan, 1998), although other studies have shown that the presence of anxiety predicted a more positive outcome of CBT for depression (Brent et al., 1998; Rohde et al., 2001). Results of investigations of whether depression reduces the efficacy of anxiety treatments also have been mixed. A significant relation between depressive symptoms and a less favorable response to anxiety treatment has been found in some studies (e.g., Berman, Weems, Silverman, & Kurtines, 2000), but not others (Southam-Gerow, Kendall, & Weersing, 2001). Thus, interventions targeting one disorder will not necessarily successfully treat the other comorbid condition, even if similar treatments are effective for each diagnosis on its own.

Taken together, these results have lead to the development of interventions designed to treat comorbid anxiety and depression or, more ambitiously, to successfully target anxiety, depression, or comorbid anxiety and depression within a single treatment protocol. Such work is still in the pilot stage of implementation and testing, but two approaches have emerged. One program with youth stems from adult work developing a unified theory of emotional disorders (Barlow, Allen, & Choate, 2004), and emphasizes the core cognitive biases and avoidance of negative emotions common to both anxiety and depression (Ehrenreich, Goldstein, Wright, & Barlow, 2009). A second approach is a more behavioral intervention focusing on graded engagement in activities designed to increase positive affect and reduce the functional impairment associated with internalizing symptoms in youth (Weersing, Gonzalez, Campo, & Lucas, 2008). The technique of "graded engagement" combines aspects of behavioral activation for depression, exposure techniques for anxiety, and problem solving skills to target the maladaptive responses to stress and negative emotions seen across anxiety and depression. Notably, this intervention targets both threshold and subthreshold levels of comorbidity between anxiety and depression, and the functional impact that these symptoms have on each other. For example, depressed youth may have difficulty developing rewarding and mood enhancing relationships if they also have a history of social anxiety. Thus, although similar interventions are efficacious with both anxiety and depressive disorders, treatments need to address their unique features as well.

Prevention

Whereas treatment aims to reduce existing symptoms and disorders, the goal of prevention is to decrease the likelihood of the onset of a disorder or a worsening of symptoms, particularly among individuals at risk based on their having current subsyndromal symptoms

(i.e., indicated prevention) or other risk factors such as parental psychopathology or exposure to stress (i.e., selected prevention). Although less extensive, research on the prevention of anxiety or depression parallels the treatment literature in several ways (for reviews, see Horowitz & Garber, 2006; Neil & Christensen, 2009; Stice et al., 2009). First, interventions aimed at preventing anxiety and depression use many of the same procedures. For example, some depression prevention programs explicitly include anxiety reducing techniques such as relaxation, anxiety management, and stress inoculation (e.g., Clarke, Hawkins, Murphy, & Sheeber, 1993; Hains & Ellmann, 1994). Second, the presence of one disorder sometimes moderates the effect of the preventive intervention on the other. For instance, some depression prevention programs have been found to be better for children with higher baseline levels of emotional arousal (Hains & Ellmann, 1994) or clinical anxiety (Lowry-Webster, Barrett, & Dadds, 2001; Lowry-Webster, Barrett, & Lock, 2003).

Third, interventions aimed at preventing one disorder sometimes affect the other as well. For example, the effects of the Penn Prevention program have been found to be as strong or even stronger in reducing anxious as compared to depressive symptoms (Gillham et al., 2006; Roberts, Kane, Thomson, Bishop, & Hart, 2003). Gillham and colleagues suggested that the stronger effects on anxiety may have been because the anti-anxiety skills were easier to learn compared to the skills that more directly targeted depression. It also is possible that including strategies aimed at reducing anxiety dilutes the effects of the overall intervention on depression.

In contrast, anxiety prevention programs have been found to have only modest effects on depressive symptoms. For instance, the FRIENDS program, a universal school-based intervention designed to prevent internalizing problems through enhancing problem-solving and coping skills, has been found to significantly reduce anxiety. A reduction in depressive symptoms, however, was found only at the 12-month evaluation and not at 24 or 36 months (Barrett, Farrell, Ollendick, & Dadds, 2006; Lock & Barrett, 2003; Lowry-Webster et al., 2001).

Treating Anxiety to Prevent Depression

Given that childhood anxiety often precedes and is a risk factor for depression (Costello et al., 2003; Wittchen et al., 2003), a potentially useful intervention strategy may be to treat anxiety as a means of preventing subsequent depression (Bienvenu & Ginsburg, 2007; Flannery-Schroeder, 2006). Although some treatments for anxiety also produce significant decreases in depressive symptoms (e.g., Barrett et al., 1996; Kendall et al., 2004; Manassis et al., 2002), the strategy of preventing depression by successfully treating anxiety in youth has yet to be tested in a way that disentangles the baseline levels of both anxiety and depression. Several important questions remain regarding the treatment and prevention of anxiety and depression, respectively. Do treatments for anxiety disorders prevent the onset of subsequent depressive disorders in addition to reducing concurrent depressive symptoms? If successful treatment of anxiety prevents subsequent depression, how enduring are these effects? For whom does the treatment of anxiety prevent depression? What are the optimal implementation parameters, such as dose and timing? Finally, what accounts for the depression prevention effects of treatments for anxiety in children? That is, through what mechanisms do these significant effects occur?

Table 1 outlines several ways that treating anxiety might be sufficient to prevent depression without directly implementing depression prevention strategies. If successful, then treating anxiety could be an efficient and cost effective way to prevent depression, at least among anxious children. We suggest at least four different ways this might occur: (a) Anxiety is a probabilistic risk factor for the development of depression. Removing anxiety may eliminate

this risk, although the underlying processes are not specified. (b) The therapeutic activities that target anxiety (e.g., cognitive reappraisal; coping) may generalize to depression. Children might learn to apply the skills acquired for dealing with their anxiety to other situations and emotions, without necessarily being explicitly taught to do so. The extent to which such transfer of learning occurs will partially depend on the child's level of cognitive development. (c) If anxiety is a *causal* risk factor for depression, then reducing anxiety should affect the processes (e.g., avoidance) that account for this link, thereby preventing depression. For example, anxiety leads some children to avoid social situations and hence miss out on positively reinforcing activities, thereby increasing their chances of depression. Similarly, anxiety may produce awkward social behaviors that result in rejection and subsequent depression. If treatment directly eliminates such anxiety and the associated mediating pathways, then depression might be prevented. (d) If anxiety and depression share common mechanism(s) such as negative affectivity, then treatments for anxiety that reduce the common risk factor(s) might prevent depression as well.

Finally, if treating anxiety is *not* sufficient to prevent depression, then it may be necessary to supplement anxiety treatments with intervention techniques specifically aimed at preventing depression. Although several successful depression prevention programs exist (see Brunwasser, Gillham, & Kim, 2009; Horowitz & Garber, 2006; Stice et al., 2009 for reviews), studies are needed that explicitly test the efficacy of combining depression prevention strategies, either simultaneously or sequentially, with treatments for anxiety (see bottom of Table 1).

RESEARCH RECOMMENDATIONS

1. Determine what are the most efficacious and cost-effective ways of providing interventions that treat and prevent both anxiety and depression.
2. Conduct randomized clinical trials with sufficiently long follow-up intervals to determine if treating anxiety significantly decreases the likelihood of subsequent depression.
3. Identify specific mechanisms that link the different anxiety disorders to depression, and test interventions that directly target these mechanisms.
4. Conduct treatment-dismantling studies to identify the specific components of the treatments that contribute to symptom reduction and improved functioning.

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Table 1

Treating Anxiety to Prevent Depression

Type	Description	Processes
	Treating anxiety *is* sufficient to prevent depression.	
Unspecified Risk Factor	Simply removing anxiety is sufficient to prevent depression. Treatment doesn't explicitly involve treating or preventing depression directly.	Remove anxiety; processes unspecified (could be biology, cognitions, etc.)
Generalization	Treatment for anxiety generalizes, so skills learned serve to prevent later depression	Coping, cognitive restructuring, exposure
Causal Risk Factor	Treating anxiety directly addresses mechanism(s) that lead to depression	Avoidance, social skills. Anxiety as a causal risk factor for depression.
Common Mechanism(s)	Treatment of anxiety directly addresses common mechanism(s)	Reducing the common factor such as NA eliminates both
	Treating anxiety *is not* sufficient to prevent depression.	
Simultaneous	Treat anxiety and add strategies for preventing depression	add depression prevention
Sequential	Treat anxiety first, then add depression prevention strategies	add depression prevention