
The Influence of Stressors on the Development of Psychopathology

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Stressful life experiences represent the most well-established environmental predictor of psychopathology across the life-span. Research focused on children and adolescents, in particular, has documented a predictive relation between stressors and both internalizing psychological symptoms (such as depression and anxiety) and externalizing psychological problems (such as aggression and delinquency) (Grant, Compas, Thurm, McMahon, & Gipson, 2004). There is also growing recognition that exposure to some degree of stress may be necessary for the development of problem-solving abilities and adaptive coping strategies (Hetherington, Parke, Gauvain, & Locke, 2005). Nonetheless, many basic questions remain about stress processes and effects on mental health and psychopathology. These include the following: (1) Which types and what magnitude of stress exposure are associated with positive and negative mental health outcomes for

most individuals of a given age? (2) Do specific types of stressors predict specific types of mental health problems? (3) Are there types of stress exposure that promote positive outcomes in some mental health domains (e.g., internalizing) but negative outcomes in others (e.g., externalizing)? (4) What biological, cognitive, and emotional processes mediate associations between stressors and mental health problems? (5) What factors moderate those relations? (6) How do specific stressors, moderators, mediators, and mental health problems relate to one another reciprocally and dynamically across development?

In this chapter, we will summarize the progress that has been made toward answering those questions, conceptualization and measurement issues that have limited that progress, and recommendations for the next steps with stress research. The chapter is informed by findings from the most recent reviews on stress and child and adolescent psychopathology as well as new developments that have occurred since those reviews.

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Conceptualizing Stress for Child and Adolescent Research

Historically, stress conceptualization and measurement has represented stimulus, response, and transactional perspectives (Grant & McMahon, 2005; Schwarzer & Schulz, 2002). Stimulus approaches focus on external, environmental threat (Holmes and Rahe, 1967); response approaches focus on physiological or emotional

responses to external threat (e.g., McEwen & Seeman, 1999; Romero, 2004); and transactional approaches emphasize interactions between external threat and appraisal processes (Lazarus & Folkman, 1984).

The field of developmental psychopathology has been dominated by stimulus (or objective threat) approaches and by transactional perspectives (Grant & McMahon, 2005). Thus, prevailing definitions of stress used in child and adolescent research include an environmental component. Definitions of stress differ, however, in the degree to which they emphasize psychological processes that occur in response to the environment. One approach has focused on exposure to environmental events (e.g., loss of a loved one, natural disaster) and chronic conditions (e.g., poverty) that represent objective measurable changes in, or characteristics of, individuals' environmental conditions, in the tradition originally outlined by Holmes and Rahe (1967). This perspective emphasizes the importance of objectively documenting the occurrence and effects of environmental events and conditions independent of the potential confounds of cognitive appraisals (e.g., Brown, 1993; Cohen, Kessler, & Gordon, 1995; Dohrenwend, 2006).

In contrast, a second approach is reflected in transactional models, which posit that stress is dependent on the degree to which individuals appraise environmental demands as threatening, challenging, or harmful (Lazarus & Folkman, 1984). Although the transactional theory that Lazarus and Folkman (1984) proposed has been seminal in advancing our understanding of stress processes, there are some inherent problems with including appraisal in the definition of stress, particularly for research with children and adolescents (Grant et al., 2003). Results of research on stress during infancy indicate there are clear negative effects of maternal separation, abuse, and neglect on infants (e.g., Goldberg et al., 2003) which occur, presumably, without the cognitive appraisal component that is central to the transactional definition. In addition, preliminary research indicates that cognitive appraisal processes that play a significant role later in development do not play the same

role for young children exposed to stressors (Nolen-Hoeksema, Girgus, & Seligman, 1992).

Further, in recent years, theoretical models of the etiology of developmental psychopathology have become more sophisticated with a greater emphasis on moderating and mediating processes that influence or explain the relation between stressors and psychopathology across development (Pearlin, 1999). Reliance on a definition of stress that "lumps" together potential mediating or moderating processes, such as cognitive appraisal processes, with stressors is conceptually unclear and empirically problematic (Reiss & Oliveri, 1991). To understand fully how stressful experiences, moderating factors, and mediating processes relate to one another in the prediction of psychopathology, it is important to discretely define and measure each of these variables (Aneshensel, 1999). This is particularly true in child and adolescent research, because the role of specific mediating and moderating processes is likely to shift across development (Grant et al., 2003).

A final reason for moving beyond a transactional definition of stress is that the individually based focus of such an approach may accentuate confounding of genetic and environmental contributions to mental health problems in stress research (Grant & McMahon, 2005). From a transactional perspective, whether an experience is defined as a stressor is based on whether the individual appraises it as such. Appraisal processes, however, may reflect genetic or other vulnerability contributions to risk, thereby exacerbating potential confounding of vulnerabilities and environmental contributions to symptomatology (Dohrenwend, 2006).

The single essential element of stress research—distinct from moderators and mediators, psychological symptoms, and other sources of risk or vulnerability—is external, environmental threat to the individual (Cohen et al., 1995). For this reason, we have proposed that *stress* be defined as "environmental events or chronic conditions that objectively threaten the physical and/or psychological health or well-being of individuals of a particular age in a particular society" (Grant et al., 2003, p. 449). Such a definition is

consistent with traditional “stimulus-based” definitions of stress (Holmes & Rahe, 1967) and with more recent definitions of *objective stress* (e.g., Brown, 1993; Dohrenwend, 2006; Hammen & Rudolph, 1999. UCLA child and adolescent life stress interview. Unpublished manuscript).

Given the historical association of the term *stress* with a wide array of psychological phenomena and definitions, we have recommended the use of the word *stressor* to refer to the environmental experiences that should be the defining feature of stress research (Grant et al., 2003). The broader term *stress* is more useful as an inclusive term that refers not only to the environmental stressors themselves but also to the range of processes set in motion by exposure to environmental stressors. Thus, *stress research* refers to the body of literature that examines environmental stressors as well as reciprocal and dynamic processes among stressors, mediators, moderators, and psychological symptoms.

Conceptualizing the Role of Stressors in the Development of Psychopathology

More than 2,000 studies have examined the association between stressors and mental health problems affecting children and adolescents. Although

important discoveries have been made, progress has not been commensurate with the sheer volume of investigation. A primary reason for this lack of progress is that most studies of the relation between stressors and psychological problems in children and adolescents have not been theory-driven (Grant et al., 2003).

To address this problem, we have proposed a general conceptual model of the role of stressors in the etiology of child and adolescent psychopathology (Grant et al., 2003). This model builds on previously proposed specific models of psychopathology (e.g., Albano, Chorpita, & Barlow, 1996; Hammen & Rudolph, 2003) and includes five central propositions (see Fig. 11.1): (a) stressors contribute to psychopathology; (b) moderators influence the relation between stressors and psychopathology; (c) mediators explain the relation between stressors and psychopathology; (d) there is specificity in the relations among stressors, moderators, mediators, and psychopathology; and (e) relations among stressors, moderators, mediators, and psychopathology are reciprocal and dynamic. None of these propositions is mutually exclusive. All may operate at once or in dynamic interactions.

To organize extant findings and to promote incremental research, we conducted a series of four reviews of the literature on stressors and developmental psychopathology, which we

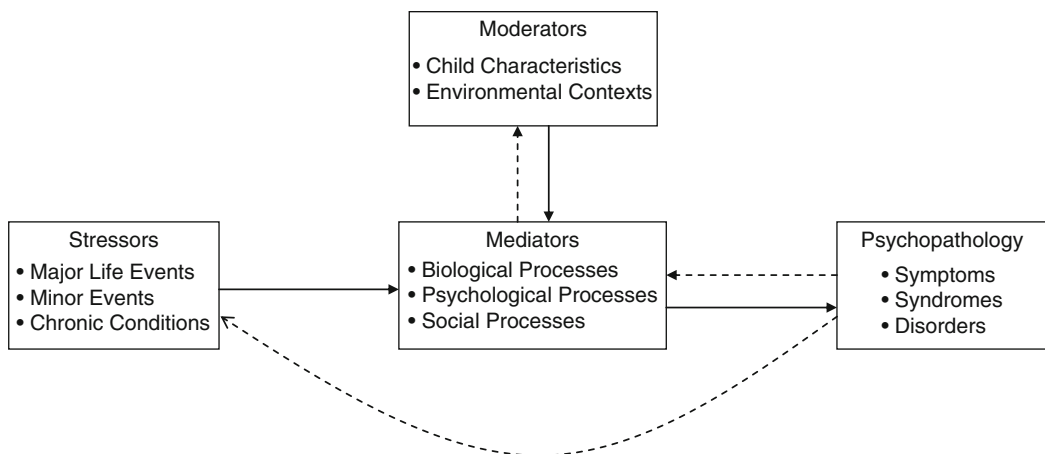


Fig. 11.1 General conceptual model of the role of stressors in the etiology of child and adolescent psychopathology. From Grant, K. E., Compas, B. E., & Stuhlmacher, A. F., Thurm, A. E., McMahon, S. D., & Halpert, J. A.

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published between 2003 and 2006 (Grant et al., 2003, 2004, 2006; McMahon, Grant, Compas, Thurm, & Ey, 2003). Across the four reviews, we evaluated the evidence in support of each proposition of our general conceptual model. Summaries of findings from those reviews, along with more recent updates and directions for future research in each area are provided below.

Empirical Findings on the Role of Stressors in the Development of Psychopathology

Prospective Findings

The first proposition of this conceptual model, that stressors contribute to psychopathology, provides the most basic hypothesis for studies in the field. Evidence for this proposition for adults has been established for some time (e.g., Monroe, 1982). In our 2004 review (Grant et al., 2004), we found consistent support for this proposition with young people. Across 60 prospective studies conducted with children and adolescents, evidence that stressful life experiences predict psychological problems in children and adolescents (controlling for prior symptom levels) was consistently found (Grant et al., 2004). Cumulative measures of stressors and particular stressful experiences (e.g., poverty, divorce) were both found to predict psychological symptoms. In addition, stressful events were found to predict both internalizing symptoms, such as depression and anxiety, and externalizing problems, such as aggression and delinquency, though the associations were typically stronger with internalizing than externalizing problems and externalizing symptoms were examined less frequently. As a result of this work, investigations designed solely to test the hypothesis that stressors predict mental health problems in children, adolescents, or adults are no longer needed. Nonetheless, much additional research is needed to test for mediation, moderation, specificity, and reciprocal and dynamic relations over time and across development.

Additional prospective research is also needed to understand associations between particular types and magnitudes of stress exposure and potential positive mental health outcomes. Findings in this area are important for the development of effective coping interventions to prevent psychopathology and promote positive mental health in youth exposed to stressors. For example, it is likely that exposure to mild to moderate stressors within the context of neighborhood, school, family, and peer protective factors provide youth with the opportunity to learn adaptive coping strategies (Del Giudice, Ellis, & Shirtcliff, 2011; Katz, Liu, Schaer, Parker, Ottet, Epps, & Lyons, 2009).

Further, some youths are able to demonstrate growth even when faced with stress levels that have been shown to predict psychological problems (Kilmer & Gil-Rivas, 2010). Paradoxically, emerging work in the area of posttraumatic growth in children and adolescents suggests that youth must experience psychological distress in order to experience psychological growth in response to trauma (Meyerson, Grant, Carter, & Kilmer, 2011). Provocative findings such as these highlight how much remains to be learned about relations among stressors, psychological symptomatology, and positive mental health across development.

Finally, multilevel models can be used to better understand the complexities and patterns in the relations between stressors and psychopathology in longitudinal studies, and they have the advantage of taking into account the dependency in the data due to repeated assessments across time. Lagged models allow exploration of prospective effects, and within- and between-person models enable assessment of intraindividual change and interindividual differences (Curran & Bauer, 2011). For example, with regard to within-person effects, McMahon and colleagues (2013) found that greater exposure to community violence at one point in time, as compared to one's average exposure to community violence across time, was associated with higher self-reported aggressive behavior, but not teacher- or peer-reported behavior. This association highlights the meaningful

connections between variations in exposure to community stressors and aggressive behaviors as well as how setting and context may lead to reporter differences. Multilevel models can also be used effectively to take into account nesting effects to better account for environmental context, such as when students are nested within classrooms, schools, and neighborhoods (Luke, 2005).

Moderation Findings

The notion that moderators influence the relation between stressors and psychopathology has been examined in numerous studies of children, adolescents, and adults. Moderators may be conceptualized as vulnerabilities or protective factors, because they represent preexisting characteristics (in existence prior to exposure to the stressor) that increase or decrease the likelihood that stressors will lead to psychopathology (Baron & Kenny, 1986; Holmbeck, 1997). Moderators may also be viewed as the mechanisms that explain variability in processes and outcomes ranging from equifinality to multifinality (i.e., the mechanisms that explain why varying processes may lead to similar outcomes, and similar processes may lead to varying outcomes; Sameroff, Lewis, & Miller, 2000).

In our 2006 review of the literature on moderators of the association between stressors and psychological problems in young people (Grant et al., 2006), few consistent moderating effects emerged. However, most studies simply included variables, such as age or sex, in more general analyses without reference to conceptual models of developmental psychopathology. Those that tested a specific theory-based hypothesis were more likely to report positive findings, although few studies examined analogous constructs, limiting analysis of patterns across studies. One simple, expected pattern of results was that boys were more likely to exhibit externalizing symptoms, and girls were more likely to exhibit internalizing symptoms, in association with stressors.

Since the 2006 review of the literature, many studies have focused on testing theoretically

driven hypotheses using sophisticated designs. Significant moderating effects of social support (Auerbach, Bigda-Peyton, Eberhart, Webb, & Ho, 2011; Flouri, Buchanan, Tan, Griggs, & Attar-Schwartz, 2010; Rueger & Malecki, 2011), cognitions (Bohon, Stice, Burton, Fudell, & Nolen-Hoeksema, 2008; Carter & Garber, 2011; Morris, Ciesla, & Garber, 2008; Skitch & Abela, 2008; Stein, Gonzalez, & Huq, 2012), and coping (Carpenter, Laney, & Mezulis, 2012; Sontag, Graber, Brooks-Gunn, & Warren, 2008; Wadsworth, Raviv, Santiago, & Etter, 2011) on the relations between stressors and internalizing and externalizing symptoms have been found. For example, Wadsworth et al. (2011) found that disengagement coping exacerbated the effects of poverty-related stress on both internalizing and externalizing symptoms while secondary control coping buffered the effects of poverty-related stress on internalizing symptoms.

In addition to advances in the conceptualization and testing of theoretically driven moderators, additional trends in the literature include (1) a focus on biological factors, (2) the inclusion of diverse samples, and (3) statistical and methodological advances. Recent research has focused on understanding the moderating role of biological factors such as the 5-HTTLPR gene in the prediction of depressive symptoms (e.g., Hammen, Brennan, Keenan-Miller, Hazel, & Najman, 2010) and respiratory sinus arrhythmia in the prediction of externalizing symptoms (Obradović, Bush, Stamperdahl, Adler, & Boyce, 2010). For example, a notable study found that the youth with higher levels of stress over time who had two short copies of the 5-HTTLPR gene were more likely to experience depressive symptoms (Hankin, Jenness, Abela, & Smolen, 2011). This effect showed specificity as well, such that the moderating effects were not found in the prediction of anxious symptoms and were still present when controlling for anxious symptoms.

Recent studies have also focused on testing moderation models in culturally diverse samples both within the USA with Latino adolescents (e.g., Stein et al., 2012) and internationally with Chinese adolescents (e.g., Abela, Stolow, Mineka, Yao, Zhu, & Hankin, 2011). Studies like

these show that there are particular types of stressors, such as economic stressors, that are more likely to interact with negative cognitions to predict depressive symptoms in specific samples of youth (Stein et al., 2012).

Methodological improvements also characterize many recent studies. Given the inherent difficulty in detecting moderation effects (McClelland & Judd, 1993), investigators have begun to incorporate statistical methods such as structural equation modeling, which reduces measurement error and increases the likelihood of finding moderation, and multilevel modeling, which takes into account dependency in the data due to nesting and repeated measures. In addition, more studies are following up on significant interaction effects with post hoc probing to determine whether simple slopes are statistically different from zero (e.g., Abaied & Rudolph, 2010; Skitch & Abela, 2008) as recommended by Holmbeck (2002). The use of multi-wave approaches that allow for the testing of interaction effects over multiple data points and allow idiographic approaches to the measurement of stress (e.g., Skitch & Abela, 2008) and the examination of three-way interactions (e.g., Rueger & Malecki, 2011) represent additional methodological improvements.

Mediation Findings

Although some variables may serve either a moderating or mediating function (e.g., cognitive attributions, coping), mediators are conceptually distinct from moderators in that they are “activated,” “set off,” or “caused by” the current stressful experience and serve to account, conceptually and statistically, for the relation between stressors and psychopathology (Baron & Kenny, 1986; Holmbeck, 1997). Mediators become characteristics of the individual or his or her social network in response to the stressor. In some cases, the individual may possess some of the mediating characteristic prior to exposure, but the characteristic increases (or decreases) substantially in response to the stressor. Mediators, conceptually and empirically, explain how and why stressors are predictive of

psychopathology. Broadly conceptualized, mediators include biological processes, psychological processes, and social processes.

Our 2006 review of the literature on mediators of the association between stressors and psychological problems in young people reported promising evidence of mediating effects (Grant et al., 2006). The most frequently examined and validated conceptual model has been one in which negative parenting mediates the relation between poverty/economic stressors and child and adolescent psychopathology (see Grant et al., 2003, 2006). Recent studies have provided further support for this conceptual model (e.g., Doan, Fuller-Rowell, & Evans, 2012; Reising et al., 2012).

More recent trends in the literature include the examination of additional mediators such as emotion regulation, proximal stressors, psychopathology, and coping responses. For example, emotion regulation was found to prospectively mediate the relation between peer victimization and internalizing symptoms (McLaughlin, Hatzenbuehler, & Hilt, 2009). Another study found evidence suggestive of emotion regulation explaining the relation between children’s maltreatment and internalizing symptoms (Alink, Cicchetti, Kim, & Rogosch, 2009), although formal tests for mediation were not performed (e.g., Cole & Maxwell, 2003).

Evidence for proximal stressors as mediators of the effects of more distal stressors has also been reported (e.g., Flouri & Tzavidis, 2008). For example, Hazel, Hammen, Brennan, and Najman (2008) found that cumulative stress measured at age 15 mediated the relation between early adversity (including financial hardship, childhood illness, and maternal life events) experienced in the first 5 years of life and adolescent depressive diagnoses. Similarly, stressful life events and exposure to violence were found to mediate the effects of neighborhood-level poverty and segregation on adolescent internalizing and externalizing symptoms (Katz, Esparza, Carter, Grant, & Meyerson, 2012). Several studies have also found that continued stressors mediate the relations between childhood stressors and externalizing, but not internalizing, symptoms (e.g., Bakker, Ormel, Verhulst, & Oldehinkel, 2012; Turner &

Butler, 2003). The stress generation (Connolly, Eberhart, Hammen, & Brennan, 2010; Hammen, 1991) and stress sensitization (Hammen, Henry, & Daley, 2000) models provide frameworks for further delineating the mechanisms through which proximal stressors mediate the relation between distal stressors and psychological outcomes.

Recent work has also begun focusing on the mediating effects of one type of psychological symptom on other types of psychological symptoms. For example, externalizing symptoms measured in young adulthood mediated the relation between stressors measured in adolescence and drug dependence disorders in young adulthood (King & Chassin, 2008). Further, negative mood, but not total depressive symptoms, mediated the relation between stressors and substance abuse (Skitch & Abela, 2008). More mediational work of this nature is critical for better understanding the developmental psychopathology mechanisms of comorbidity (e.g., Drabick & Kendall, 2010; Sheidow et al., 2008).

Finally, preliminary evidence that particular types of coping responses mediate the relation between stressors and symptoms has been found (e.g., Sontag & Graber, 2010) since the publication of the 2006 review (Grant et al., 2006). Sontag and colleagues (2008) examined different types of coping strategies as mediators of the relation between peer stress and internalizing symptoms in adolescent girls. While higher levels of peer stress predicted decreased use of primary and secondary control coping responses and increased use of involuntary coping responses, only primary and secondary control coping significantly mediated the relation between peer stress and internalizing symptoms. Another study that used a different method of conceptualizing coping did not find evidence that avoidant coping mediated the relation between stressors and depressed mood even though stressors significantly predicted increased use of avoidant coping (Martyn-Nemeth, Penckofer, Gulanick, Velsor-Friedrich, & Bryant, 2009). These studies provide preliminary evidence that lower levels of adaptive coping strategies, rather than higher levels of maladaptive coping

strategies, mediate the relation between stressors and internalizing symptoms.

Future research on mediation models would benefit from the use of multi-wave designs and direct tests of the significance of mediation paths using recommended approaches (e.g., Cole & Maxwell, 2003; Hayes, 2009). Researchers should also formally test for mediation effects when they find evidence that there are several variables that predict outcomes, such as the longitudinal findings that acculturation stress and relationship problems both predicted internalizing symptoms (Smokowski, Bacallo, & Buchanan, 2009). Future research should also explicitly examine moderated mediation (Preacher, Rucker, & Hayes, 2007), given that studies reviewed here have found mediation paths for girls, but not boys (e.g., Sontag et al., 2008). Finally, additional research on biological mediators (e.g., cortisol reactivity) of stress effects on mental health is needed. Despite growing interest (Del Giudice et al., 2011), few tests of these variables have been conducted using recommended approaches for testing mediation (Cole & Maxwell, 2003; Hayes, 2009).

Specificity Findings

The fourth proposition of our broad conceptual model is that there is specificity in relations among particular stressors, moderators, mediators, and psychological outcomes. According to this proposition, a particular type of stressor (e.g., interpersonal rejection) is linked with a particular type of psychological problem (e.g., depression) via a particular mediating process (e.g., ruminative coping) in the context of a particular moderating variable (e.g., female gender, adolescent age).

Findings from our 2003 review of the literature on specificity in the relation between particular stressors and particular psychological problems in children and adolescents (McMahon et al., 2003) revealed that, with a few notable exceptions (e.g., Eley & Stevenson, 2000; Sandler, Reynolds, Kliwer, & Ramirez, 1992), these studies did not define themselves as

“specificity” studies, nor did they test a specificity theory. Further, a consistent pattern of specific effects failed to emerge, with the exception of findings for sexual abuse. Several studies demonstrated that sexual abuse was specifically associated with internalizing outcomes, posttraumatic stress disorder (PTSD), and sexual acting out.

Since our 2003 review on specificity (McMahon et al., 2003), there has been significant growth in the number of self-identified specificity studies, and this particular review has been cited 164 times to date according to Google Scholar. Further, specificity is increasingly being investigated internationally (e.g., Bancila & Mittelmark, 2005; Benjet, Borges, Mendez, Fleiz, & Medina-Mora, 2011; Davis & Humphrey, 2012; Gustafsson, Larsson, Nelson, & Gustafsson, 2009; Lee et al., 2011; Phillips, Hammen, Brennan, Najman, & Bor, 2005). However, there are still relatively few studies that identify as specificity studies and test theory-based hypotheses with multiple stressors and multiple outcomes using rigorous methods across time.

Recent large-scale international studies have found some evidence for specificity as well as evidence for equifinality (varying processes lead to similar outcomes) and multifinality (similar processes lead to varying outcomes), consistent with our previous review (McMahon et al., 2003). For example, Benjet and colleagues (2011) found that family dysfunction adversities (e.g., abuse and violence) were consistently associated with many types of disorders among Mexican adolescents but also found evidence of specificity with regard to parental loss and adolescent anxiety disorders. Phillips and colleagues (2005) also found some evidence of specificity among low-income Australian adolescents. In particular, the youth with an anxiety disorder were significantly more likely to have been exposed to mothers’ partner changes, prenatal marital dissatisfaction, and mothers’ partners’ troubles with the law. More generally, adolescents with anxiety disorders were more likely to have experienced a greater number of adversities than adolescents with depressive disorders. Studies such as these examined many stressors and many outcomes,

but did not test specific, comprehensive models based on theory.

Here we highlight two studies that demonstrate progress in testing for specificity using comprehensive theory-based hypotheses. First, Hankin, Wetter, Cheely, and Oppenheimer (2008) tested specificity of mediation and moderation processes based on Beck’s (1987) cognitive theory of depression in a racially diverse, predominantly middle-class sample of youth and found that dysfunctional attitudes combined with negative life events predicted anhedonic depressive symptoms but not general depressive, anxious, or externalizing symptoms over time. Bidirectional effects were evident and moderated by sex, showing initial depressive symptoms and stressors predicted changes in dysfunctional attitudes over time more strongly for girls than boys.

Flynn and Rudolph (2011) also provide an excellent illustration of theory-based specificity research using a longitudinal design. They examined specificity by pitting noninterpersonal versus interpersonal stressors and anxiety versus depression and also examined models that proposed alternative directions of effects. They found that time two self-generated interpersonal stressors mediated the relation between time one ineffective stress responses and time three depression. These studies provide illustrations of progress in the field toward theory-based analysis of comprehensive specificity hypotheses (McMahon et al., 2003).

Although there has been growth in specificity research and advances in the rigor of studies that test specific theory-based hypotheses, this field of study is still in its infancy. Part of the reason for this is that there are so many combinations of variables that can be examined that it will take a long time to accumulate evidence on any given pattern of findings. Furthermore, much of the recent self-identified specificity literature has focused on depression and/or anxiety, suggesting a need to examine a more diverse set of outcomes. In addition, there has been little work examining specificity of stressors in relation to positive outcomes. Finally, there are still relatively few studies that include diverse samples

(e.g., Hankin, 2008). Thus, we recommend that researchers test theory-based models using rigorous, longitudinal designs and examine multiple stressors in relation to multiple outcomes with diverse samples. Such research is needed to reveal complex patterns that may exist for specific populations. In addition, another review of the literature is warranted to establish current patterns in specificity research.

Reciprocal and Dynamic Findings

The final proposition, that relations among stressors, moderators, mediators, and psychopathology are reciprocal and dynamic, broadly encompasses the following specific hypotheses: (a) Each variable in the model influences the other (with some exceptions, e.g., fixed moderators such as age will not be influenced by other variables); (b) the role of specific variables within the model may vary across specific stressors and shift over time (e.g., a mediator that developed in response to a particular stressor may become a fixed pattern of responding and may thus interact as a moderator with subsequent stressors); and (c) reciprocal and dynamic relations among stressors, moderators, and mediators will predict not only the onset of psychological problems but also the exacerbation of symptoms and the movement along a continuum from less to more severe forms of psychopathology (e.g., shifts from depressive symptoms to depressive disorder).

The proposition that relations among stressors, moderators, mediators, and psychopathology are reciprocal and dynamic has received the least research attention. Extant research has generally focused on psychopathology predicting additional stressful experiences (Hammen, 1991). Our 2004 review (Grant et al., 2004) suggests that symptoms do predict increased exposure to stressors, indicating that at least some children and adolescents are caught in a continuing cycle in which stressful experiences contribute to increases in internalizing or externalizing symptoms, which contribute to other problems and stressors. Some findings also suggest that cognitive variables may serve initially as mediators in

young children but later crystalize, as children become adolescents, to function as moderators in relation to later stress exposure (e.g., Grant et al., 2004; Nolen-Hoeksema et al., 1992).

Since the publication of our 2004 review, new evidence has emerged that psychological symptoms and stressors predict each other in a reciprocal fashion using designs with two time points (Kercher, Rapee, & Schniering, 2009; Yang, Chiu, Soong, & Chen, 2008). In addition, more researchers are collecting multi-wave data that include more than two time points (e.g., Carter et al., 2006; Cole et al., 2006; Rudolph et al., 2009). Multi-wave studies allow more complex relations among variables to be examined (e.g., Auerbach et al., 2011; Flynn & Rudolph, 2011; Hankin, Stone, & Ann Wright, 2010; McLaughlin et al., 2009) and allow researchers to test changes in relations among variables across development. For example, in a 3-year study of adolescents, stressors predicted rumination at one wave, but not the other (Hankin et al., 2010). More researchers are also using structural equation modeling, which is well suited for tests of these types of models as they allow researchers to test multiple relations among multiple variables (Hankin et al., 2010; McLaughlin et al., 2009).

An emerging area of research has demonstrated the role that stressors can play as moderators of other variables (i.e., potential protective factors) typically viewed as moderators of stress effects. In particular, Luthar, Cicchetti, and Becker (2000) introduced the concept of a protective reactive effect, in which protective moderators lose their power at the highest level of stress exposure. In other words, stressors may change the relation between protective factors and outcomes. Several studies have documented such an effect (e.g., Gerard, & Buehler, 2004; Formoso, Gonzales, & Aiken, 2000; Seidman, Lambert, Allen, & Aber, 2003). For example, in some of our work (Grant, 2011), we found evidence that stress exposure moderated the association between protective factors and psychological symptoms, such that protective factors were associated with fewer symptoms under conditions of low stress but with more symptoms under conditions of high stress in a sample of low-income

urban youth. Consistent with this pattern, cluster analyses with this sample revealed stronger prospective associations between stressors and psychological symptoms among the youth who relied on individually based coping strategies than the youth who reported not using any coping strategies at all. Supplemental analyses indicated, however, that even highly stressed youth could benefit from individually based coping strategies if they were used in the context of supportive interpersonal relationships and protective settings (i.e., family, school, church, community organization). Additional research is needed to replicate findings such as these, as they suggest the potential for iatrogenic or protective reactive effects for individually based programs targeting highly stressed youth unless sufficient interpersonal and setting support is ensured (Farahmand, Grant, Polo, Duffy, & Dubois, 2011).

More generally, much additional research is needed to test reciprocal and dynamic relations among stressors, moderators, mediators, and outcomes. Only one general pattern has been established to date in this area and that is that psychopathology also predicts exposure to stressors. Some promising trends suggest that cognitive variables may initially serve as mediators early in development but progress to become moderators as children become adolescents (e.g., Grant et al., 2004; Nolen-Hoeksema et al., 1992), and that stressors can change the association between protective moderators and mental health outcomes (Grant, 2011; Luthar et al., 2000). But, much remains to be learned and established. The creation and examination of specific models and hypotheses related to reciprocal and dynamic relations among stressors, moderators, mediators, and mental health outcomes across development are needed.

Remaining Barriers to Progress in Stress Research

In addition to the findings emanating from our reviews summarized above, we also concluded that measurement issues have negatively affected progress in the field. In fact, our reviews of the

literature led us to conclude that the single most important barrier to progress in the field has been inadequate and inconsistent measurement of stressful life experiences (Grant et al., 2003, 2004, 2006; McMahon et al., 2003). To illustrate, we found that fewer than 10 % of stress researchers used a well-validated measure, and no single measure was used in more than 3 % of studies (Grant et al., 2004). Nonetheless, concurrent with the execution of thousands of studies examining the association between stressors and psychopathology, a small rigorous body of research has focused on stressor measurement. We summarize results of that research to date, measurement issues that continue to plague the field, and strategies for addressing remaining issues.

Progress and Barriers in Stressor Measurement

As noted toward the beginning of this chapter, there has been growing agreement that stressors should be defined as environmentally based events or circumstances that are “objectively threatening” (i.e., independent raters agree they would pose threat to the average individual) (e.g., Cohen & Hamrick, 2003; Monroe, 2008). The most commonly used measures (i.e., stressor checklists), however, have not been empirically developed to assess objective threat (Dohrenwend, 2006; Grant et al., 2004).

Stressor Checklists

The most widely used method for assessing stressors is the self-report checklist. Checklists are relatively easy to administer and allow investigators to collect data on large samples, thus increasing statistical power to detect relations among stressors, mediating and moderating variables, and psychological outcomes. Data have established the test-retest reliability and concurrent validity of several stress checklists for adolescents, in particular (for a review, see Grant et al., 2004). Nonetheless, many problems with these measures remain. Most notably, the items have been selected by researchers based on focus groups or authors’ opinion, without empirical

evaluation of the objective threat level associated with each item/stressor (Grant et al., 2004). Furthermore, as checklists include a list of brief items (e.g., death of a grandparent), it is unclear to what degree each stressor assesses the same experience for different adolescents (Dohrenwend, 2006). For example, death of a grandparent who has had little contact with a young person is less threatening than death of a grandparent who has served as that youth's primary caregiver (Hammen & Rudolph, 1999. UCLA child and adolescent life stress interview. Unpublished manuscript). Stressor checklists have also been critiqued for not requiring respondents to provide information about the timing, frequency, or chronicity of events (e.g., Grant et al., 2004; Hammen & Rudolph, 1999. UCLA child and adolescent life stress interview. Unpublished manuscript).

Stressor Interviews

Stressor interviews were developed to address the methodological shortcomings of stressor checklists and to provide relatively objective indices of contextual threat. Interviews are used to generate a list of stressful events experienced and the surrounding conditions, including a description of what happened, when it happened, who was involved, and the consequences of the event (Rudolph & Hammen, 1999; Rudolph & Flynn, 2007). External raters then evaluate the level of threat and severity of impact of each event and objectives indices are formed (e.g., Garber, Keiley, & Martin, 2002; Rudolph & Flynn, 2007). Inter-rater reliability of objective threat ratings has typically been quite high (e.g., Garber et al., 2002; Rudolph & Flynn, 2007), and, in the adult literature, stress interviews have generally proven superior to checklist measures in accuracy and ability to predict negative outcomes (e.g., Dohrenwend, 2006). There have been far fewer published comparisons of the two approaches with adolescents, and the results of these comparisons have been less conclusive (e.g., Duggal et al., 2000; Wagner, Abela, & Brozina, 2006). One possible reason for weaker effects for adolescents is that interviews may be less likely to elicit information that is

embarrassing or have potential negative consequences if reported (Singleton & Straits, 1999), and these concerns may be especially salient for younger samples. In addition, personnel and time demands associated with stressor interviews have limited their use with researchers (Grant et al., 2004).

Stress interviews are limited in several other important ways. For example, although existing interviews capture some minor stressors (e.g., failing a test, argument with a friend), they do not comprehensively measure minor stressors, which may also predict negative outcomes (e.g., Miller, Webster, & MacIntosh, 2002). Nor do they comprehensively assess stressors at the opposite of the continuum (i.e., broad and pervasive systemic stressors such as racism or classism), perhaps because the very nature of these stressors increases the likelihood that they will go unrecognized by individuals who experience them. For example, interviews developed for young people have not included questions about exposure to discrimination, and researchers who have added discrimination questions or have assessed for discrimination using checklist methods have found that the youth report relatively few events (Gee & Walsemann, 2009; Flores, Tschann, Dimas, Pasch, & de Groat, 2010; Seaton, 2009). This finding stands in contrast to growing evidence that health disparities associated with race/ethnicity and class may be largely attributable to differences in stress exposure (Adler, 2009; Goodman, McEwen, Dolan, Schafer-Kalkhoff, & Adler, 2005; Jackson, Knight, & Rafferty, 2010) and suggests the need for new approaches to the assessment of systems-level stressors. Another problem with the stress interview is its retrospective approach, which limits the linking of stressful experiences with mediating processes that are immediately activated.

Physiologically Focused Laboratory Measures of Stress

During a period in which developmental psychopathologists have worked to conceptualize stressors objectively and measure them using narrative interviews, stress researchers in other disciplines took a different approach. Biologists and

neurologists interested in understanding stress effects on physical health developed measures that focused on physiological responses to stressors (e.g., McEwen & Seeman, 1999; Romero, 2004). This approach is most consistent with a response definition of stress (Grant & McMahon, 2005). Studies conducted using this approach have revolutionized stress research by revealing proximal physiological responses to stressors and linking those responses to long-term physical health outcomes (McEwen & Seeman, 2006). Nonetheless, conceptualization and measurement of stress in this area also remains incomplete. In particular, response definitions of stress confound external stressors with stress responses, making it difficult to examine these variables discretely or to test responses as mediators and moderators of long-term stressor effects (Grant et al., 2003). Additionally, such approaches can suffer from circular logic by defining a stressor as any experience that produces a stress response (Monroe, 2008). Finally, although frequently conceptualized as acute responses, physiological processes change in response to stressors over different time spans (i.e., chronic versus acute stressors elicit different, sometimes opposite, responses; Adam, 2012; Miller, Chen, & Zhou, 2007) highlighting the need to examine the role of stressor chronicity in biological responses to stress.

Beyond critiques of checklist, interview, and physiologically focused laboratory measurement approaches lies a central problem affecting each method: a lack of standardization of stressor measurement. As noted above, our reviews revealed that fewer than 10 % of stress researchers used a well-validated measure, and no single measure was used in more than 3 % of studies (Grant et al., 2004). Lack of standardization highlights a central difference between the state of the field of stressor conceptualization and measurement compared to psychopathology conceptualization and measurement. Specifically, taxonomies of psychopathology (e.g., the *DSM-5*; APA, 1994; the Achenbach System of Empirically Based Assessment; ASEBA; Achenbach & Rescorla, 2001) have been developed, but no such taxonomy exists for stressors. In order to foster incremental research, we need

to agree upon a common conceptualization of stressors and to develop and utilize valid and reliable measures of stressors that capture their breadth and complexity.

Strategies for Addressing Measurement Barriers

The development of reliable and valid narrative stressor interviews indicates that it is possible to achieve agreement about events and conditions that pose threat to youth in our society. Evidence for the reliability and validity of stressor checklists has also emerged in spite of the fact that these measures have been developed independently from empirically based objective threat ratings. In addition, advances in theory and measurement of physiological responses to stress provide models for examining mediators of stress effects on developmental psychopathology in real time. These achievements suggest that a standardized system of stress measurement, which builds on the strengths of each of those methodologies, could be developed. Members of our research group have been working to do just that with a particular focus on adolescents, given their heightened exposure to stressors, greater risk for mental health problems, and capacity to report on their own stress exposure (Grant et al., 2004).

Our goal is to create a series of advanced checklist measures that offer the increased confidentiality and reduced time demands of checklists while preserving the strengths of interviews, including contextual indicators of objective threat and assessment of stressor duration and frequency. We also are working to develop novel laboratory-based stress challenges that mimic minor stressors identified by youth themselves (through daily diary studies) and rated as objectively threatening by independent coders (perhaps by virtue of exposure to multiple minor events or exposure to minor events linked with major or systems-level stressors). These stressor challenges will facilitate collection of biological, cognitive, and affective response data in real time.

In addition, we are working to empirically examine possible taxonomic organizations based on conceptual hypotheses. For example, we will test the hypothesis that particular types of minor stressors (e.g., achievement frustration tasks) will be consistently rated as objectively threatening when they are experienced within the context of major events (e.g., academic failure) and/or systemic stressors (e.g., racist stereotypes) within the same meaning domain (e.g., agency/achievement). Through empirical analysis of conceptually based hypotheses such as these, we hope to develop a stressor taxonomy that will guide, and be refined through longitudinal and life-span research, and, ultimately, be standardized for use across multiple studies. Standardization (on a large, nationally representative sample) would establish stressor base rates, norms, and risk cut points relative to clinically significant symptomatology as well as competence cut points, highlighting levels of stress exposure ideal for the development of adaptive coping strategies.

Summary and Conclusion

Thousands of studies have examined the association between stressful life experiences and mental health problems affecting children and adolescents. Although important discoveries have been made, progress has not been commensurate with the sheer volume of investigation. A primary reason for this lack of progress is that most studies of the relation between stressors and developmental psychopathology have not been theory-driven.

To address this problem, we have proposed a general conceptual model of the role of stressors in the etiology of child and adolescent psychopathology. This model builds on previously proposed specific models of psychopathology and includes five central propositions (see Fig. 11.1): (a) stressors contribute to psychopathology; (b) moderators influence the relation between stressors and psychopathology; (c) mediators explain the relation between stressors and psychopathology; (d) there is specificity in the relations among stressors, moderators, mediators, and

psychopathology; and (e) relations among stressors, moderators, mediators, and psychopathology are reciprocal and dynamic. In a series of four reviews, we evaluated evidence for each proposition of the model.

Results indicate the field has unequivocally established that stressful life experiences prospectively predict mental health problems in young people (consistent with well-established patterns for adults), and there is growing evidence that mental health problems, in turn, predict stress exposure. Evidence has also emerged that gender influences the type of distress associated with stress exposure and that sexual abuse specifically predicts internalizing problems. These two latter patterns, however, highlight the need for further analysis and integration across stress research areas, as sexual abuse is much more common for girls (i.e., moderation and specificity findings are confounded). Finally, there is solid evidence that compromised parenting behavior and disrupted family relationships mediate the association between poverty/economic stressors and mental health problems affecting young people.

Exciting new patterns to emerge since our reviews were completed (i.e., between 2003 and 2006) include findings on positive mental health effects associated with mild to moderate stress exposure and the possibility of posttraumatic growth even in the face of more severe exposure. Research on moderators of stress effects has become more sophisticated with greater use of theory-driven hypotheses, longitudinal designs, multilevel modeling, rigorous post hoc probing, tests for three-way interactions, inclusion of culturally diverse samples, and examination of genetic moderators of stress effects. New findings in the area of mediation suggest that emotion regulation, proximal stressors, specific types of psychopathology, and coping responses also mediate stress effects on mental health problems in young people. Additional integrative research is needed to test for moderated mediation.

There has been growth in the number of studies, as well as quality and rigor of designs that allow for comprehensive tests of specificity. Researchers are now recognizing the importance of understanding the context in which specific

types of stressors lead to specific outcomes among particular populations and beginning to test for alternative plausible models that clarify the reach of their findings. Additional longitudinal, theory-based research with diverse samples is needed in this area.

In the area of reciprocal and dynamic relations among stressors, moderators, mediators, and psychopathology, emerging research suggests that stressors can moderate the association between protective factors/processes and mental health outcomes. Despite findings such as these, research in this area is the least developed of all. The creation and examination of specific models and hypotheses related to reciprocal and dynamic relations among stressors, moderators, mediators, and mental health outcomes across development are needed.

Beyond establishing points of progress in the field, our reviews also highlight methodological problems, particularly with stressor measurement, that have impeded progress. There has been growing agreement that stressors should be defined as environmentally based events or circumstances that are “objectively threatening” (i.e., independent raters can agree they would pose threat to the average individual); yet, only the most labor-intensive narrative interviews are capable of assessing such threat, and such interviews have been used by only a small minority of stress researchers. Furthermore, narrative interviews are limited in their assessment of minor stressors, which may also predict negative outcomes, due to challenges in achieving agreement about what constitutes objective threat with minor events. Narrative interviews are also limited in their capacity to assess stressors at the opposite end of the continuum: systemic stressors that are so broad and pervasive they may not be recognized as stressors by individuals who experience them (e.g., racism, classism). Finally, stressor interviews are limited by their retrospective approach, which does not allow for the linking of stressful experiences with mediating processes in real time.

To address current limitations with conceptualization and measurement of stressful life experiences, we recommend the creation of an

empirically based series of measures capable of (a) assessing stressful experiences across multiple levels ranging from minor stressors to broad systemic pressures and (b) linking those stressors, individually and in combination, with the biological, cognitive, and emotional processes that mediate their effects on developmental psychopathology. Constructing such a system will require integration of the strengths of existing approaches to stress measurement including checklists, narrative interviews, and physiologically focused laboratory measures. We also recommend that measurement advances are used to develop a taxonomy of stressors that organizes stressor subtypes in ways that are theoretically and empirically meaningful.

In conclusion, if the field of stress research were an architectural drawing, it would present a strange-looking picture. On the one hand, many architects have contributed numerous structures to the drawing including multiple simple structures (many of these redundant in function) and also some amazingly creative and complex ones. All the while, the foundation to support these structures remains incompletely drawn. If we, as stress research architects, could complete our foundation drawings, we could consolidate our basic structures and integrate our beautiful ones and, ultimately, build an impressive cathedral of knowledge. In this way, the potential for stress theory and research to substantially influence basic and applied understanding of processes leading to developmental psychopathology would be realized.

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