

Contributions of Temperament to Buffering and Sensitization Processes in Children's Development

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ABSTRACT: Temperament refers to relatively stable, early appearing, biologically rooted individual differences in behavioral traits. Individual differences in temperament are multidetermined encompassing both biological and experiential influences. Evidence indicates that certain temperament traits, such as impulsivity, inhibition, and negative emotionality, can serve as developmental risk factors. Evidence also indicates that other temperament traits, such as flexible self-regulation, sociability, and task orientation, can serve to increase children's resilience. Five potential mechanisms through which individual differences in temperament can increase vulnerability or facilitate resilience are presented: (1) Differential treatment of children with different temperaments by caregivers or teachers (reactive covariance). (2) Children with different temperament styles seeking out environments that may increase risk or promote resilience (active covariance). (3) Goodness or poorness of fit between child temperament characteristics and environmental demands. (4) Children with different temperaments reacting to similar levels or types of stress in different ways. (5) Different coping strategies used by children with different temperaments.

KEYWORDS: stress; temperament; resilience; self-regulation

INTRODUCTION

While there are multiple definitions of *temperament*, a working definition often used by a majority of researchers in this area refers to temperament as: "Biologically rooted individual differences in behavior tendencies that are present early in life and are relatively stable across various kinds of situations and over the course of time."¹ It is important to understand that individual differences in temperament should not be regarded as unvarying across time or

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place. Rather than complete stability researchers view temperament as *predisposing individual characteristics* that have the potential to both quantitatively and qualitatively change over time as the child develops, and which can manifest themselves in different ways in response to the nature of the context within which the individual is functioning.² For example, even highly inhibited children may react in the same way as less inhibited children when the situation is familiar to the child. It is only in unfamiliar situations that we would see differences between more and less inhibited children.

Behavior tendencies that are considered to fall within the domain of temperament include negative and positive emotionality (now regarded as distinct dimensions), soothability, activity level, adaptability, approach to new situations or persons, sensitivity, sociability, attentional patterns, persistence in task situations, and behavioral rhythmicity. There have also been a number of conceptual approaches for organizing these separate dimensions into a higher-order framework. The most well-known of these approaches are the Chess and Thomas³ classification of easy, difficult, and slow to warm-up temperaments, and the conceptual framework developed by Rothbart⁴ wherein individual differences in temperament dimensions reflect underlying differences in reactivity and self-regulation.

In terms of biological roots it is clear that individual differences in temperament reflect individual differences in central nervous system function and structure.^{5,6} There is also a consistent body of evidence documenting the contribution of genotype to individual differences in temperament.⁷ However, it is also becoming increasingly apparent that individual differences in temperament are multidetermined reflecting not only genetic and brain contributions but also the contribution⁸ of bioecological influences (e.g., nutrition⁸) and environmental characteristics involving both parenting styles^{9,10} and the nature of the home context.¹¹ Given evidence on the sensitivity of the central nervous system to environmental input,¹² contextual characteristics may influence both the behavioral and neural aspects of individual differences in temperament.

At a functional level certain dimensions of temperament, such as negative emotionality, inhibition, low adaptability, or the combination of low self-regulation and high reactivity, have been shown to act as a developmental risk, increasing the likelihood of children's developing behavioral problems or reduced social and academic competence.¹³⁻¹⁵ Available evidence also indicates that the contributions of temperament to developmental risk are significantly stronger when children displaying risk temperament dimensions live in dysfunctional families, in families under stress, or in families where parents use high levels of negative disciplinary techniques.¹⁶⁻¹⁸ It seems clear that certain dimensions of temperament can act to increase children's developmental risk. Can temperament also promote resilience in children?

TEMPERAMENT AND RESILIENCE

Resilient children are those who show age-appropriate developmental competencies in spite of repeated exposures to biological and psychosocial developmental risk factors.¹⁹ It is clear that individual differences in resilience are multidetermined by a variety of individual, family, and contextual influences.^{20,21} Temperament has been proposed as one domain of individual characteristics that may act to promote resilience in children.^{22,23} If temperament can promote resilience, a critical question is which specific dimensions of temperament are linked to the development of resilience. The age range in the studies reviewed goes from infancy through adolescence. The environmental risks encountered by the children in the studies reviewed include living in poverty, exposure to major life event stresses, family conflict and divorce, and exposure to violence or parent and peer substance abuse.

In interpreting findings from this body of literature there are methodological issues that need to be noted. For example, results have been found to vary by reporting source,²⁴ outcome measures used,²⁵ child gender,²¹ and presence or absence of certain maternal characteristics, such as depression²⁶ or self-efficacy.²⁷ Keeping these methodological issues in mind, what dimensions of temperament have been linked to resilience in children?

Easy–Difficult Temperament

Compared to children with difficult temperament, children characterized as having an easy temperament were found to have significantly *lower levels of behavior problems*,^{28–31} *higher levels of social competence*,^{21,29,32} and *higher levels of adaptive behavior at school*^{31,33} and *at home*.³⁴

Emotionality

While there is some evidence showing greater resilience for children with overall lower levels of emotional reactivity,³⁵ the majority of studies report that the nature of the emotional reaction to stress is critical. Specifically, results indicate that for at-risk children a temperament pattern characterized as *high in positive emotional reactivity* is linked to resilience, as manifest in higher levels of social and emotional competence,³² lower rates of behavioral–emotional problems,^{25,36} and lower levels of substance abuse.²⁴ Conversely, a temperament pattern characterized as *high in negative emotional reactivity* is linked to reduced resilience, as manifest in higher rates of behavior problems²⁶ and lower ratings of school competence for children under stress.³⁷

Sociability/Approach

For conceptual reasons I am integrating studies where children are characterized as showing high or low levels of sociability or approach to new or complex

situations.² Results show significantly lower levels of behavior problems³⁵ and higher than expected levels of cognitive performance³⁸ and social-emotional competence^{21,32} for children experiencing stress who are high in sociability as compared to children with lower levels of sociability. Similarly, significantly lower levels of behavior problems are found for children under stress who are high in the temperament dimension of approach, as compared to children who are low in approach.^{28,39,40}

Self-Regulation

For conceptual reasons I also am integrating studies directly measuring self-regulation, as well as studies using related dimensions of temperament, such as flexibility/adaptability and level of impulsivity. Children who are higher in flexibility or adaptability show significantly fewer behavior problems than children who are temperamentally rigid or unadaptable.^{39,40} Children under stress who are rated by themselves and their parents as higher in self-regulation also show a significantly lower level of internalizing behavior problems than children rated as lower in self-regulation.⁴¹ Similarly, for children with physiological markers of increased self-regulation (high vagal tone) there is no relation of family stress to either adjustment or health, whereas for children with physiological markers of poor self-regulation (low vagal tone) family stress is linked to both poorer adjustment and health.^{42,43} Not surprisingly children under stress who are high in impulsivity, which can denote poor self-regulation, show a higher level of externalizing behavior problems than children who are low in impulsivity.²⁵

Attention-Task Orientation

While individual differences in attention/orientation are often considered to be dimensions of self-regulation, I view these aspects of temperament as “hybrid traits” encompassing both the temperament and cognitive domains.⁴⁴ For these reasons I treat attention/orientation separately from self-regulation. Similar to what is found for self-regulation children of divorce or children exposed to high levels of family conflict who are rated as higher in task orientation^{24,39} or attention focusing³⁶ have significantly lower levels of behavior problems or problems with substance abuse than children with lower levels of these traits. Given that persistence is also regarded as a dimension of attention-task orientation¹⁵ it is not surprising to also find that adolescents who were previously rated by parents as high in task persistence were more resilient (significantly fewer behavior problems) following loss of a parent than adolescents who were previously rated as low in persistence.²⁸

PROCESSES UNDERLYING LINKS BETWEEN TEMPERAMENT AND RESILIENCE

While the available literature is relatively small it is also surprisingly consistent. Across a wide range of ages, life stressors and outcome variables more resilient children are those with easy temperaments, or who have higher levels of positive emotionality, sociability/approach, are more flexible, or possess more optimal levels of self-regulation and higher levels of attention focusing and task orientation. Given these patterns of findings a critical issue involves the processes or mechanisms through which individual differences in temperament translate into higher levels of resilience.

Because the qualities that define child competence are highly similar to the qualities that characterize “resilient” children^{21,45} I chose to focus on underlying processes that are involved in explaining the contributions of individual differences to normal developmental competence.⁴⁶ Five potential mechanisms will be considered. Two of these mechanisms involve temperament–environment *covariance*. The remaining three mechanisms involve different forms of temperament–environment *interaction*.

Reactive Covariance

Reactive covariance refers to differential treatment of children with different individual characteristics.⁴⁶ While the fundamental assumption that temperament influences parenting is correct in a broad sense it is also clear that the influence of child temperament on parenting is moderated by a variety of nontemperament factors including child age, gender, parental personality, or adjustment and characteristics of the home environment.^{44,46,47} While the path from child temperament to parenting is more complex than a simple main effect, within a reactive covariance framework we would expect a greater likelihood of resilience to occur when children have temperament patterns that elicit more positive and supporting parenting, which in turn helps to buffer the child when the family or child encounters major life stresses or disruptions.⁴⁸

There are a number of studies that support the operation of reactive covariance processes underlying temperament–resilience links. Parents of children high in negative emotionality or difficult temperament show decreasing involvement with their child, either in terms of reduced attempts to develop their child’s regulatory capacities⁴⁹ or in terms of providing less positive discipline and adequate monitoring.⁴⁸ This decreasing involvement with the child can lead to even greater vulnerability when children encounter subsequent stresses. Conversely, more sociable infants elicit more positive responses and support from their parents and other adults than unsociable infants, which in turn promotes resilience.²¹ Evidence also indicates that parents of shy inhibited children are less likely to try to promote a sense of independence by their child, which only increases their child’s initial inhibitory tendencies.⁵⁰ This decreases

the likelihood that these children will become involved with and learn from peers, which again is likely to increase the child's vulnerability to subsequent stress. In terms of physiological measures Katz and Gottman⁴³ report that 24-month-old children with vagal tone patterns indicating better self-regulation received more parental support and positive parental interactions in the areas of emotional expression and emotional regulation than less regulated children. In turn, the children with better self-regulation and more supportive parenting had better cognitive, behavioral, and social outcomes following parental divorce.

Active Covariance

Active covariance refers to a process wherein children with different individual characteristics selectively gravitate to environments that are compatible with their characteristics.⁴⁶ If active covariance processes are occurring, children with certain temperament patterns would be more likely to select environments that do not expose the individual to environmental risk factors, or which allow the child to structure their world to compensate for deficits in certain skills.⁴⁸ In terms of promoting vulnerability, evidence indicates that difficult to manage children are more likely to encounter negative life events⁵¹ and have higher rates of physical injury than more tractable children.⁵² In terms of resilience, low activity levels in adolescents have been shown to predict higher levels of self-control, which in turn predict less association with peers who are substance abusers.⁵³ Similarly, the path from peer substance abuse to adolescent substance abuse is significantly lower for individuals who are high in task orientation and positive emotionality.²⁴ These results suggest that specific dimensions of temperament have the potential to both reduce the child's exposure to major risk factors in their environment and increase the child's ability to resist peer pressure to engage in risky behaviors.

Interaction: Goodness-of-Fit

The concept of goodness-of-fit is derived from the writings of Chess and Thomas³ who hypothesized that positive development occurs when child temperament characteristics are congruent with the interaction styles, values, and goals of the child's caregivers, such as parents or teachers. Put within a temperament-resilience framework, parents or teachers are more likely to function as a support for children under stress when child temperament characteristics fit what adults value in a child.³ While a theoretically compelling concept with some validating research, in a recent review of this area my conclusion was that empirical support for the operation of goodness-of-fit processes for both normal and abnormal development was inconsistent at best.⁵⁴ One major reason for inconsistent findings may be that goodness-of-fit may depend upon other factors besides child temperament and parent values and

rearing styles. For example, using a sample of depressed mothers with difficult temperament infants Teti and Gelfand²⁷ report that a good mother–infant fit is more likely to occur for depressed women with a high level of maternal self-efficacy beliefs than for depressed women with a low sense of maternal self-efficacy beliefs.

Interaction: Differential Reactivity

Differential reactivity refers to a process wherein children with different individual characteristics are more or less reactive to the same level and type of environmental input.⁴⁶ Vulnerable children should be highly reactive to environmental stressors or less reactive to environmental supports. Children high in fearfulness,¹⁷ difficult temperament,^{34,55,56} and negative emotionality¹⁶ have been shown to be more reactive to environmental stressors than less fearful, less difficult, or less negative children. Resilient children should be less reactive to environmental stressors or more reactive to environmental supports. Lower reactivity to environmental stressors has been shown for children high in positive emotionality³⁶ or low in negative emotionality.⁵⁷ These data, while supporting the operation of differential reactivity, are only a first step. As Rutter²³ has emphasized it is critical to begin defining what mechanisms underlie differential reactivity. One suggested mechanism for differential reactivity involves temperament-driven differential sensitivity to reward and punishment cues in the environment.^{58,59}

Interaction: Differential Coping

It has also been hypothesized that temperament differences predispose to children's utilization of different coping mechanisms to deal with stress, and that the type of coping mechanisms used can lead either to vulnerability or resilience.⁶⁰ Evidence suggests that under stress conditions inhibited children are more likely to practice avoidant coping strategies, such as expression of negative emotions and proximity seeking to adults.⁶¹ The child's use of non-productive avoidance strategies in dealing with early stresses is not likely to promote the child's coping with later stresses (sensitization). In contrast, under stress children high in self-regulation are better able to redirect their attention as needed⁶² and are more likely to respond in adaptive and flexible ways depending upon the nature of the stressor.^{39,49} Evidence also indicates that children who are high in the temperament dimensions of positive emotionality, approach, and activity level are more likely to use active coping mechanisms to deal with stress, while children low in these temperament dimensions are more likely to try to cope with stress by using avoidant strategies.^{36,39,63} Children who use more active, flexible coping strategies when faced with stress are more likely to successfully cope with stress and thus show what we would describe as resilience. Further, the child's ability to successfully deal with early stresses

through use of active flexible coping strategies may predispose the child to use active flexible coping when faced with stress later in life (buffering).²³

SUMMARY AND CONCLUSIONS: PROCESS MECHANISMS AND FUTURE DIRECTIONS

Clearly, there is far more evidence available on dimensions of temperament that promote or inhibit resilience than on the processes underlying how individual differences in temperament translate into vulnerability or resilience. In terms of available evidence, reactive covariance and differential coping processes have the most support. While there is also evidence in support of the operation of differential reactivity, more research is needed on exactly what leads to children with specific temperaments being more or less sensitive to environmental risk. Goodness-of-fit has conceptual elegance, but its utility as an explanatory mechanism is severely limited by inconsistent results. At present far too little is known about active covariance to determine if this can also serve as a process underlying resilience. Looking at development across time there are existing research models describing processes through which early temperament risk factors can translate into later deficits in cognitive and social-emotional competence sensitization.⁶⁴ However, far less is known about the processes through which early protective temperaments, as described in this article, may translate into later resilience in the face of stress (steeling).

What is also not known is the generalizability of our findings and theories on resilience in general, and temperament and resilience in particular, to the vast majority of the world's children who live in developing countries, and who encounter multiple and chronic life stresses that are far more severe than those encountered by children in developed countries (e.g., malnutrition, severe chronic infection, refugee status as a result of religious or political violence⁶⁵). With a few exceptions,⁶⁶ the overwhelming majority of research and theorizing on resilience involves children from developed countries. A paper on temperament and resilience may seem a strange venue for raising this issue except for the fact that what little research is available indicates that temperament plays a part in both risk exposure⁶⁷ and competence of children from developing countries.⁶⁸ Extending the study of resilience to children living in developing countries seems an important step, both for testing the generalizability of our theories and findings on resilience, and for designing intervention strategies to promote resilience in the all too many children across the world who are currently exposed to multiple severe risks that threaten developmental competence.

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