

Disorders of Childhood and Adolescence: Gender and Psychopathology

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Abstract

Early-onset disorders (e.g., conduct problems, autism) show a marked male preponderance, whereas adolescent-onset disorders (e.g., depression, anxiety) show a marked female preponderance. A developmental psychopathology framework provides a means to investigate complex gender-related etiologies of these different disorders. This review focuses on biological and environmental factors implicated in the development of conduct problems and depression in boys and girls. Boys and girls showed certain differences in types, rates, comorbidities, antecedents, correlates, and trajectories of these problems. Origins of male and female preponderant problems are likely to be rooted, in part, in biological, physical, cognitive, and social-emotional differences in boys and girls that can precede the expression of clinical problems. These male-like and female-like characteristics are considered regarding conduct problems and depression to explore how they inform biological and environmental theories about gender and psychopathology. At the same time, because boys and girls also show many similarities, it is important to avoid sex-stereotyping mental health problems.

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INTRODUCTION

Sex differences in child and adolescent mental disorders fall into two main groups (Rutter et al. 2003). Early-onset disorders such as conduct disorder, autism, developmental language disorders, attention

deficit-hyperactivity disorder (ADHD), and dyslexia show a marked male preponderance. Adolescent-onset emotional disorders such as depressive/mood disorders, anxiety disorders, and eating disorders show a marked female preponderance. Anxiety disorders and anti-social disorders do not fit as neatly into this classification of childhood versus adolescent onset. Anxiety problems peak in adolescence, particularly in girls, and are more common in girls than in boys even at an early age. And although the early-onset form of antisocial disorders is associated with neurodevelopmental impairment, conduct problems, which remain more common in males than females, peak again in adolescence. Because the etiologies of early- versus late-onset disorders may differ, developmental stage becomes a starting point for examining possible causes for different problems in males and females.

Although the term “neuropsychiatric disorders” is used almost exclusively to describe the early-onset male preponderant disorders, the adolescent female preponderant disorders are likely to have neurological substrates as well (Cahill 2005, Heller 1993). Most psychiatric disorders in adults are now known to originate in adolescence and childhood (Kessler et al. 2005). A developmental psychopathology approach, where longitudinal designs are used to follow children over time, makes it possible to explore evolution of these problems across a range of normal, sub-clinical, and clinical symptoms. Research on sex differences and psychopathology in children and adolescents is recent in origins. Early work emphasized sex differences in the prevalence rates for different disorders at different ages. Today, more research examines both similarities and differences in the development, antecedents, correlates, and consequences of different forms of psychopathology in girls and boys. Also, more attention is now paid to problems previously ignored in one sex because they occurred less often, e.g., antisocial behavior in girls (Bell et al. 2005, Putallaz & Bierman 2004) and

depression in boys (e.g., Gjerde & Block 1996, Pollack 1998).

The study of sex differences provides a means to identify the complex etiologies for different forms of emotional and behavioral problems (e.g., Rutter et al. 2003, Zahn-Waxler et al. 2006). Empirical efforts have often focused on biological factors *or* childhood adversities that distinguish between males and females with problems, with less research on how these factors interact to influence developmental outcomes. At one end of the continuum, disorders such as autism result primarily from genetic, neurological, hormonal, constitutional, and other biological abnormalities. At the other end, environmental factors play a major role (e.g., posttraumatic stress disorder resulting from maltreatment). Between these extremes is a range of other emotional and behavioral problems (e.g., conduct problems and depression), where biological *and* environmental processes are likely implicated in the etiology.

In this review, we use the terms “environmental factors” and “childhood adversities” interchangeably to describe external events that impinge upon the child. Examples include poverty, violent neighborhoods, harsh discipline, rejection, parental mental illness, marital discord, and maltreatment. Most often these (as well as the biological vulnerabilities referred to above) are called risk factors (rather than causal factors). Although they are likely to play an etiologic role, direct causality cannot always be readily inferred. Moreover, they are not “pure” environmental influences. Biological factors influence both how the child is affected by adversity (e.g., by angry or anxious/inhibited temperament) and why she or he is exposed to the childhood adversities (e.g., the child experiences the parent’s depressive symptoms but those symptoms result, in part, from parent’s genetic makeup as well as life stressors). Similarly, biological processes are influenced by the environment; e.g., chronic stressors alter cardiac, hormonal, and neurochemical activity (Raine 2002).

Although the distinctions between biological and environmental factors are coarse and not fully accurate, they provide a starting point for parsing processes that contribute to psychopathology. They will undergo significant transformations as theories, methods, and analytic approaches become better able to deconstruct more accurately nature and nurture (see Moffitt et al. 2005). Diathesis-stress models are used increasingly to study how persons with either a genetic vulnerability or a childhood history of adversity might respond to later environmental stressors to trigger the onset of symptoms. Processes may differ for boys and girls because of differences in biology and life experiences.

Several processes could produce sex differences in psychiatric disorders and symptoms. Boys and girls may (*a*) experience different environmental risk factors, (*b*) experience different levels of the same environmental risk factors, (*c*) have different biological processes or mechanisms of gene expression (such that these influences may be differentially amplified or diminished for one sex or the other), (*d*) require different thresholds of biological or genetic risk for serious problems to develop, and (*e*) differentially experience interactions of environmental and biological influences. We consider examples of each in sections below. By focusing on sex differences, we do not imply that they are more important than similarities in risk factors and processes for boys and girls. However, risk-by-gender interactions often emerge, suggesting that gender plays a role in the different mental health outcomes for boys and girls.

To place this review of male-preponderant and female-preponderant disorders in context, we first summarize early sex differences in biological, physical, cognitive, social, and emotional domains. We remind readers that the sex differences described are based on average differences that characterize subsets of individuals within the populations studied. We propose that extremes of normative differences are likely implicated in different

clinical and subclinical problems. We review two types of disorders/symptoms that are subsumed under the broader classes of externalizing and internalizing problems, i.e., conduct problems and depressive symptoms, respectively.

We chose conduct problems and depressive symptoms because (*a*) both have high prevalence rates, (*b*) one is more common in males, the other in females, (*c*) both sexes show sufficient variability in both types of problems to study interactions by gender, (*d*) there is more gender-relevant research for conduct problems and depressive symptoms than any other forms of psychopathology, and (*e*) extremes of normative biological, cognitive, social, and emotional sex differences are present in both types of problems. Conduct problems and depression, which appear to have little in common and no overlapping symptoms, except perhaps for irritability, show substantial comorbidity.

Comorbidities, both within and across disorders, can provide insights about why males are more prone to externalizing problems whereas females are prone to internalizing problems. Conduct problems frequently co-occur with other disorders and symptoms that involve attentional problems, hyperactivity, and oppositional behaviors (i.e., other externalizing problems). Depression frequently co-occurs with anxiety, eating, and somatization disorders (i.e., other internalizing problems). Of special interest is the lesser but still substantial comorbidity between conduct problems and depression.

In the final section of this review, we first consider a more broad-based biological theory of male preponderant disorders; more specifically, the extreme male brain theory that emphasizes the role of testosterone in the intrauterine environment, hemispheric asymmetries, and disinhibitory processes. We then expand upon these ideas to include brain-based female preponderant disorders and how biological factors may interact with environmental processes to differentially shape outcomes for boys and girls.

SEX DIFFERENCES IN INFANCY, CHILDHOOD, AND ADOLESCENCE

Biological, Physical, and Cognitive Development

Sexual dimorphisms of behavior are often assumed to derive from sexual dimorphisms of the brain and body that begin in utero. By adulthood there are biological sex differences relevant to psychopathology at the levels of genes, neurotransmitters, hormones, brain structure/function/circuitry, and pharmacokinetics (see review by Zahn-Waxler et al. 2006). Many may originate in two earlier developmental periods.

The first period begins in utero when the activities of sex hormones affect the fetal brain, particularly testosterone, which masculinizes the brains and bodies of males. These masculinizing hormones exert an effect on behavior independent of circulating hormones. The resulting structural and functional brain differences in males and females that are linked to males' earlier higher testosterone levels are now thought to be relevant to both normative sex differences and psychiatric conditions (Cahill 2005).

Prenatal exposure to testosterone may account for slower biological and physical maturation, as well as greater disinhibition in boys than in girls (Baron-Cohen 2002; Geary 1998, 2002; Keenan & Shaw 1997). It is also thought to be associated with slower maturation of parts of the temporal cortex in boys than in girls (McClure 2000). In normative samples, higher fetal testosterone is associated with boys' lower empathy (Knickmeyer et al. 2005b) and more restricted interests and lower quality of social relationships in both boys and girls (Knickmeyer et al. 2005a, Maccoby 1998). Delayed maturation thus may create risk for conduct problems and other disorders.

The second period begins in puberty, when there are dramatic increases in androgens such as testosterone for boys and estrogens such as estradiol and progesterone (which

are cyclically released) for girls. The moderating role of gonadal steroids can change the functional role of other hormones differently for boys and girls, with testosterone suppressing and estrogen enhancing activity of the hypothalamic-pituitary-adrenal (HPA) axis. Although estrogen and progesterone can have a protective effect on females' stress response, these hormones also dampen negative feedback mechanisms of cortisol on earlier stages of the HPA axis. This may delay the ability of females to recover from stress and may leave them more affected than males by long-term effects of stress (Young 1998) and hence at risk for depression. By puberty, the apparent advantages of rapid development of females disappear and may even be detrimental (Hayward 2003).

The developing male brain is about 10% larger than the female brain. After correcting for brain volume differences, girls have relatively larger caudate and boys have larger globus pallidus (Giedd 1997, Giedd et al. 1997). Interpreting sex differences in the size of brain structures is complicated, as both larger and smaller structures may indicate enhanced function. Larger structures may confer greater protection from neuronal loss or environmental insult, or smaller structures may reflect enhanced neuronal pruning with more mature, differentiated brain areas. There is a notable increase in size of the lateral ventricles in boys after age 11, but the increase for girls is more gradual. Amygdala volume increases more for boys than girls, but hippocampal volume increases more in girls than in boys (Giedd 1997, Giedd et al. 1997). Many of the dimorphic brain areas are related to mood, emotion, and emotion regulation. Neurological differences also include hemispheric lateralization, where there is a right hemisphere advantage for females for processing emotional cues (McClure 2000).

The curve of development of the frontal cortex, caudate, and temporal lobes in girls is considerably faster than in boys, by as much as 20 months. The frontal cortex is associated with decision-making, insight, judgment,

and inhibitory control. Rapid maturation of the frontal cortex would decrease risk for externalizing problems in girls, but if it is extreme, it might increase risk for internalizing problems, particularly if accompanied by rapid physical maturation, early puberty, and overprocessing of emotional cues.

When sex differences in language are present, they favor girls (see reviews by Keenan & Shaw 1997, Maccoby 1998, Ruble & Martin 1998). Boys have more reading problems and other learning disabilities than do girls. Boys have smaller vocabularies than girls, acquire language later, and less often use language to label and describe objects, events, personal experiences, and preferences. Although there is little evidence of sex differences in intelligence, girls and boys differ in how they process information (Geary 1998, 2002). The lessened abilities of boys relative to girls to use language, especially about personal experiences, may make it difficult to engage in social problem solving during conflict that would help to minimize physical aggression and conduct problems.

Social-Emotional Development and Temperament

Several sex differences have been seen in infants and preschool children (see reviews by Ruble & Martin 1998, Weinberg et al. 1999, Zahn-Waxler et al. 2006). Male newborns are less responsive to social and auditory stimuli and less able to maintain eye contact than are female newborns. From very early on, girls smile more than do boys. Infant boys also have greater difficulty regulating and controlling negative emotions that include anger and irritability than do infant girls. By preschool and throughout childhood, boys are more physically active and show less frustration tolerance, as well as more anger, impulsivity, and dysregulation of emotion than girls. A recent meta-analytic review of sex differences in temperament (Else-Quest et al. 2006) revealed that boys showed greater surgeny than did girls, i.e., higher levels of

impulsivity, activity, and high-intensity pleasure. The subset of boys who account for the significant sex differences in these studies may be at risk for externalizing problems such as ADHD.

In addition, by early preschool, the heightened social awareness of girl infants in comparison with boy infants is seen in girls' higher (*a*) empathy and prosociality, (*b*) social skills, (*c*) remorse after transgression, and (*d*) understanding of others' emotions, problems, and intentions. These patterns of greater social sensitivity and emotion regulation in girls than boys continue throughout childhood and adolescence (see reviews by Brody 1999, McClure 2000, Zahn-Waxler et al. 2006). These qualities in conjunction with advanced physical maturation and language abilities of girls relative to boys during childhood could be expected to make girls more resilient to problems, a common theme in the literature. This has helped to perpetuate the "myth of benign childhoods for girls" (Zahn-Waxler 1993), i.e., the belief that girls have very few problems in childhood. Because girls are less disruptive than are boys and their difficulties are more internal, girls are less likely to come to the attention of others.

Girls show more fearfulness and anxiety than boys show as early as their preschool years (Carter et al. 2003; see review by Else-Quest et al. 2006). A meta-analytic review (Else-Quest et al. 2006) also indicated that girls show higher levels of effortful control than boys, indicating that girls are more compliant and better able inhibit their actions. Guilt, shame, and sadness are also more common in girls than in boys in childhood (see review by Brody 1999), as is the ability to hide disappointment (Cole 1986). Girls use emotional coping strategies and ruminate about problems more, whereas boys use distraction and aggressive strategies more (Nolen-Hoeksema & Girgus 1994, Zeman & Shipman 1998). Girls also are more likely to "read" other people for signs of approval and disapproval, reflecting a greater dependence on others for how they are viewed.

Beginning early and throughout childhood, boys show more physical and direct verbal aggression than do girls. Girls more often use indirect or relational aggression that creates psychological damage in relationships rather than physical harm (see Crick & Zahn-Waxler 2003). Boys' play themes emphasize action, attention to objects and construction, and personal achievement and power. Girls' play is less hierarchical and more reciprocal, nurturing, and affiliative in nature. It often involves relationship and family themes (Geary 2002, Maccoby 2002). Boys play in public in large groups, use direct commands, and establish physical dominance more than do girls (Coie & Dodge 1998, Maccoby 1990). Girls, in contrast, spend more time indoors, interact in smaller groups, and have one or two best friends. Girls tend to make suggestions and requests. They also have difficulty influencing boys, but the reverse is not true. In concert, these sex differences suggest the tendency toward a more submissive, deferential style in girls than boys.

Differences in the social-emotional lives of boys and girls continue, on average, throughout childhood and adolescence. As children grow older, these differences tend to occur against a backdrop of differences in how boys and girls feel about themselves. Boys report higher self-esteem than girls, on average, particularly beginning in adolescence, with boys describing more positive aspects of the self such as self-confidence and success expectations (e.g., Harter 1993, Ruble & Martin 1998).

Implications for Psychopathology

The magnitudes of sex differences vary both within and across domains from strong to weak. Differences are often context specific and not always replicable. However, even the weaker differences occur with sufficient regularity to merit serious consideration. Moreover, it would be extremely rare to find differences opposite to what would be predicted, e.g., more physical aggression, activity, and

impulsivity in girls than boys or more nurturing, socially sensitive behaviors in boys than girls. Because most studies that report sex differences do not screen for psychopathology, the differences reviewed could be present both normatively and in clinical populations. Or the differences could just be present (or magnified) at the extremes. In either case, at some point on the continuum, quantitative differences are likely to become qualitative differences that have adverse implications for the child's functioning.

Extremes of the sex differences reviewed here could be said to reflect sex-role traits and stereotypes. The stereotypic adult female is described as nurturant, dependent, emotional, passive, and self-sacrificing (see review by Zahn-Waxler et al. 2006). These qualities are also correlates of or risk factors for depression. The stereotypic adult male is described in opposite terms: aggressive, independent, rational, active, and self-enhancing. Although most of the masculine qualities sound more positive than feminine characteristics, they are associated with other kinds of problems. Even in normative samples, males score higher than females on autistic features and antisocial, psychopathic traits (Baron-Cohen 2002, Hamburger et al. 1996). Many if not most of the observed sex differences we have described in children and adolescents, in the extreme, are reflected in the different kinds of psychiatric and psychological problems that develop in girls and boys. That is, male-preponderant and female-preponderant disorders often reflect extremes of normative characteristics of boys and girls, respectively, as evidenced in subsequent sections.

CONDUCT DISORDER AND SYMPTOMS

Conduct disorder (CD) consists of persistent and repeated violations of social rules and the rights of others (Am. Psychiatr. Assoc. 2000). Symptoms include aggression toward people and animals, destruction of property, theft, deceitfulness, and an emotional profile that

includes impulsivity, hostility, and a lack of empathy. In addition to aggressive and delinquent behaviors that reach diagnostic criteria, these symptoms have also been studied as externalizing problems (Achenbach 1991) on a continuum of severity. Here we draw from both literatures. Males show much higher rates of CD than do females (Am. Psychiatr. Assoc. 2000). Estimates based on epidemiological samples in the United Kingdom and the United States range from 2–4 boys to each girl, averaged across wide age groups (Moffitt et al. 2001). Although the rates are much lower for girls than boys, they have increased in recent years (Putallaz & Bierman 2004).

Physical aggression and conduct disorder show substantial continuity over long periods of time (Coie & Dodge 1998). Whereas males show more physical aggression, females show more status violations and conflicts with authority (Maughan et al. 2000). Efforts to identify antisocial problems more common to girls such as relational and indirect aggression are more recent. Although relational and physical aggression often co-occur, relational aggression provides predictive information above and beyond physical aggression and other conduct problems (Crick et al. 2006).

CD is comorbid with other externalizing (e.g., ADHD, substance problems), internalizing (e.g., anxiety, depression, somatization), and learning disorders (Am. Psychiatr. Assoc. 2000, Hinshaw & Anderson 1996). Compared with boys with CD, girls are at higher risk for comorbid internalizing conditions (Loeber & Keenan 1994). These girls often choose antisocial mates, become young teen-age mothers, and raise children with CD (Serbin et al. 1998).

Developmental Models

There is growing consensus on developmental models of conduct disorder behavior that include dual pathways (Moffitt 1993, Patterson et al. 1991), i.e., childhood-onset and adolescent-onset subtypes (Am.

Psychiatr. Assoc. 2000). The two subtypes of CD are distinguishable in terms of etiology and developmental course. Childhood-onset type is diagnosed in children who meet criteria for CD prior to age 10. They are at greater risk for a severe and persistent course of the disorder than are youths with the adolescent-onset form. Early-onset CD is linked to cognitive and neurological deficits, comorbid ADHD, poor parenting, and parental antisocial behavior (Moffitt 1993).

Moffitt & Caspi (2001) found that both early-onset and adolescent-onset CD similarly apply to males and females, but the ratios differ; males predominate for child-onset and adolescent-onset CD, but this disparity lessens for adolescent-onset problems. Although very low rates of early-onset CD in girls in several early studies initially led to questions about whether early-onset CD applied to girls (Silverthorn & Frick 1999), later longitudinal studies with high-risk samples bolstered Moffitt & Caspi's (2001) original conclusions that early-onset CD applies to both boys and girls (Conduct Problems Prev. Res. Group 1999, 2002; Lahey et al. 2006; McCabe et al. 2004).

In most research on conduct problems, the youngest children studied have already begun formal schooling. However, even toddlers and preschool children can have serious externalizing problems, and sex differences are already present at this time. This suggests an even earlier onset that may need to be incorporated into developmental models. The delayed physical maturation and language development of boys, along with emotion regulation problems, may place young boys at greater risk than girls (Keenan & Shaw 1997). In a study of 2-year-old high-risk children (Cummings et al. 1985), boys with clinically depressed mothers showed more dysregulated, inappropriate aggression than girls, and this aggression predicted their externalizing problems at ages 5 and 6. Boys, but not girls, showed stability of aggression over time. Aggression in girls decreased over time, perhaps in response to socialization pressures

for appropriate conduct (Keenan & Shaw 1997).

Another longitudinal study of preschool boys and girls with conduct problems found sex differences in observed emotions and symptom expression over time, even though boys and girls were initially equated on conduct problems (Zahn-Waxler & Polanichka 2004, Zahn-Waxler et al. 2005b). In challenging situations (e.g., frustration, disappointment, or temptation), disruptive boys more often showed negativity and anger, whereas girls more often appeared compliant and anxious.

Genetic/Biological Factors

Twin studies indicate a genetic contribution to conduct problems for both sexes, though the estimates of genetics versus shared environment vary, as does the magnitude of sex differences in heritability (Foster 2005, Jacobson et al. 2002). The consistent sex differences in overt aggression observed in animals and humans have produced a robust literature on the role of hormones that differentiate males and females. The main androgen, testosterone has often (but not invariably) been linked with aggressive and dominant behavior in males. Although research with females has been limited, some work has shown linkages between adrenal androgens and aggression (Susman & Pajer 2004).

Arousal has been examined in terms of the HPA axis and the autonomic nervous system. Antisocial behavior in male children, adolescents, and adults has been linked to low responsiveness in these systems, e.g., low cortisol levels, low heart rate, and low heart-rate variability (Lahey et al. 1993, Susman & Pajer 2004). Some studies of antisocial girls have confirmed this pattern for cortisol (e.g., Pajer et al. 2001, Susman et al. 1997). Moreover, girls with low cortisol showed poor executive function, impulsivity, and lack of empathy (Pajer et al. 2001).

Eveningness (staying up late and sleeping late) and morning-to-afternoon cortisol ratio

have been studied in relation to antisocial behavior problems in adolescence (Susman et al. 2007). Eveningness was related to antisocial behavior in both sexes; however, for boys it was related to conduct problems, whereas for girls it predicted relational aggression. Also, early puberty was related to conduct problems in boys and relational aggression in girls. Notably, depressed persons often show eveningness.

In summary, there are more conduct problems in boys than in girls and occasional sex differences in biological processes associated with conduct problems. Within each gender, the biological factors and conduct problems often show similar associations.

Childhood Adversities

A number of childhood adversities have been implicated in the development of antisocial behavior similarly in boys and girls (Lahey et al. 2006, Moffitt 1993, Zahn-Waxler & Polanichka 2004). Examples include low socioeconomic status, violent neighborhoods, maltreatment, marital conflict, parental alcoholism, and mental illness, including depression and antisocial personality disorders. Lack of parental warmth, poor supervision, and either overly harsh or overly permissive discipline styles all have been linked to children's antisocial behavior. Until recently, there were few longitudinal studies. Often only boys were studied, and if girls were included, statistical analyses were based on boys and girls combined. As with biological factors, childhood adversities often appear to operate similarly for both sexes (Lahey et al. 2006, Moffitt 1993).

However, several longitudinal studies demonstrate interactions of adversities and gender, e.g., only one sex is affected, one sex is affected more than the other is, or both sexes are affected but in opposite ways. We consider several examples while also noting that many more interactions may remain undetected because often gender is controlled for in statistical analyses. Also, many studies are underpow-

ered, i.e., sample sizes are insufficient to detect existing differences. (The same analytic points apply to research on depression and anxiety.) We do not claim there are more differences than similarities—only that it is important to recognize the differences that do exist.

In parenting research, mothers' coercive behavior and lack of affection predicted increases in boys' physically aggressive and disruptive behavior from kindergarten to third grade. In contrast, these same maternal behaviors predicted decreases for girls (McFadyen-Ketchum et al. 1996). Similarly, mothers' anger toward their preschool children predicted continued conduct problems in elementary school for sons but decreased problems for daughters (Cole et al. 2003). Davies & Windle (1997) found that family discord played a greater role in the conduct problems of girls than boys. In another study (Windle 1992), stressful life events and low family support predicted problem behaviors for adolescent girls but not boys.

A very recent large-scale longitudinal study (Lahey et al. 2006) examined developmental trajectories for conduct problems and delinquency from ages 4–5 years to 14–17 years. The magnitude of sex differences varied with age, which suggests that many processes differentially influence levels of these behaviors in females and males across development. As predicted by Keenan & Shaw (1997), conduct problems declined more in girls than in boys from preschool into the early elementary school years, resulting in a doubling of the proportional sex difference. This widening gap in early childhood was hypothesized to result from differences in adults' socializing responses to misbehavior in boys and girls, in interaction with pre-existing differences in language and temperament.

Delinquent behaviors can spur later criminal involvement for both boys and girls but in different ways (Tolan & Thomas 1995). For boys, it was best explained by participation in deviant peer groups. For girls, family factors, school achievement, and acceptance were important deterrents. A review of several studies

found antisocial girls to be more sensitive to disruptions in the social environment, particularly at home (Loeber & Stouthamer-Loeber 1986). Sixth-grade girls appear to be more sensitive than are boys to positive parenting in ways that reduce their antisocial behavior (Griffin et al. 2000).

Adolescent antisocial girls and female criminals may come from family backgrounds that are more dysfunctional than are those of antisocial boys (Henggeler et al. 1987). Mother-youth dyads and parents in families of female delinquents have higher rates of conflict than did male delinquents. Female delinquents more often come from violent, abusive homes than do males (Lewis et al. 1991). Often they become enmeshed in violent relationships with men, perpetuating family violence, child abuse, and neglect. Highly aggressive girls experience more family adversity than do males (Maughan et al. 2000).

In summary, childhood adversities often predict conduct problems similarly in boys and girls. There are also many examples of differences; girls seem to be particularly affected by the quality of parenting and family climates.

MOOD DISORDERS AND SYMPTOMS

The essential feature of depression is either depressed mood or loss of interest or pleasure in nearly all activities. In children and adolescents, the mood may be irritable rather than sad. There are also vegetative (e.g., changes in appetite), cognitive (e.g., difficulty concentrating), and emotional (e.g., feelings of guilt and worthlessness) signs. Depression is infrequent in childhood and is comparable for boys and girls, with boys sometimes showing slightly higher rates. It increases markedly in adolescence; girls become depressed two to three times more often than males, as seen in both community-based and clinically referred samples (Zahn-Waxler et al. 2006). This is the case whether depression is diagnosed as a disorder or measured on a continuum of symp-

tom severity. Here, as with conduct problems, we draw on both literatures. The literature on gender and depression is larger than that for conduct problems, a likely result of the fact that (unlike research on conduct problems) both girls and boys were studied from the onset.

Developmental Models

Low rates of childhood depression and dramatic increases in adolescence often have led to an assumption that depression is discontinuous across these periods of development and, moreover, that the causes for the later higher rates of depression in girls emerge during adolescence. One of the first explanations can be found in the gender-intensification hypothesis (Hill & Lynch 1983). Cultural reinforcement of the feminine ideal or stereotype promotes behaviors that are dependent, relationship driven, emotional, helpless, passive, and self-sacrificing. These behaviors are hypothesized to create risk for depression. Before puberty, gender roles are more fluid and girls are not expected to adhere to them. However, expectations change at puberty; many girls start to conform to the feminine ideal and to become less assertive (e.g., Allgood-Merten et al. 1990, Aube et al. 2000). Consistent with this view, the "loss of voice" (suppression of opinions) and low self-worth in adolescence, more common to girls than boys and implicated in depression, is restricted to a subset of girls who endorse a feminine orientation (Harter et al. 1998). In related work with adolescents, for girls but not boys, negative self-perceptions about global self-worth, physical appearance, and achievement were related to depressive symptoms (Eberhart et al. 2006).

Two subsequent theories provide a number of testable hypotheses and implicate etiologic processes that are set in motion well before adolescence (Cyranowski et al. 2000, Nolen-Hoeksema & Girgus 1994). Cyranowski et al. (2000) proposed that female gender socialization and increased hormones such as oxytocin at puberty (a hormone also involved in

reproduction and childbearing) can intensify the need for affiliation in girls. Gender intensification could result from earlier vulnerabilities such as insecure attachments to parents, an anxious or inhibited temperament, and low instrumental coping. The increase in interpersonal stressors related to friendships and dating during adolescence is hypothesized to interact with girls' increased need for affiliation, making them more vulnerable to depression following negative interpersonal events.

Nolen-Hoeksema & Girgus (1994) advanced three hypotheses: (a) the causes of depression are the same for girls and boys, but become more prevalent for girls in adolescence, (b) there are different causes for depression in girls and boys, and causes for girls become more prevalent in early adolescence, and (c) girls are more likely than boys to carry risk factors for depression even before early adolescence, but these risk factors only lead to depression in the face of challenges that increase in early adolescence. Given that there are multiple determinants of depression, each hypothesis could be valid under certain conditions. Because the third model is most relevant to the developmental approach of this review, we consider it in greater detail.

The third model implies heterotypic continuity of depression from childhood to adolescence, in that earlier biological, cognitive, and social-emotional characteristics leave girls more vulnerable than boys to later depression. Nolen-Hoeksema & Girgus (1994) identify several risk factors more common in girls than in boys. These included low instrumentality, low dominance, low aggression, and a tendency to dwell on problems (i.e., ruminative coping, which can increase and prolong negative mood). When such factors combine in adolescence with biological and social challenges faced by girls, depression may ensue. We consider below a developmental pathway from early anxiety to later depression as an example of heterotypic continuity.

Recent evidence now points also to homotypic continuity, i.e., stability in depressive symptoms over time well before adoles-

cence, especially when studied in combination with anxiety. Sterba et al. (2007) used a person-oriented (latent growth mixture) method to model heterogeneity in internalizing symptoms in children ages 2 to 11 years. There were three trajectories for both boys and girls; low-stable, decreasing/increasing, or elevated-stable. Twice as many girls as boys showed elevated-stable patterns. Sterba et al. (2007) question why these girls are often not identified until adolescence.

Genetic/Biological Factors

Although some studies yield similar heritability estimates for depressive disorders in males and females, several others find differences (Zahn-Waxler et al. 2006). In genetic linkage studies, the impact of some loci on risk for major depression is likely to vary by sex (Kendler et al. 2001a). Silberg et al. (2001) found that genetics had a larger effect on depression in adolescent girls who had experienced a negative event in the previous year than on those who had not. At puberty, girls' negative life events and stability of depression over time are more genetically mediated than are those for boys (Silberg et al. 1999).

Girls who reach puberty earlier are more likely to develop depressive symptoms than those who reach puberty on time (Ge et al. 1996). Angold et al. (1998, 1999) have examined the influence of hormones and body development on the increased rates of adolescent depression. During pubertal development (measured by Tanner stages), boys showed higher rates of depression than girls before Tanner stage III (the midpoint of puberty when body changes become apparent). Girls showed much more depression than boys showed at and after Tanner stage III (Angold et al. 1998). Estradiol and later depressive affect were positively linked even after the course of a year (Paikoff et al. 1991).

Cortisol activity/reactivity is often higher in depressed than nondepressed adults. The picture is mixed with children and adolescents, and sex differences are not common.

However, in one study of adolescents who were normal, depressed, or depressed with comorbid externalizing problems (Klimes-Dougan et al. 2001), only depressed girls did not show the typical diurnal pattern of high early-morning cortisol and a marked decline across the day. Rather, they showed a flattened diurnal rhythm (i.e., cortisol remained elevated) and a more gradual decline after discussing conflict with a parent. In younger children (Smider et al. 2002), girls showed higher cortisol than boys at age 4.5 years. For girls only, high cortisol predicted more depression and anxiety 1.5 years later.

Childhood Adversities

A number of childhood adversities have been linked to later depression (Espejo et al. 2006). These include negative childhood experiences such as poor maternal care, parental marital problems, early death or separation from a parent, childhood physical and sexual abuse, and parental drinking and mental illness, particularly depression. Here we consider several examples that are pertinent to sex differences in depression.

Parental depression. Parental depression creates substantial risk for depression in children (see review by Goodman & Gotlib 1999); the lifetime risk of depression for offspring has been estimated at 45% (Hammen et al. 1990). Because depression is heritable, it is commonly assumed that these children are at increased risk due to genetic similarity. However, children's experiences also differ markedly.

Girls of depressed mothers are more susceptible to internalizing problems than are boys (Boyle & Pickles 1997, Sheeber et al. 2002; see review by Goodman & Tully 2006). The effects of maternal depression on adolescent girls' depression become stronger as girls mature. Longitudinal studies indicate that maternal depression has long-term effects on later development of depression in daughters but not sons (Davies & Windle

1997, Duggal et al. 2001, Fergusson et al. 1995). In one study, depressive symptoms increased over time in adolescent daughters who provided comfort and suppressed their own aggression (Davis et al. 2000). Daughters may be susceptible because they spend more time with depressed mothers and have stronger emotional ties than sons (Gurian 1987).

A recent longitudinal study from infancy to 13 years of age showed quite different effects of maternal postpartum depression on emotional sensitivity, maturity, and depression in adolescent boys and girls (Murray et al. 2006). Girls and boys of well mothers did not differ on emotional sensitivity and maturity in adolescence. However, there was a gender-based diathesis for children of mothers with postpartum depression; girls showed enhanced sensitivity and maturity while boys showed diminished responses. Insecure attachments and emotional sensitivity predicted later adolescent depressive symptoms in daughters but not sons of depressed mothers.

Family processes: marital conflict and parenting. When exposed to family discord, adolescent girls are more likely than are boys to develop depression (Zahn-Waxler et al. 2006). Girls show more interpersonal concern, caring behaviors, and overall involvement in family problems than boys show, which contributes to girls' higher rates of depressed mood (Davies & Lindsay 2004, Gore et al. 1993). Even prior to adolescence, girls show more distress, fear, and guilt than boys show in these conflict situations (Davies & Lindsay 2004), whereas boys are likely to show more externalizing problems. Aube et al. (2000) found that unassertive girls who also felt overly responsible for others were more depressed than were boys. Conflict with mother in conjunction with submissive coping was related to concurrent depression and predicted increases in symptoms one year later for adolescent daughters but not sons (Powers & Welsh 1999).

In one recent study, young girls (but not boys) who were more prosocial at school

entry showed more anxiety and depressive symptoms in third grade (Essex et al. 2006). In another study, prosocial themes of 7-year-olds (more common in girls than boys) predicted greater anxiety in girls but not boys in early adolescence (Zahn-Waxler et al. 2005). A next step will be to examine whether these links between early concern for others and later internalizing problems occur more often in a context of family distress.

Cumulatively, these studies of family environments where there is parental depression and/or parental discord provide good examples of how environmental stress can change an adaptive response pattern into a maladaptive pattern. Taylor et al. (2000) describe a tend-and-befriend response to stress that is more common in females than males and likely linked to the hormone oxytocin. This is in contrast to the fight-or-flight response more common to males and likely linked to testosterone and other hormones. The fact that some girls are tending to their parents (and perhaps siblings as well) creates risk for them in the long run. Of particular interest is the fact that some of these sex differences are present well before the hormonal surges of adolescence.

Reactions to stressful life events. Girls tend to show different patterns in the relationship between life events and depression than those of boys, particularly after puberty (Ge et al. 1994, Silberg et al. 1999). Because adolescent girls are more invested in relationships with friends and romantic partners than are boys (Leadbeater et al. 1999, Rudolph 2002, Rudolph & Hammen 1999), they are, as noted above, more likely to become depressed when relationships are disrupted. Heightened interpersonal focus and reliance on others are inversely related to agency and instrumentality, which protect against depression (Allgood-Merten et al. 1990, Nolen-Hoeksema & Girgus 1994).

Vulnerability to interpersonal stressors may lead to helplessness, fear of abandonment, and a heightened need for intimacy

(Leadbeater et al. 1999), creating an escalating cycle of distress. Negative feedback seeking about one's perceived negative attributes (a backhanded way of seeking reassurance) prospectively predicted depressive symptoms almost a year later uniquely for young adolescent girls (Borelli & Prinstein 2006). Excessive reassurance seeking is a maladaptive interpersonal style that can be a vulnerability factor for depression (Joiner et al. 1999).

Adolescent girls both may experience higher levels of these types of stress associated with depression and may be more reactive to these stressors than are boys (Rudolph & Hammen 1999). One type of stress, interpersonal conflict, is linked to depressive symptoms in adolescent girls but not boys. Recent work also finds that girls experience more interpersonal stressors than boys do and that interpersonal stressors are uniquely predictive of depression in girls (see Hankin et al. 2007 for a discussion of direction of effects in relations between depression, gender, and types of stressors).

In summary, some risk factors for depression appear to be similar for boys and girls, whereas others obviously differ in both biological terms and social consequences, e.g., early puberty. Most research focuses on adolescence, but sex differences in risk factors and precursors of depression may be present and influential earlier in development.

PRECURSORS OF DEPRESSION

Comorbidity of depressive and anxiety disorders and symptoms is much more common in girls than in boys (Lewinsohn et al. 1995b); moreover, depression that is comorbid with more than one anxiety disorder is virtually exclusive to females (Lewinsohn et al. 1997). Co-occurrence of subclinical symptoms is even higher. A developmental perspective may shed light on the meaning of these comorbid patterns and help to understand girls' greater risk for depression in adolescence than in comparison with boys.

There is an emerging body of literature on childhood antecedents of adolescent and adult depression (Block & Gjerde 1990, Gurian 1987, Keenan & Hipwell 2005, McCauley et al. 2001, Nolen-Hoeksema & Girgus 1994). Anxiety shows stability over time in childhood (e.g., Ialongo et al. 1995). The female preponderance in major depression may be a secondary outcome of a sex difference in early anxiety. The fact that generalized anxiety disorder and panic disorder often precede depressive episodes in early adolescence suggests that early anxiety may lead to later depression, especially in girls (Parker & Hadzi-Pavlovic 2004). Several prospective, longitudinal studies have found that anxiety disorders and symptoms temporally precede and predict later depression in children, adolescents, and young adults (e.g., Breslau et al. 1995, Cole et al. 1998, Kovacs et al. 1989, Lewinsohn et al. 1995b). Prepubertal anxiety disorder precedes recurrent major depression across generations in high-risk families (Warner et al. 1999).

Rumination in childhood can be an important link between early anxiety and later depression, as rumination is likely to be present before depression develops. Rumination involves worry and perseveration, and a focus on one's inner state, and may begin in childhood as anxiety and worries develop. Rumination can magnify problems, heighten physiological arousal, and eventually create depression. Corumination with friends can further exacerbate anxiety. In a study of children from middle childhood to mid adolescence, corumination (excessively discussing problems with friends) predicted depressive symptoms six months later in girls only (Rose et al. 2007). Because girls coruminate more than boys do but also have higher-quality friendships than nonruminators, their depression may be overlooked owing to their apparent social skills and supports.

Not all depression is preceded by anxiety, and anxiety does not always lead to depression. But the pathway from anxiety to depression occurs with sufficient regularity

to postulate that anxiety often plays an etiologic role. Because girls develop depression more often than boys and have earlier (and comorbid) anxiety, girls experience this pathway more often. In conjunction with stressful, traumatic events, depressive episodes may be precipitated in biologically predisposed (e.g., anxiety-prone) individuals (Post et al. 1996). Goodwin & Jamison (1990) further argued that depression appearing unexpectedly in young adults originates in early environmental trauma to create biological vulnerability. Repeated exposure to psychological stress over time may sensitize children so that later even brief exposures to similar (or milder) stressors could induce depression.

Rudolph & Flynn (2007) tested the stress-sensitization model in a short-term longitudinal study on predictors of depressive symptoms in adolescent boys and girls. Exposure to childhood adversity, in the form of disruptions in critical interpersonal relationships, lowered thresholds for depressive reactions to recent interpersonal (but not noninterpersonal) stress for pubertal girls but not for pubertal boys. In another study, adolescent males and females with both greater exposure to childhood adversity and a history of anxiety disorder displayed increased depression severity following low levels of episodic stress compared with youths with only one or neither of these risk factors (Espejo et al. 2006). Although findings did not differ by gender, the model is particularly germane to females, given their higher rates of early anxiety, comorbidity, and later depression.

In summary, childhood anxiety, sometimes in conjunction with other risk factors more common to girls, may provide a pathway to later depression.

COMORBIDITY OF CONDUCT PROBLEMS AND DEPRESSION

Although a substantial comorbidity exists between conduct problems and depression, most research still does not consider them both within the same research design.

Future research on comorbidity should address (Kopp & Beauchaine 2007), from a developmental and a gender-based perspective, (a) whether CD and depression result from a common latent trait, (b) whether depression is primary to CD in comorbid cases, (c) whether CD is primary to depression in comorbid cases, and (d) whether comorbidity represents two unique disorders or a separate disorder.

To complicate matters further, the comorbidity rates are substantially higher for girls than boys. Moreover, not only are girls much less likely than are boys to engage in antisocial, physically aggressive behavior during childhood and adolescence, but also when they do aggress, they are more likely to be depressed and anxious. This is known as the "gender paradox of comorbidities" (Loeber & Keenan 1994) and is related to the "selective female affliction" phenomenon (Eme 1992), whereby in childhood girls have fewer psychiatric disorders than boys have, but when girls do have disorders, they are more severely afflicted.

We review five recent studies of comorbid antisocial behavior and depression that illustrate sex differences. Some focus more broadly on externalizing and internalizing problems, but the approaches can readily be applied to the study of more specific problems. Wiesner & Kim (2006) identified different types of co-occurring delinquency and depressive symptom trajectories for adolescent boys and girls from a large community-based sample. Consistent with several other studies, they found (a) some similar risk factors for boys and girls, and (b) higher comorbidity for girls than boys. In addition, using a person-centered analytic approach, they identified sex differences in linkages; delinquency was more predictive of depressive symptoms than vice versa for boys, whereas delinquency and depression were mutually predictive for girls.

Compton et al. (2003) examined a dual coercion model of family processes associated with the development of antisocial and depressive behavior during adolescence in an at-risk sample. Involvement in coercive family

and sibling interactions increased risk for antisocial behavior in both boys and girls, but it increased risk for depression only in girls. Coercive family interactions may place girls in double jeopardy and serve as a common pathway for comorbid conduct problems and depression.

Relational aggression and internalizing problems are comorbid in both boys and girls in middle childhood (Murray-Close et al. 2007). However, girls' but not boys' relational aggression increased over time, and increases in friends' intimate exchanges were associated with increases in relational aggression for girls. Relational aggression often occurs in the course of intimate relationships, and disclosure provides fodder for relational aggression. Intimacy has benefits but can increase vulnerability to rejection and depression, since rejection sensitivity is an aspect of depression.

In other work, preschool children with conduct problems (and comorbid depression/anxiety) showed more conduct problems by adolescence than did controls. With respect to depression/anxiety, however, only girls with conduct problems showed an increase in adolescence compared with boys and low-risk children (Zahn-Waxler et al. 2005a). Thus, young girls who are oppositional and antisocial may represent another, different subgroup of girls at disproportionate risk for later depression/anxiety.

New analytic approaches are needed to understand the different implications of comorbid conduct problems and depressive symptoms of boys and girls. One new technique considers separately the severity of comorbid externalizing and internalizing problems (i.e., their combined influence) and the directionality of these problems (i.e., the preponderance of one set of problems over the other). The differential influence of maternal depression and family discord on the directionality of boys' and girls' comorbid problems is seen very early in development (Essex et al. 2003). Infant boys of depressed mothers had a preponderance of internalizing problems but shifted to a preponderance of externalizing

problems at clinical levels if later exposed to marital conflict during the toddler/preschool period. For girls exposed to marital conflict during this later period, their earlier preponderance of internalizing problems increased to clinical levels. This was a low-risk sample, which highlights the impact of early childhood adversity and the utility of a stress-diathesis model in revealing different directionalities for boys and girls.

THEORETICAL CONSIDERATIONS AND FUTURE DIRECTIONS

This overview of research on the development of conduct problems and depression indicates differences in types, rates, antecedents, correlates, trajectories, comorbidities, and consequences of these problems for girls and boys. It also shows many similarities for boys and girls. Developmental models that allow for different parameters for males and females when genetic and environmental factors implicated in psychopathology are examined will help to elucidate both the similarities and differences.

Few overarching theories attempt to explain male-preponderant and female-preponderant disorders, across the range of disorders. Most theories focus on risk factors pertinent to a particular disorder. Here we review and expand upon approaches used to explain sex differences that span a range of problems. We consider (*a*) the roles of inhibition and disinhibition, (*b*) delayed neural maturation and advanced neural maturation, and (*c*) ways in which socialization and other environmental factors may alter biological predispositions. One common set of findings throughout this review concerns sex differences in emotion regulation, self-control, impulsivity, and social sensitivities. On average, boys are less able than are girls to inhibit negative behaviors, control impulses, and suppress frustration/anger, whereas girls are more socially attuned, restrained, and able to regulate emotions than boys are, starting

early and across development. Disinhibition is a common denominator in many of the psychiatric problems, including externalizing psychopathologies seen more often in boys than in girls. In contrast, inhibitory processes are associated with internalizing problems seen more often in girls than boys.

Bjorklund & Kipp (1996) proposed that inhibition mechanisms evolved from the need to control social and emotional responses in small groups of humans for the purposes of cooperation and group cohesion. The pressures to inhibit inappropriate social and emotional responses and to create cohesion (adaptive functions) were thought to be greater on females than males, resulting in enhanced inhibition abilities for females in a range of contexts. The need for inhibition stemmed from females' roles in bearing and rearing children and greater parental investment than males. Adaptive functions of males would require them to be bold, strong, skilled in exploration, and willing to take risks, qualities related to disinhibition. It is no coincidence that so much of the play during childhood appears preparatory for differential sex roles and activities, i.e., exploration, dominance, and competition for boys versus caregiving, cooperation, and affiliation for girls. These robust sex differences in play are present through childhood.

Hypermasculinization: The Extreme Male Brain

At the extremes, both disinhibition and inhibition are maladaptive. High levels of disinhibition are said to be linked to delayed neural maturation due in part to high levels of circulating testosterone that hypermasculinize the brain early in development. Baron-Cohen (2002) has proposed a theory of the extreme male brain to explain male-preponderant disorders. This theory builds upon the conceptual work of Geschwind & Calaburda (1985), who discussed the role of an asymmetrical nervous system that included anomalous cerebral dominance and also emphasized

the role of testosterone in the intrauterine environment.

In Baron-Cohen's theory, which focuses on autism but is more broadly construed to cover other male-predominant problems, delayed neural maturation increases the probability of certain kinds of problems associated with behavioral, motor, social, and emotional disinhibition, e.g., sexual attacks, compulsions, physical violence and brutality, tics, and problems in social communication and understanding emotions. Although Baron-Cohen's theory emphasizes the role of testosterone, other hormonal or genetic complements may also be lacking (Insel et al. 1999, Koenig & Tsatsanis 2005).

According to Baron-Cohen (2002), sex differences in autism reflect the extreme ends of the sex dimorphism in functions of empathizing and systematizing. Although both are present in both sexes, males show relatively more systematizing and interest in inanimate objects, while females show more interest in the interpersonal, social realm. Frequent interests and behaviors more common to children with autism and Asperger's syndrome (e.g., focus on detail, mathematics, mechanics, and science) represent an extreme on the systematizing dimension of the male brain and a relative absence of empathizing broadly defined (e.g., perspective taking, concern for others, communal activities, close dyadic relationships). Notably, empathizing is diminished in other disinhibitory disorders more common in boys than in girls (e.g., conduct problems and psychopathy).

The extreme male brain theory groups different disorders and symptoms into one unifying framework. It does not, however, explain why a given hypermasculinized child is more likely to develop one type of disinhibitory problem (e.g., autism) than another (e.g., conduct disorder). A necessary expansion to the theory involves identification of other constellations or patterns (besides systematizing) to characterize other disinhibitory problems more common to boys than girls. Another constellation relevant to hypermasculiniza-

tion and delayed maturation can be proposed for conduct problems. This constellation includes physical aggression, daring/risk taking, impulsivity, anger proneness, and low frustration tolerance, which in the extreme are reflected in conduct problems.

Hyperfeminization: The Extreme Female Brain

Extreme brain theories to date have focused only on male-preponderant disorders. Baron-Cohen (2002) suggested that there may be an extreme female brain but that it is not relevant to psychopathology. The prototypic person would be highly empathic but deficient in object-related skills. Such a person (more often female) would be good at organizing and making sense of the social world. In this view, because one can function in society even with minimal object-related skills, these individuals would not be at risk.

Our theoretical arguments and review of the literature suggest otherwise (Zahn-Waxler et al. 2006). In childhood and adolescence, high empathy, prosociality, and caregiving in girls, particularly in dysfunctional environments (e.g., parental depression, marital conflict), carry risk for anxiety and depressive symptoms. Other qualities more common to females than males also have been linked to these internalizing problems. Many of them are part of a feminine role orientation, e.g., being unaggressive, unassertive, submissive, and uncertain of one's own worth, which is also reflected in dependence on others for self-definition. Although these qualities become more common in adolescence, they can be seen before then. Similarly, the higher levels of internalizing emotions in girls than boys (i.e., anxiety, guilt, shame, and sadness) also may be harbingers of a subsyndromal depressive orientation. Many of these qualities are the opposite of disinhibition and may reflect a hyperfeminized brain.

An extreme female brain theory would focus on the role of behavioral, motor, social, and emotional inhibition in disorders and

problems seen in both females and males, but more often in females. Inhibitory problems would include unipolar mood disorders (depression), anxiety disorders and eating disorders, as well as corresponding subclinical syndromes (also see Brizendine 2006, Cahill 2005, Heller 1993). Female-preponderant disorders may in part have their origins in early neural maturation of the brain. Most theory and research on brain maturation emphasizes the deleterious consequences of extreme delayed maturation for problems more common to males. An important next step is to examine the role of advanced physical and neural maturation for problems more common to females. Advanced maturation may result from hormonal variations at two points in development. One is puberty, where sex differences become accentuated and early maturers are at the greatest risk. Another is in the prenatal and infancy period for children with very low testosterone and other possible biological abnormalities.

It is beyond the scope of this review to develop a female brain theory that involves extreme feminization, but we provide a starting point. During brain maturation, protracted development is thought to maximize neural plasticity and allow individuals to develop in line with particular constraints of their early and concurrent environment (Andersen 2003). If the environment is too constrained or the child develops too quickly, plasticity may be reduced, leaving the child poorly prepared for later environmental shifts. Early puberty, particularly in girls, is a prime example of how early maturation makes it difficult to adapt to a completely new social world (Ellis 2004).

Similarly, Bjorklund (1997) argues that in humans immaturity plays an adaptive role in development: It takes an extended childhood to acquire all that must be learned in order to function in society. Because brain growth continues well into adolescence, neuronal connections continue to be created and modified; this plasticity of the brain is thought to create protection from overstimulation. One fac-

tor that may contribute to overstimulation is heightened exposure and responsiveness to a social environment that provides constant information about emotions and intentions of others and about the self in relation to others. Precocious social awareness and sensitivity (a likely result of early maturation) in conjunction with an anxious temperament would contribute to greater self-reflection and possible dwelling on emotional experiences and circumstances. When experiences are negative, children (more often girls than boys) form negative emotional memories that provide grist for rumination and internalization of distress.

Yurgelun-Todd and colleagues (Rosso et al. 2004, Yurgelun-Todd & Killgore 2006), who study links between adolescent emotions and brain development, focus on frontalization or the development of the prefrontal cortex, which is associated with improvements in cognitive control and behavioral inhibition. They found that as the prefrontal cortex matured, youths developed better judgment and impulse control, but they also became more prone to social anxiety. Adolescents' growing ability to think abstractly outside of themselves allows them to make inferences about others' thoughts and feelings. But this same capacity also can give rise to increased social self-consciousness and more worry about what other people think about them.

The more rapid maturation of the frontal cortex in girls than boys suggests that (*a*) very early brain maturation will hasten the tendency to internalize distress, (*b*) heightened awareness of self in relation to others is part of this process, and (*c*) girls will be more vulnerable than will boys. Viewed another way, Bjorklund argues that egocentrism, the inability to take others' perspectives (which is part of immaturity), can have an adaptive function. Although it may hamper social responding, a lack of social awareness may leave children less vulnerable to prematurely taking on responsible roles in society. The first society that young children experience is the family environment. If boys are more unaware of and

unaffected by the family climate, this greater egocentrism could protect them from early negative experiences, at least for internalizing symptoms.

Neurological differences with respect to brain maturation also include hemispheric lateralization, with delayed maturation hypothesized to be associated with left cerebral dominance. Is there a corresponding right frontal asymmetry associated with early maturation? Although this is clearly an oversimplified notion, substantial evidence supports differential brain activation for different emotions: Left frontal activation is associated with positive affect; right frontal activation is associated with internalizing/inhibitory emotions (fear/anxiety and depression) (Davidson et al. 1990) more common in females than in males. The meta-analytic review by McClure (2000) indicated a right brain advantage for females in processing emotional cues. This advantage may overstimulate the early-maturing child in an emotionally adverse family climate, who begins to dwell on the self in relation to a negative world.

Nelson and colleagues (2004) provide a neuroscience perspective on the social re-orientation of adolescence that considers links between developmental alterations of the brain, environmental transitions, and the emergence of mood and anxiety disorders. They have proposed that neural substrates of self-referential and self-reflective thinking may be coactivated with brain regions that organize affective responding in anxious individuals. The combined network of neural activity may ultimately result in enduring low self-evaluation that becomes part of the depressive experience (Guyer et al., unpublished manuscript). Heller (1993) has proposed that the higher rate of depression in females may be affected by coping strategies such as rumination that produce certain cognitions to influence neurophysiological mechanisms underlying mood, in part by activating particular regions of the brain. These processes may begin in childhood.

Environmental Considerations

Extreme brain theories that focus on masculine and feminine qualities provide a starting point for understanding sex differences in psychopathology. But they do not take into account the importance of the environment. Without significant expansions, such theories can contribute to stereotypes, prejudices, and even caricatures of sex differences, e.g., most males are uncaring, socially opaque, and aggressive, and most females are weak, emotionally vulnerable, and unassertive.

None of the qualities considered in the discussion above as reflecting maleness or femaleness are inherently positive or negative. Their adaptive versus problematic nature will be determined by whether they help or hinder the functioning of the individual and their contextual appropriateness. Whether they will be risk or protective factors also depends upon the type of problem the child is more likely to develop—for environmental as well as genetic reasons. There are tradeoffs or costs and benefits at play. Qualities more common to girls make them less likely to injure others physically, but they also create risk for depression if relationships are threatened or social needs unmet. Qualities more common to boys may make it easier for them to succeed in competitive environments, but also easier for them to hurt and take advantage of others. The problems considered above are likely to result from different constellations of biologically based child qualities in conjunction with different stressful environmental adversities.

This review provides many examples of childhood adversities and environmental stressors that have a differential impact on males and females. This research is in early stages; few, if any, studies include measures of neural, hormonal, and other physiological processes to see how they interact with childhood adversities or concurrent stressors in ways that might differ for boys and girls. Stress-diathesis models that include both biological and environmental measures provide a

means to test biosocial interactions that may differ for males and females. These models now include several possibilities: (*a*) stress amplification, whereby early adversity leads to later problems when individuals experience high levels of stress; (*b*) stress sensitization, whereby early adversity sensitizes the individual such that low levels of later stress will lead to problems; and (*c*) stress inoculation, whereby individuals are relatively unaffected by later stressors as a result of early experiences with moderate stress.

In addition to the childhood adversities considered above, less harmful and more subtle childrearing practices may inadvertently steer boys and girls in directions consistent with underlying predispositions. Parents are known to treat boys and girls differently in terms of the behaviors they model, the kinds of training and instruction they use, the opportunities and resources they provide, and the ways in which they monitor and manage their children's activities (Leaper 2002). Parents are more likely to foster autonomy in their sons than in their daughters; they also show greater physical affection to daughters than to sons, in ways that are likely to foster interpersonal closeness. Parents discuss more emotional experiences and focus on different emotions with their daughters than with their sons (Leaper 2002). From a young age, girls are seen as more fragile and dependent and are therefore more protected and socialized to be dependent on interpersonal relationships (Gurian 1987, Hill & Lynch 1983). Girls more often than boys are treated in ways that discourage anger, assertion, and physical aggression (Zahn-Waxler et al. 2006).

Parents discourage exploration of the physical environment more often in girls than in boys (see review by Siegal 1987), thus limiting girls' opportunities to deviate and heightening their exposure to the socializing influences of the family. Parents use more power-assertive discipline and physical punishment with boys than with girls (see review by Lytton & Romney 1991), which have been equated with harsher treatment of boys and

are known to be ineffective. But parents are harder on their girls in other ways, including greater pressure to anticipate the consequences of their negative acts and to restrain from doing harm, practices that encourage internalization of responsibility and conscience.

Although the family plays a predominant role in children's early development, as children reach school age and beyond, the nature of peer groups and peer rejection plays an increasingly important role. Boys and girls also are more influenced over time by the ways in which they are viewed and treated by society, institutions, and the media. Although these factors are unlikely to cause psychiatric disorders, they can exacerbate existing problems (e.g., cultural ideals for thinness and body-objectification for girls).

Methodological and Analytic Considerations

Our review is confined mainly to problems studied in sufficient numbers of both boys and girls. There is still little research on girls with ADHD or autism, although this is starting to change. Some disorders show such a strong preponderance in one sex that comparative studies seem unlikely (e.g., eating disorders are seen almost exclusively in girls). Even with depression studies, where males typically have been included from the onset, research is not designed to consider factors that may be more relevant to male depression.

In general, our review yields more findings about sex differences and interactions relevant to depression (and anxiety as a precursor) than to conduct problems. It is too early to assume that this pattern will continue as more gender-relevant data accumulate. There is a more established research history on depression in both boys and girls than for conduct problems. Not only were fewer gender interactions found for conduct problems than depression, but they were notably absent for biological processes. Yet we would expect differences in patterns for boys and girls in this area, given the marked sex differences in testosterone and

the role it plays in brain development. This issue awaits further research.

The study of sex differences in psychopathology requires examination of the moderating and mediating roles of sex in statistical analyses. When interactions are considered (e.g., does a putative etiologic factor predict problems exclusively or more strongly for one sex?), traditional statistical approaches pose limitations. Several statistical experts (e.g., McClelland & Judd 1993) have emphasized the difficulties inherent in detecting moderators in field research, indicating that even weak or modest interactions are noteworthy. That interactions often emerge despite these analytic problems requires caution in prematurely assuming equivalences for males and females.

Because the formal study of sex differences and psychopathology is very recent, we do not yet have many state-of-the-art measures of biological and environmental antecedents or of the different forms of psychopathology. Within disorders, problems vary in terms of subtypes, severity, and forms of expression. These differences are not yet well represented in the research on gender. Our generalizations are based on studies of problems at subclinical as well as clinical levels. We need to know more about whether the differences identified hold at the different levels of severity.

Future research needs to address the fact of high comorbidity between disinhibitory disorders and inhibitory disorders. One approach would be to unpack the overall concordance by taking a person-oriented analytic approach that distinguishes meaningful subgroups, e.g., for purposes of the present review, conduct problems only, depressive symptoms only, comorbid where conduct problems predominate, comorbid where depressive symptoms predominate, and comorbid problems with an equal mix of symptoms.

We have focused on problems associated with masculine and feminine orientations that are tied to male-preponderant and female-preponderant disorders and symptoms. The

former are said to begin in childhood, the latter in adolescence. This ignores other possibilities that require study, e.g., (*a*) early onset of problems in girls, (*b*) late onset of problems in boys, (*c*) early signs of problems in both boys and girls that go unnoticed for several years, (*d*) factors that contribute to individual differences within groups of boys and girls, and (*e*) factors that contribute to gender-atypical problems, i.e., what causes boys to become depressed and what causes girls to become antisocial?

CONCLUSIONS

Increasingly, researchers and clinicians have come to recognize the implications of differences in the kinds of problems more common to males or females as early as childhood. This understanding is relevant to both (*a*) advancing theories about the etiology of different disorders (Rutter et al. 2003), and (*b*) identifying and developing different treatments (Brizendine 2006, Cahill 2005). Child and adolescent treatment studies of different disorders reveal that girls are more responsive than are boys to a range of psychotherapeutic treatments (Gillham et al. 2006, Weisz et al. 1995). Effective psychosocial treatments can be construed as positive environmental experiences that reduce symptoms and increase adaptive functioning. Well-designed intervention research could yield information about (*a*) processes implicated in differential effectiveness of treatments for boys and girls, (*b*) how treatments might be tailored as a function of gender, and (*c*) how risk and protective factors operate in children's lives.

Children do not enter this world with psychiatric disorders. However, many do begin to show social, emotional, cognitive, biological, and/or behavioral dysfunctions that reflect extremes of normative patterns quite early in life. Therefore, it is important to understand these dimensions of children's lives as precursors, moderators, and mediators of the different types of problems boys and girls develop. Research will need to focus on

interactions of biological predispositions and life experiences, both positive and negative, to understand why boys and girls differ in both their strengths and susceptibilities.

DISCLOSURE STATEMENT

The authors are not aware of any biases that might be perceived as affecting the objectivity of this review.

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Errata

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