

Placing Emotional Self-Regulation in Sociocultural and Socioeconomic Contexts

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In their review, Cole, Martin, and Dennis (this issue) relied on a valuable set of empirical examples of emotion regulation in infancy, toddlerhood, and the preschool period to make their case. These examples can be extended to include an emergent body of published research examining normative emotional regulatory processes among low-income and ethnic minority children using similar experimental methods. The following article considers emotion regulation across differing income, risk, and sociocultural contexts. Review of this literature points to ways these broader contexts are likely to influence children's development of emotional self-regulation. This review also points to innovative analytic approaches that might be useful in inferring causal mechanisms in emotion regulation research.

Cole, Martin, and Dennis (this issue) made a clear and compelling case for the importance of the construct of emotional self-regulation in early childhood. In this brief article, I wish to extend the authors' points by considering children's emotion regulation within broader socioeconomic and sociocultural contexts. In reviewing research on emotion regulation among children facing varying levels of risk, I raise three questions. First, to what extent can measures and models of emotional self-regulation that have been developed within normative developmental frameworks be generalized across different populations of children growing up in markedly different conditions of low and high risk? Second, what evidence is there that ecological contexts may alternately support or compromise young children's development of competent emotional self-regulation? And third, what can an emergent body of at-risk literature tell us about emotion regulation that we might otherwise not have learned studying children facing lower risk? In addressing this last question, I go on to address some of Cole et al.'s concerns regarding the empirically rigorous criteria the field must meet to build persuasive support for a cohesive

model of emotional self-regulation in early childhood. Specifically, analytic approaches that have been used to analyze change over time in applied research may offer promising solutions to the challenge of inferring causal mechanisms in emotional self-regulation. In short, the following brief review makes the case that research on emotional regulation within broader ecological contexts bounded by risk, culture, and poverty is not peripheral to basic research but instead can provide an informative and complementary perspective (see Cicchetti & Aber, 1998; Cole, Bruschi, & Tamang, 2002).

Theoretical Frameworks in Understanding the Roles of Income, Risk, and Culture

Poverty is argued to have a negative impact on young children's emotional development by increasing infants' risk of exposure to a set of prenatal and perinatal factors that negatively affect their neurological, attentional, and affective development (Aber, Jones, & Cohen, 2000; Brooks-Gunn, Klebanov, Liaw, & Spiker, 1993). Infants and young children in poverty are also more likely to be exposed to multiple ecological stressors such as residential instability, higher levels of neighborhood and family violence, greater psychological distress among adult caregivers, and a range of other cofactors that appear to place children's emotional adjustment in jeopardy (Brooks-Gunn, Duncan, & Aber, 1997; Gershoff, Aber, & Raver, 2003; McLoyd, 1998). It is important to remember that although exposure to risks increases young children's risk of maladjustment, most young children in poverty do not develop emotional

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and behavioral difficulty (Garmezy, 1991; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). A clearer understanding of the processes that predict positive outcomes despite exposure to cumulative risk has significant implications for prevention, intervention, and policy (Gilliom et al., 2002; Jones & Garner, 1998).

Because children of color are disproportionately likely to be poor, are more likely to face a higher number of poverty-related risks, and are disproportionately identified as having emotional and behavioral difficulty, many studies involving risk, poverty, and emotional development also involve ethnic minority children (Ingoldsby, Shaw, Owens, & Winslow, 1999; Piggot & Cowen, 2000). Numerous investigators have counseled us to disaggregate carefully the respective roles of income, risk, and culture in this area of research (e.g., see Barbarin, 1999; Garcia Coll et al., 1996). Theory generated from the study of ethnic minority children and their optimal development, more generally, helps us parse these often complex and intertwined variables. With these tools, we can test whether normative models fit differently or similarly for children residing in different sociocultural contexts (Garcia Coll et al., 1996; Knight & Hill, 1998; Phinney & Landin, 1998).

Specifically, this literature suggests that research on a given normative developmental construct such as emotional self-regulation be considered from the perspectives of both measurement equivalence and model equivalence. Measurement equivalence establishes whether a given set of assessments tap a latent construct such as emotional self-regulation similarly enough across racially, ethnically, or socioeconomically diverse groups so that meaningful inferences can be drawn from the data collected with that assessment or experimental paradigm (Hughes, Seidman, & Williams, 1993; Hui & Triandis, 1985; Knight & Hill, 1998; Whiteside-Mansell, Bradley, Little, Corwyn, & Spiker, 2001). Simply put, if our measures of emotional self-regulation do not tap emotional self-regulatory skills similarly enough across sociocultural and socioeconomic contexts, we run the risk of introducing unacceptably large amounts of error into our models. Broadly defined, questions of model equivalence refer to whether observed associations among a set of predictors and outcomes are similar or different across two or more groups. Previously, much developmental inquiry has focused on general process models where "general theoretical constructs are assumed to be universal" and where questions of whether there are sociocultural differences in measurement or model specification are left untested (Phinney & Landin, 1998,

p. 93). More recently, investigators have begun to challenge this key assumption by considering the moderating role of the broader ecological context and explicitly testing for model equivalence across groups. Studies that include measured indicators of race, ethnicity, or culture as exogenous or endogenous predictors of the developmental construct in question pursue a measured-ethnic-correlates model (Phinney & Landin, 1998).

Recently, several investigators have offered a cohesive, clear means of testing for measurement equivalence as well as model equivalence across groups, where analysis of the moderating role of ecological and cultural context tells us whether measures and models fit similarly or differently across sociocultural contexts (Knight & Hill, 1998; Little, 1997). Although neither measurement equivalence nor model equivalence can be established here, this brief review offers a thumbnail sketch of what might reasonably be expected regarding measurement and model equivalence for constructs of emotional regulation were they to be tested. These models can be extended to examine the generalizability of emotional self-regulation theory and research for children residing in differing socioeconomic strata. By including measures of poverty and cofactors as predictors of young children's emotional self-regulation, we can also build and test comprehensive measured-income-correlates models. In short, this theoretical framework expands Cole et al.'s (this issue) useful discussion of contrasting conditions to include socioeconomic and sociocultural contexts, determining whether there is evidence to support the role of income, risk, and culture as inferred or measured correlates of children's emotional regulatory skills.

Relevant Research Reconsidered: Regulation in Infancy and Early Childhood

With this set of tools to guide us, how does emotional self-regulation look through the prisms of risk, economic disadvantage, and culture? A wide range of studies of low-income, ethnic minority infants facing varying levels of biological and ecological risk have used standardized research paradigms such as those mentioned by Cole et al. (this issue). Using methodologies such as the still-face paradigm and microanalyses of naturalistic mother-infant interaction, several investigators have highlighted the ways the initiation, disruption, and maintenance of affective and attentional synchrony depend on the coordinated participation of both partners (Beeghly & Tronick, 1994; Garner, Landry, & Richardson, 1991;

Landry, Smith, Miller-Loncar, & Swank, 1997; Raver & Leadbeater, 1995; Segal et al., 1995). Across these studies, mutual regulation in early infancy and attentional regulation in later infancy serve as important indexes of optimal parenting among high-risk, low-income families. These studies provide additional support for the normative models of emotion regulation in infancy that have been previously proposed and tested with White, middle-class samples (Crockenberg & Leerkes, 2000; Hustedt & Raver, 2002; Landry, Garner, Swank, & Baldwin, 1996).

Similarly, an emerging body of research using delay-of-gratification (or waiting) paradigms (Evans & English, 2002; Gilliom et al., 2002; Lengua, 2002; Raver, 1996; Raver, Blackburn, Bancroft, & Torp, 1999; Rodriguez, Mischel, & Shoda, 1989), separation and disappointment paradigms (e.g., Garner, Jones, & Miner, 1994; Garner & Power, 1996; Molitor, Mayes, & Ward, 2003), and paradigms in which children are exposed to interadult anger (Ingoldsby et al., 1999; Maughan & Cicchetti, 2002) has been carried out with samples of low-income, ethnic minority children. These studies have replicated many of the findings of prior general-process-model research, reporting that low-income children use many of the same behavioral strategies to regulate negative emotion as do their middle-income counterparts. As with earlier research with more advantaged samples, results from these studies suggest that individual differences in low-income children's use of self-distraction are contemporaneously associated with their lower levels of distress and longitudinally predictive of children's greater ability to maintain emotional and behavioral self-control (Evans & English, 2002; Gilliom et al., 2002; Lengua, 2002; Raver, 1996; Raver et al., 1999; Rodriguez et al., 1989). In short, the standardized, direct assessments of emotional self-regulation described by Cole et al. (this issue) have repeatedly demonstrated concurrent and predictive validity with low-income minority samples, suggesting probable measurement equivalence across multiple ecological contexts.

With the confidence that these experimental research paradigms work with diverse groups of infants and young children, what can these studies tell us about the role of broader ecological contexts in predicting children's development of competent emotional self-regulatory skill? Relevant research among dyads facing high risk clearly suggests that these poverty-related environmental and biological risks (such as maternal depressive symptoms, in utero cocaine exposure, or very low birth-weight status) are indirectly predictive of significant dis-

ruptions to regulatory processes in infancy (Beeghly & Tronick, 1994; Molitor et al., 2003; Raver, 1996; Raver & Leadbeater, 1995; Segal et al., 1995; Sheinkopf, Mundy, Claussen, & Willoughby, in press; Uvlund & Smith, 1996). These studies illustrate that, although compromised caregiving in the context of high risk is associated with some infants having regulatory difficulty, sensitive and responsive caregiving has consistently been found to predict infants' self-regulatory competence, even after accounting for the role of infant characteristics. Responsive caregivers with extremely low-birth-weight preterm infants, for example, have demonstrated greater effort to capture and sustain their infants' attention than mothers of infants facing lower perinatal risk, appearing to make behavioral adjustments for their infants' attentional difficulties (Landry et al., 1997). These studies highlight ways in which most ethnic minority children who receive competent caregiving in low-income contexts develop effective self-regulatory skills and positive emotional adjustment despite economic disadvantage (Garner & Spears, 2000; Raver, 1996).

Higher levels of cumulative risks in early and middle childhood have also repeatedly been found to be directly predictive of children's lower levels of competent emotional self-regulation (Evans & English, 2002; Lengua, 2002). At extremely high levels of risk, such as when children experience maltreatment or chronic exposure to interadult violence, children have been found to demonstrate patterns of both undercontrolled and overcontrolled, or hypervigilant, regulatory profiles (Ingoldsby et al., 1999; Maughan & Cicchetti, 2002; Smith & Walden, 1999). In addition, more distal ecological contexts such as neighborhood violence, greater residential crowding, and lower residential quality are associated with more difficulty self-regulating and higher physiological indexes of stress for preschool- and school-aged children (Evans & English, 2002; Richters & Martinez, 1993). These findings suggest that emotional self-regulation may play a key mediating role in models of poverty, ecological risk, and children's development of behavior problems (Aber et al., 2000; Maughan & Cicchetti, 2002).

The study of emotional regulation among high-risk samples has also yielded some empirical surprises, where general process models of emotional self-regulatory processes do not always fit samples of low-income, ethnic minority children in the same way they did for White, middle-class samples. First, it has been surprising to find that constructs of reactivity, regulation, and social cognitions regarding felt emotional experience appear to cohere for chil-

dren in some samples but not for others. The lack of concordance found in some studies provides a complementary perspective to Cole et al.'s (this issue) discussion of convergence across multiple measures of emotion regulation. In some cases, results from high-risk research suggest that non-convergence of classes of regulatory constructs should be considered as informative rather than as problematic. For example, although low-income, nonmaltreated children are more likely to demonstrate coherent emotional and behavioral profiles in the face of simulated interadult anger, their maltreated counterparts are more likely to display either undercontrolled styles (i.e., both positive and negative affect, disorganized behavior, and mismatched social cognitions) or overcontrolled styles (i.e., low reactivity, high avoidance, and social cognitions of feeling very angry; Maughan & Cicchetti, 2002). The lack of convergence found in this high-risk population of children suggests that some children may actively modify expressed emotion but not felt emotion in response to strong sanctions against displays of distress by family members. These findings also highlight possible nonlinearity in models of optimal reactivity and regulation (see also Cole et al., 1996; Eisenberg et al., 2003; Garner & Spears, 2000; Lengua, 2002).

A second surprise has been that parameter estimates among patterns of caregiving, negative emotionality, emotional self-regulation, and socio-emotional outcomes have been found to fit differently with low-income samples than with White, middle-income samples (Hill, Bush, & Roosa, 2003; McLoyd & Smith, 2002; Mendez, Fantuzzo, & Cicchetti, 2002; Simons et al., 2002). For example, in several studies, effect sizes among caregiving quality, emotion regulation, and later outcomes appear to be magnified in conditions of higher versus lower risk. A good illustration can be found in research with mothers and low-birth-weight infants, where mothers' sensitive maintenance of emotional and attentional coregulation predicted increases in positive outcomes for all infants over time, with coregulation found to be especially beneficial for highest risk infants (Landry et al., 1997). Similarly, prior research with more advantaged samples has posited that children's emotion regulatory skills are likely to play a key mediating role in models of family process and child behavior problems (Cole et al., 1996; Cole, Teti, & Zahn-Waxler, 2003; Davies & Cummings, 1994; Eisenberg, Cumberland, & Spinrad, 1998; Eisenberg & Fabes, 1992). Yet, some recent research with low-income children suggests that emotion regulation may serve a moderating role, where children with

competent regulatory skills weather cumulative stresses more effectively than do children with less adaptive regulatory strategies (Ingoldsby et al., 1999; Lengua, 2002).

Finally, extant research in high-risk contexts highlights possible discontinuities in children's development of emotional self-regulation, which might be surprising. Although many of the studies reviewed by Cole et al. (this issue) focused on continuity of children's effortful control and emotional self-regulatory profiles over time (e.g., Eisenberg et al., 1998; Kochanska, Coy, & Murray, 2001), recent "high-risk" research demonstrates that children's emotional self-regulatory skills are vulnerable to biological and environmental insult, amenable to environmental support, and may demonstrate measurable change over time.

Analyzing Change Over Time

Several studies that examine discontinuities in children's emotional and behavioral adjustment hold significant promise as possible solutions to the problems of inferring the predictors, processes, and sequelae of emotion regulation that were raised by Cole et al. (this issue). A growing number of studies on the causal impact of income poverty (and its cofactors) on children's socioemotional adjustment can provide emotion regulation researchers with a new set of empirical tools with which to test key hypotheses. Specifically, random-assignment experimental intervention designs (often used in clinical and social policy research) and fixed-effects designs (capitalizing on change over time) could profitably be applied to test causal components of emotion regulation theory (e.g., Ackerman, Brown, & Izard, 2003; Brotman, Gouley, Klein, Castellanos, & Pine, 2003; Dearing, McCartney, & Taylor, 2001; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Morris, 2002; Raver, 2002).

Given its hypothesized role as a mediator in risk and poverty research, several theoretically driven randomized prevention and intervention trials have tried to modify children's emotional self-regulation skills and reactivity in an effort to improve outcomes for children at risk for emotional and behavioral difficulty (for reviews, see Brotman et al., 2003; Izard, Fine, Mostow, Trentacosta, & Campbell, 2002; Raver, 2002). Essentially, these randomized intervention programs offer compelling tests of the mediating role of emotional self-regulation by converting emotion regulation from a hypothesized mediator into a moderator (Baron & Kenny, 1986). That is, by randomly assigning children and families to programs

that specifically target emotional regulatory processes and determining whether treated children show significantly better outcomes than their control-group-assigned counterparts, researchers can experimentally test the mechanism of emotion regulation in producing positive impacts in young children's long-term emotional and behavioral adjustment. As an experimental test of the role of this developmental mechanism, intervention-oriented research offers an important complement to experimental laboratory research with lower risk populations (Genettian, Morris, & Bos, in press).

Whereas experimental research tries to get around potential confounds in emotion regulation research by initiating change in children's emotional self-regulatory outcomes, a second, nonexperimental approach addresses the problem of omitted variables bias differently, by making a set of simple yet elegant statistical assumptions that lead to equally simple yet elegant statistical solutions. Specifically, research using fixed-effects designs assume that if a confound (or omitted variable) is stable, and unlikely to change over time, then regressing intraindividual changes in a given outcome on intraindividual changes in a set of predictors will lead to reduction of the likelihood that the observed associations between the outcome and predictors are due to that third, troublesome, confounding variable (Jones & Carter, 2003; e.g., see the Appendix).

Fixed-effects models have recently been used to estimate the causal impact of income, maternal employment, and residential instability on both parents' and children's mental health and socioemotional adjustment (Ackerman et al., 2003; Dearing et al., 2001; Gershoff, Aber, & Raver, 2003). Approaches that consider continuity and change in children's emotional self-regulatory abilities as both a function of changes in caregiving environments (such as abrupt increases or reductions in family violence) and changes in the more distal environment (e.g., a change in neighborhood or in income) could yield valuable insight into this basic developmental process.

It is important to recognize that neither fixed-effects models nor experimental interventions are without their drawbacks. Fixed-effects models may be better suited to modeling outcomes that undergo rapid change in response to exogenous shocks rather than to slowly accreting processes (Chase-Lansdale et al., 2003; Steyer, Partchev, & Shanahan, 2000). Experimental interventions have their own problems (such as whether those randomly assigned to the treatment group received the intended treatment). Notably, both approaches rely on large sample sizes

for adequate statistical power. From this perspective, the field faces new methodological challenges: We clearly need to develop rigorous yet affordable direct assessments of children's emotional self-regulation, for use in large survey data-collection efforts, if we wish to take advantage of fixed-effects models and large-scale experimental interventions using randomized design (e.g., see Li-Grining, Pittman, & Chase-Lansdale, 2003; Winston et al., 1999).

From this vantage point, it is heartening to witness increased research emphasis on the development of a range of developmental and clinical instruments for assessing infants and young children's emotional regulatory capacities (Carter, Briggs-Cowan, Jones, & Little, 2003; Chase-Lansdale et al., 2003; Wakschlag & Danis, 2003) as well as greater inclusion of carefully measured correlates of income in recent ER research. Clearly, we are moving closer to Phinney and Landin's (1998) measured-correlates framework for understanding the roles of income and risk. But what is equally clear is that the field still has a long way to go in building and testing comprehensive models of the measured ethnic correlates of emotion regulation. Can the still-face paradigm or the emphasis on coordinated joint attention be said to be reliable and valid with Hispanic American and Asian American infants and parents, for example, given prior research on ways that coregulation, object play, and norms regarding emotional displays may differ across these cultural groups (Cole et al., 2002; Harwood, Schoelmerich, Schulze, & Gonzalez, 1999)? It is to the field's advantage to focus more squarely on the culturally circumscribed values, attitudes, and practices that might influence parents' socialization of young children's emotional self-regulation (see cross-cultural work by Cole et al., 2002).

Summary, Implications, and New Directions

What can we conclude from this new look at the construct of emotional self-regulation through frameworks that more strongly emphasize cultural and economic contexts? The model of emotional self-regulation posited by Cole et al. (this issue) cohesively describes the dynamic interaction of multiple behavioral, psychophysiological, attentional, and affective systems that allow young children to participate effectively in their social worlds. This brief literature review introduces additional levels of complexity in models of emotional self-regulation. But the empirical payoff is that, with complexity, the accuracy of our methods and our models of emotion regulation may be strengthened in broader social con-

texts. These studies also highlight nonconcordance across children's developmental domains and discontinuities in children's developmental trajectories as lawful rather than as noisy or problematic components of error (Belsky, Fish, & Isabella, 1991). With increased empirical complexity, models of emotion regulation may offer compelling answers to the questions of specific ways that environmental risks and protective factors both within and outside the family may influence children's adjustment over time. In short, the value of the construct of emotion regulation is heightened both for developmental science and for child-focused social policy when Cole et al.'s discussion of emotion regulation is placed squarely within sociocultural and socioeconomic contexts.

Appendix

For example, in recent research estimating the impact of a predictor such as poverty (a given x_1) on children's socioemotional adjustment (a given y), skeptics might argue that an unmeasured confound, or omitted, third variable (e.g., any given x_2 such as parental or community characteristics that might lead both to lower family income and to children's higher behavior problems) is the underlying causal factor that explains the association between the presumed predictor (income) and the presumed outcome (child behavior problems). In fixed-effects models, intraindividual changes in children's behavior problems (Δy) are regressed on intraindividual changes in income (Δx_1). Because the omitted variable is assumed not to change over time (admittedly, a big assumption), the omitted variable is essentially eliminated from the equation (because $\Delta x_2 = 0$; Duncan et al., 1998).

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