It is not uncommon for youngsters to test the limits of authority and break the rules set for them, and so it may seem, as Socrates proposed, that “all youth are reckless.” This generalization is a myth, however, because the majority of children and adolescents develop in positive and socialized ways. It is uncommon for children and adolescents to engage in serious rule-breaking repeatedly. It is this small percentage of children, approximately 2% to 6% of the general population, that is of particular concern.¹

The antisocial behavior of these children tends to remain stable over time and lead to myriad associated problems such as physical injury, academic underachievement, peer rejection, exacerbated family conflict, and psychopathology. Moreover, this small number of children contributes to a disproportionately large number of antisocial acts. For example, statistics indicate that approximately 50% of all violent crimes in the United States are perpetrated by 5% of the child and adolescent subpopulation.²

A similar pattern of antisocial behavior in children has been identified in psychiatric literature and is called conduct disorder. Conduct disorder reflects a repetitive and persistent pattern of behavior in children and adolescents that violates the rights of others. Prevalence rates range from approximately 6% to 16% for boys and 2% to 9% for girls in the general population of children and adolescents. Criteria for the disorder, as defined by the Diagnostic and Statistical Manual for Mental Disorders, fourth edition (DSM-IV),³ include an array of behaviors in four general categories: aggression toward people and animals, property destruction, deceitfulness or theft, and serious rule violations.

Conduct disorder is further broken down into two types, childhood-onset and adolescent-onset, based on the age of symptom onset. Childhood-onset represents those children for whom at least one symptom appears before age 10. Adolescent-onset represents those for whom no symptom is present before age 10. This typing is based on studies on development of antisocial behavior from childhood to adulthood, which suggest a better prognostic picture for the patient with adolescent-onset type.¹

FOCUS ON PSYCHOPHYSIOLOGY

For the remainder of this article, we refer specifically to children and adoles-

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**Eduational Objectives**

1. Recognize that serious and chronic conduct problems in youth are partly symptomatic of an underlying biological dysfunction.
2. Discuss psychophysiological relationships to conduct problems in children and adolescents.
3. Assess theories and the evidence that explains the relationship between psychophysiological underarousal and childhood misconduct.
When discussing the psychophysiology of child misconduct, it becomes important to understand how such behavior changes from a developmental perspective.

trol of the child and may be viewed as a handicap or learning disability that the child must struggle to overcome.

A growing body of literature suggests biological differences may predispose a person to antisocial behavior. These include a wide range of findings on genetics, biochemistry, neuropsychology, brain imaging, and psychophysiology. These factors often interact with environmental events in a dynamic interplay. This article focuses on one area of biological influences on child antisocial behavior—psychophysiology. Psychophysiology involves the study of cognitions, emotions, and behavior as related to physiological principles and events (i.e., the mind-body relationship), typically using noninvasive measures. This article reviews the major psychophysiological findings and theories regarding antisocial behavior in children and adolescents, with a specific focus on heart rate, skin conductance (SC), and electroencephalogram (EEG) measures.

Because antisocial behavior encompasses a wide range of behaviors and diagnoses, not all studies have determined the existence of conduct disorder in the participants. Other constructs that have been studied are childhood aggression, violence, and delinquency. Studies of delinquency include acts ranging from vandalism to murder. Studies of aggression and conduct disorder include behaviors that are not necessarily illegal (e.g., lying, slapping, pushing) or individuals who have never been charged with or convicted of a crime. The psychophysiological findings reviewed in this article are in relation to any of these antisocial expressions. As such, they can be considered pervasive across many different kinds of child misconduct, but also increasingly need to be clarified.

A DEVELOPMENTAL PERSPECTIVE

When discussing the psychophysiology of child misconduct, it becomes important to understand how such behavior changes from a developmental perspective. A longitudinal study of inner-city children and adolescents was designed to track profiles of children as they progress toward serious juvenile delinquency. A primary conclusion from this work is that these children begin with minor behavior problems in early childhood that develop into more serious problems in later childhood and adolescence. More specifically, the study identified three developmental pathways to delinquency from childhood to adolescence. In the first pathway, the authority-conflict pathway, children exhibit stubborn behavior followed by defiance, such as refusal and disobedience followed by authority avoidance including truancy from school, running away from home, and staying out late. In the covert pathway, children escalate from minor concealed behaviors, such as shoplifting or frequent lying, to property damage and more serious property crimes, such as burglary and theft. In the overt pathway, children progress from minor expressions of aggression (e.g., annoying, bullying others) to increasingly serious physical fighting and finally to violent acts such as assault and rape. While many children exhibit the described minor behavior problems in early childhood, only a small proportion of children will progress to more serious levels.

Developmental studies such as this one help clinicians understand the progression of child misconduct and remind them that serious antisocial behavior does not develop spontaneously. Rather, these children display a chronic course of misconduct with warning signals from early in development.

A similar conclusion was drawn by Moffitt in a study on developmental course of delinquent behavior. Two clusters of children and adolescents were identified and used as the basis for the childhood-onset and adolescent-onset typology for conduct disorder described in DSM-IV. These groups of antisocial children and adolescents were termed "life-course persistent" and "adolescence-limited," respectively. Life-course persistent antisocial behavior begins in childhood and persists to adulthood. The children and adolescents in this group account for approximately 7% of the general population. These children are more likely to be aggressive, drop out of school, and have comorbid attention-deficit/hyperactivity disorder, neuropsychological problems, and family conflict. Adolescence-limited antisocial behavior, however, begins in adolescence and does not persist. It is reported in 20% to 60% of all adolescents and therefore is more common, involves less aggressive offenses, and is primarily associated with the adolescent's influence by deviant peers.

In summary, the work of Loeber suggests that child misconduct starts early and progresses to more serious transgres-
sions in a small proportion of children. 

The work of Moffitt1 also identified a subset of antisocial children and adolescents who display a chronic pattern of misconduct throughout their lives. The relevance of these developmental findings to the study of psychophysiology is the implication that biological risk factors, when present, are especially connected to early-onset, life-course–persistent antisocial behavior. In support of this notion, low resting heart rate, one of the best-replicated psychophysiological findings in antisocial youth, has been found particularly in those in the life-course–persistent category.11 Another implication is that because a life course of antisocial behavior often begins with relatively minor transgressions, the majority of findings in young children will operationally reflect milder forms of antisocial behavior (e.g., mild aggression, oppositionality, disruptiveness), although these milder forms of behavior should and do predict more serious behavior in longitudinal studies.12

PSYCHOPHYSIOLOGICAL FINDINGS IN CHILD MISCONDUCT

As mentioned previously, psychophysiology is defined as the study of relationships between physiological measures with psychological states and processes. The most common measures in the study of antisocial behavior have been electrophysiological, cardiovascular, and cortical. These measures are particularly relevant to psychological interpretations of behavior because they are connected to concepts such as learning, cognition, emotion, and arousal.

Theoretical Interpretations

The psychophysiological findings detailed in this article generally indicate reduced electrophysiological, cardiovascular, and cortical arousal functioning — the physical reaction associated with alertness and the fight-flight response — in disruptive children. The causal explanation for this primary finding is yet unknown. Several theories have been suggested, however, and they need not be viewed as mutually exclusive.

One theory links reduced arousal levels with poor socialization to punishment. Eysenck13 argued that the socialization process and development of a conscience stem from a set of classically conditioned, negative emotional responses to situations that have previously led to punishment. In this way, socialized individuals develop a feeling of uneasiness at even contemplating antisocial behavior, presumably because such thoughts elicit representations of punishment earlier in life. Furthermore, arousal levels are related to conditionability; low levels of arousal predispose to poor conditionability and high levels to good conditionability. Thus, psychophysiological underarousal represents a lack of anticipatory fear to mild or moderate stressors, leading to poor socialization from punishment or reduced effectiveness of conditioning.

On a related note, autonomic underarousal may reflect a disinhibited temperament. Kagan14 reported on two styles of temperament, inhibited and uninhibited, based on a tendency to withdraw or interact consistently during a wide variety of novel experimental situations. Uninhibited children are especially bold or fearless in novel situations. This tendency has been found to be relatively stable from age 21 months to 8 years. Inhibited children have heightened and more stable heart rate relative to uninhibited children. Thus, reduced autonomic arousal in infancy may predispose to exploratory behavior and a disinhibited or bold temperamental style that can predispose to later externalization of behavior problems, including aggression and hyperactivity. Consistent with this possibility, a series of studies in a sample of children from Mauritius reported that inhibited or uninhibited temperament remains stable from ages 3 to 11. Those children with disinhibited temperaments exhibited reduced resting SC and heart rate levels relative to those with inhibited temperament,18 and low resting heart rate at age 3 predicted aggression at age 11.

Another theory suggests the relationship between arousal and functioning follows an inverted-U shape: there is an optimal level of arousal at which an organism functions best and feels most comfortable,20 but at low or high levels, functioning and comfort decrease. Thus, at these suboptimal levels, patients will attempt to restore themselves to an optimal level of functioning. It is theorized that chronic levels of underarousal will lead to stimulation-seeking behavior in an attempt to raise arousal levels to optimal states. Stimulation seeking, in turn, predisposes to risk-taking behavior and a greater likelihood of associated antisocial behavior.21 Related to these three theories, findings indicate that both fearlessness and stimulation-seeking at age 3 predicted aggressive behavior at age 11.

Others have theorized that chronically antisocial people are characterized by high vagal tone, which Venables22 termed “vagotonia.” Vagotonia is defined as a predominance of parasympathetic relative to sympathetic autonomic nervous system activity caused by parasympathetic activity being primarily mediated by the vagus nerve. The parasympathetic system has a restorative, adaptive function that allows the organism to recover from activating and stressful experiences. Normally, it is associated with a passive coping response
to mildly stressful situations, which would prepare an organism for disengagement and inactivity in a threatening situation. Because of its parasympathetic influence, high vagal tone is also thought to reflect emotion-regulation capacity because an individual is able to self-soothe when experiencing a strong emotion.\textsuperscript{24,25} It is hypothesized, however, that such passive emotional withdrawal, increased control of emotionality, immobilization, and resulting muscular relaxation may attenuate painful experiences, which again may lead to an insensitivity to socializing punishments.

In addition, it has been speculated that underarousal reflects specific deficits in brain structure and functioning.\textsuperscript{4} Frontal areas of the brain, in particular, have been linked to reduced SC activity,\textsuperscript{26} and it has been suggested that prefrontal brain dysfunction possibly underlies the reductions in SC activity found in antisocial samples.\textsuperscript{27} Thus, even in the absence of visible lesions, some subtle impairment in frontal lobe functioning may lead to antisocial behavior by interrupting fear conditioning, autonomic arousal regulation, emotional control, and executive cognitive functioning (eg, planning, decision making, consideration of future consequences to guide behavior). Damasio\textsuperscript{28} has termed this “acquired sociopathy.”

**Heart Rate and Child Misconduct**

Heart rate reflects both sympathetic (ie, activation) and parasympathetic (ie, conservation) nervous system activity. It can be measured both tonically, using the beats per minute at rest, or phasically, using change in response to a stimulus. As described previously, tonic heart rate may reflect fearlessness or disinhibition\textsuperscript{16,18} or a pattern of stimulation-seeking behavior.\textsuperscript{21} One of the best-replicated psychophysiological findings is that of reduced resting heart rate in disruptive and antisocial youth. In his review of this topic, Raine\textsuperscript{4} noted that of 14 relevant studies, there were no failures to replicate the finding of reduced-resting heart rate in antisocial groups.

Low heart rate is a robust marker independent of cultural context, with the relationship having been established in England,\textsuperscript{29} Germany,\textsuperscript{30} New Zealand,\textsuperscript{11} the United States,\textsuperscript{31} Mauritius,\textsuperscript{19} and Canada.\textsuperscript{32} It is also diagnostically specific and multiple potential confounding factors have been controlled.\textsuperscript{19} Furthermore, in a recent study of childhood aggression, a negative relationship was found between heart rate and proactive (ie, goal driven), but not reactive (ie, defensive, impulsive), forms of aggression,\textsuperscript{33} suggesting heart rate underarousal may be specific to unemotional and instrumental displays of aggression.

When measured phasically, accelerations in heart rate to a stimulus are thought to reflect sensory rejection or “tuning out” of noxious environmental events, while decelerations are thought to reflect sensory intake or an environmental openness. As such, accelerations in heart rate in response to a stimulus are considered defensive responses and decelerations are considered orienting responses. One prospective study found that reduced heart rate and SC orienting to neutral tones in adolescents predicted a later criminal outcome.\textsuperscript{11} The pattern of heart rate and SC-orienting deficits in future criminals may reflect a general failure to allocate attentional resources to stimulus processing, especially if the stimulus is not very interesting, which is consistent with theories of frontal or neuropsychological deficits.\textsuperscript{34}

Another cardiovascular measure that is gaining popularity is heart rate variability (HRV), which is the normal variation in interval that occurs between heart beats as a function of respiration. Whereas heart rate has both sympathetic and parasympathetic influences, HRV is vagally mediated and controlled primarily by the parasympathetic branch of the autonomic nervous system. In other words, the parasympathetic nervous system helps to slow the heart, which creates more beat-to-beat variability in HR. As such, high HRV is a reflection of vagotonia and thought to reflect emotion regulation capacity.\textsuperscript{24} Contrary to theories of vagotonia, however, the few studies of HRV in children have shown inverse relationships between antisocial behavior and HRV. These studies indicate that reduced HRV, and therefore decreased vagal tone, is related to increased levels of aggressive behavior in boys exposed to marital conflict,\textsuperscript{28} externalizing behavior in younger brothers of adjudicated delinquents,\textsuperscript{35} and a composite of antisocial behavior in inner-city male adolescents.\textsuperscript{32}

The inconsistency in findings between low tonic heart rate and decreased HRV is difficult to reconcile. One possibility is that findings differ according to the kind of antisocial behavior that is assessed. For example, in a previous review, it was argued that autonomic underarousal is related primarily to proactive displays of aggression that are relatively unemotional and instrumental in nature, while autonomic overreactivity is related to reactive displays of aggression that are more emotional and impulsive in nature.\textsuperscript{6} Thus, low heart rate may characterize primarily proactive aggression, while decreased HRV may characterize primarily reactive aggression. This would be consistent with the theory that decreased HRV is a reflection of decreased emotion regulation ability and consequent difficulties with self-control and negative emotionality.\textsuperscript{24}
Two recent studies support this possibility. In an unselected sample of children and adolescents from a metropolitan area, decreased HRV was found to be related to poor impulse control in boys. In a study designed to examine reactive and proactive childhood aggression, low heart rate and increased HRV were found to be specifically related to proactive aggression, suggesting that vagotonia may reflect a style of aggression that involves a high degree of emotional control.

In summary, while some types of childhood misconduct may be related to underarousal, others may be related to deficient emotion-regulatory capacity associated with high negative affect.

**Skin Conductance (SC) and Child Misconduct**

SC measures the electrical conductance of a small current that is passed through two electrodes, usually placed on the hand, as sweat rises in the glands. As with heart rate, SC can be measured both tonically and phasically. Typical tonic measures of SC include SC level and the number of nonspecific SC fluctuations. Nonspecific SC fluctuations are changes in SC that look like phasic orienting responses but do not occur in response to a known stimulus. Both SC level and nonspecific SC fluctuations are thought to reflect a baseline level of physiological sympathetic arousal and often have been associated with fear emotions in the fight-or-flight response.

With regard to SC underarousal, both SC level and nonspecific SC fluctuations have been found to be reduced in antisocial groups in a number of studies, although this has not been consistent. The findings are primarily found in institutionalized subjects with mild forms of aggression or other antisocial behavior. However, the findings seem to predict later institutionalization. For example, in a study of children with behavior disorders, low SC level measured at age 11 predicted institutionalization at age 13. Furthermore, findings of a reduced number of nonspecific SC fluctuations at age 15 predicted criminal behavior 9 years later. Raine and colleagues suggested that this pattern, along with low resting HR, reflected autonomic underarousal in future criminals. More recently, a study of 335 boys from the community who self-reported with serious delinquency found this classification was characterized by low SC level measured at age 16, consistent with the notion of reduced SC arousal in antisocial boys. Findings of reduced SC activity may be specific to children with conduct disorders who display a pattern of callous, unemotional traits.

Regarding phasic SC activity, changes in the electrical activity of the skin generally occur in response to the presentation of novel stimuli in an environment. For example, the presentation of a new tone generally causes an orienting response that is accompanied by increased electrical activity in the skin, and thus, a change in levels — the SC-orienting response. This response also increases if a novel stimulus is recognized as significant and needs further processing. Thus, the SC-orienting response is a useful index of how one’s attention to and processing of novel environmental stimuli.

In his review, Raine concluded that deficits in the SC-orienting response have been observed consistently in patients who display both antisocial behavior and features of schizotypal personality disorder, which is characterized by odd behavior, interpersonal deficits, and cognitive or perceptual distortions. A more recent study supported this conclusion, finding adolescents with schizotypal tendencies who later displayed criminal behavior were characterized by reduced SC-orienting responses relative to those who were nonschizotypal or did not display criminal behavior. It seems that SC-orienting–response deficits may be specific to schizotypal criminals. Raine et al. found a significant relationship between reduced prefrontal cortex area measured by magnetic resonance imaging and fewer orienting responses in normal subjects. The finding of fewer SC-orienting responses in schizoid and schizotypal antisocial adolescents may indicate frontal dysfunction in this particular subgroup.

Other findings, however, have indicated increased SC reactivity in relation to antisocial behavior in specific contexts. For example, a study of children in second grade found reactive, but not proactive, aggression was positively related to SC reactivity as well as to angry, nonverbal behaviors in response to a frustration challenge. Also, a prospective study found reduced SC-orienting responses in 3-year-old children from high social classes were related to their aggressive behavior at age 11. This result was not found in children from low social classes.

SC has also been used to assess Eysenck’s theory that antisocial people may be characterized by poor classical conditioning. In these studies, a neutral, nonaversive tone is presented to the subject, followed a few seconds later by either a loud tone or an electric shock. The key measure is the size of the SC response elicited by the neutral, nonaversive tone after a number of pairings of the neutral tone with the loud tone and the neutral tone with the shock. Reduced SC conditioning seems to be one of the
strongest SC findings to date relative to antisocial populations. Hare and Raine collectively reported this finding in 19 out of 20 studies. It seems that all of these studies used adult samples, however, with the exception of one that found reduced SC conditioning in children with conduct disorder from high but not low social-class backgrounds. Thus, further studies with drowsiness and low levels of alertness, alpha is associated with relaxed wakefulness, and beta is associated with alertness and vigilance. As such, individuals with a predominance of delta, theta, or slow alpha activity would be viewed as having relatively reduced levels of cortical arousal, while those with relatively faster alpha and beta activity would be viewed as relatively more aroused.

Early studies indicated more slow-wave EEG activity in antisocial boys who were violent and institutionalized, although it was unclear if the slowing was a predictor for or a consequence of violent fights. Since then, several prospective longitudinal studies found EEG slowing in adolescence predicted later criminal offending. In addition, EEG activity localized particularly to the left frontal area was found to be inversely related to retrospective reports of antisocial personality disorder and childhood behavior problems. Consistent with the brain dysfunction theory, Volavka speculated EEG slowing in childhood reflects brain injuries obtained at various developmental stages. These subtle brain injuries, in turn, could impair the child’s ability to learn to avoid aggressive behavior and result in disinhibited behavior, especially if the injuries involved the frontal cortex.

EEGs may also be assessed qualitatively through visual inspection to determine more broadly whether results are normal or abnormal. In such clinical scoring, approximately 10% to 15% of normal subjects have abnormal EEGs; this is important when considering rates of abnormalities reported in antisocial populations. In his review, Volavka reported qualitative EEG abnormalities have been noted primarily in incarcerated or hospitalized violent adolescents but not in delinquents who were not selected for violence. Interestingly, a study of aggressive people from the community who were not incarcerated, most of whom ranged in age from 4 to 20, found an overall rate of EEG abnormalities of 6.7%, similar to the general population. This finding suggests that abnormal EEGs may pertain specifically to “unsuccessful” violent individuals, who are unable to avoid detection and thus cannot evade incarceration.

When an EEG is used to measure phasic activity, it is referred to as the event-related potential (ERP), which reflects averaged changes of electrical activity of the brain in response to specific stimuli. ERP responses typically follow a sequence of early, middle, and late components that are thought to reflect the psychological processes of environmental filtering, cortical augmenting, and attention, respectively.

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of SC classical conditioning in children and adolescents are needed.

In summary, the strongest SC finding with respect to child misconduct involves SC under arousal in terms of reduced SC levels and nonspecific SC fluctuations. This may particularly characterize callous, unemotional traits in antisocial children and adolescents, and these traits have been associated with increased stimulation-seeking. Reduced SC-orienting responses may be specific to antisocial adolescents who also have schizotypal personality features or come from high social-class backgrounds. The one finding of SC conditioning in children is consistent with the larger literature showing poor classical conditioning in relation to antisocial behavior.

Electroencephalogram (EEG) and Child Misconduct

EEG reflects the electrical activity of the brain recorded from electrodes placed at different locations on the scalp according to the standardized International 10-20 system. EEG can be broken down into different frequency components, most commonly delta (0 to 4 Hz), theta (4 to 8 Hz), alpha (8 to 12 Hz), and beta (13 to 30 Hz). EEG frequency has been aligned with a continuum of consciousness — delta is associated with sleep, theta is associated with specific psychological and physical processes in antisocial populations. Raine and colleagues conducted a series of prospective psychophysiological analyses in 15-year-old male schoolchildren for whom official records indicated a criminal offense by age 24. The first in this series indicated that, relative to noncriminal controls, the future criminals

PSYCHOPHYSIOLOGICAL STUDIES OF CRIME

Raine and colleagues conducted a series of prospective psychophysiological analyses in 15-year-old male schoolchildren for whom official records indicated a criminal offense by age 24. The first in this series indicated that, relative to noncriminal controls, the future criminals
exhibited electrodermal, cardiovascular, and cortical underarousal reflected in significantly fewer nonspecific SC fluctuations, lower resting HR, and more low-frequency EEG theta activity. This is the first study to show physiological underarousal in three independent psychophysiological response systems. In the second analysis of this series, future criminals were found to be characterized at age 15 by a reduced number of SC- and heart-rate-orienting responses to a series of 65 Db tones. Furthermore, 31% of criminals were characterized by electrodermal nonresponding — no response to any of the orienting stimuli — in contrast to a rate of only 10% in noncriminal controls. Findings from the third analysis in the series indicated significantly larger N100 ERPs to the attend stimulus in future criminals. The authors interpreted this finding as suggesting enhanced early stimulus-set attention in passive-attend situations in adolescents who would become criminals.

These prospective findings are impressive in that they generally support the SC, heart rate, EEG, and ERP findings from cross-sectional studies reported previously in one population of subjects from the same laboratory. They imply psychophysiological dysfunction in children and adolescents predate later criminal behavior and may reflect some early processes in misconduct that lead to more serious antisocial outcome.

CONCLUSIONS

A great deal of evidence has accumulated on psychophysiological correlates of child misconduct. In particular, low autonomic and central nervous system arousal has been implicated in terms of reduced resting heart rate and SC measures and increased slow-wave EEG activity. Low resting heart rate, in particular, is one of the best-replicated psychophysiological measures that characterize antisocial behavior. Evidence is most supportive of theories suggesting that such underarousal indexes a fearless, disinhibited temperament, or a tendency toward stimulation-seeking behavior, characteristics that have been found to be predictive of antisocial outcomes. Underarousal could also reflect a deficit in classical conditioning to punishment and thus interfere with the socialization process. However, evidence for reduced classical conditioning, although strong in adult antisocial populations, is lacking in child studies.

Findings of reduced SC-orienting responses in antisocial adolescents with schizotypy and EEG abnormalities localized to the frontal lobes have implicated frontal dysfunction in antisocial children and adolescents, particularly in relationship to violence and institutionalization. Damage to this area of the brain has been associated with personality and behavioral characteristics that are similar to what is observed in psychopathic patients, thus leading Damasio to coin the term “acquired sociopathy” in patients who suffer these sorts of injuries. Even in the absence of visible lesions, there may exist some subtle impairment in frontal-lobe functioning that may lead to antisocial behavior by interrupting fear conditioning, autonomic arousal regulation, emotional control, and executive cognitive functioning.

Some contrasting findings of increased SC reactivity and decreased HRV in relation to some antisocial behavior in children and adolescents suggest further clarification of the underlying physiological dysfunction is needed. These findings are often associated with situations and analog-aggression tasks that involve provocation, anger, and heightened negative emotionality, providing support to the suggestion that psychophysiological profiles will differ depending on the type of antisocial behavior studied (eg, reactive versus proactive aggression) and the temperament qualities expressed (eg, negative emotionality versus fearlessness).

Indeed, in light of the extreme variation in antisocial behaviors manifested and studied, it would be overly simplistic to assume they are all characterized by the same underlying biological dysfunction and concomitant psychophysiological correlates.

SUMMARY

Psychophysiological evidence supports the notion that serious and persistent childhood misconduct is symptomatic of an internal dysfunction that dynamically interacts with other psychological and social causes. Childhood misconduct is a complex phenomenon with multiple causes and no easy solutions. Rather than think our civilization is doomed, however, we should realize that the great majority of our children grow up to be sociable and law-abiding individuals. For the others, we are afforded optimism that this problem can be minimized as we gain a more complete understanding of the interplay among biological, psychological, and social risks, and through the consequent refinement of interventions.

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