Conjoined Effects of Low Birth Weight and Childhood Abuse on Adaptation and Well-being in Adolescence and Adulthood

Yoko Nomura, PhD, MPH; Claude M. Chemtob, PhD

Objective: To characterize the conjoined effects of low birth weight (LBW) and childhood abuse on impaired adaptation and illness in adolescence and adulthood.

Design: Longitudinal study of a birth cohort.

Setting: Baltimore, Md.

Participants: Children (N=1748) were followed from birth to adulthood (mean age, 26 years) as part of the Johns Hopkins Collaborative Perinatal Study.

Main Exposures: Childhood abuse and LBW.

Main Outcome Measures: Indicators of adaptation were delinquency, school suspension, repeating grades, academic honors, quality of life, and socioeconomic status. Indicators of psychiatric and medical problems were depression, social dysfunction, somatization, asthma, and hypertension.

Results: Participants with both LBW and subsequent childhood abuse, relative to those with neither risk, were at a substantially elevated risk for psychological problems: 10-fold for depression; nearly 9-fold for social dysfunction, and more than 4-fold for somatization. However, they were not at an elevated risk for medical problems in adulthood. Those exposed to childhood abuse were more likely to report delinquency, school suspension, repeating grades during adolescence, and impaired well-being in adulthood, regardless of LBW status. For those with LBW alone, the prevalence of those problems was comparable with that of individuals without either risk factor.

Conclusions: Children with LBW and childhood abuse are at much greater risk for poor adaptation and psychiatric problems than those with LBW alone and those with neither risk. Preventive interventions should target families with LBW children who are at greater risk for childhood abuse.

Arch Pediatr Adolesc Med. 2007;161:186-192
pituitary-adrenal axis functionality, in children with the 2 adversities.

METHODS

The Johns Hopkins Collaborative Perinatal Study consists of data collected from pregnant women who received prenatal care and delivered their babies at Johns Hopkins Hospital between January 1, 1960, and December 31, 1964. Infants were continuously followed until 8 years of age and then were contacted again between January 1, 1992, and December 31, 1994 (mean age, 26 years), in the Pathways to Adulthood Study. The Pathways to Adulthood Study collected data from members of inner-city families for 34 years (January 1, 1960, to December 31, 1994). Of the 2694 second-generation children (G2) eligible for the Pathways to Adulthood Study, 1756 participated in a complete interview. The study design and methods are described in details elsewhere.30

Eight G2 did not provide information on childhood abuse, leaving 1748 individuals for the present study. The 1748 respondents G2 did not differ on race, age, LBW status, or any other controlling variables from nonrespondent G2 (n=946). However, female offspring were more likely to be represented among respondents than nonrespondents (54% vs 41%; P=.001). This study was ruled exempt by the institutional review board at Mount Sinai School of Medicine in 2006 because it involved secondary data analysis of deidentified data.

ASSESSMENTS

Low Birth Weight

Birth weight was recorded by a nurse observer in the delivery room. Birth weight less than 2500 g was considered to be LBW. Gestational age was adjusted for in multivariate analyses.

Childhood Abuse

Childhood abuse history was obtained through face-to-face interviews by trained researchers masked to LBW status using the Conflict Tactics Scale,3 a 19-item (rated on a 5-point Likert scale) measure12-37 that assesses intrafamilial violence, including physical and verbal violence. The Conflict Tactics Scale has good reliability (range, 0.78-0.96, in this study Cronbach α = .82),31,34,36,40 and validity (concurrent and construct) to detect intrafamilial violence has been previously reported.3,31,34,36,40 The mean (SD) total score was 19.073 (12.884). The cutoff score plus 1 SD (31.96) was the high-level exposure to childhood abuse, used as indicator of abuse (henceforth referred to as abuse): 15.5% of participants were in this category.

Childhood/Adolescence Delinquency, School Problems, and School Excellence

Lifetime history of running away from home, dropping out of high school, and trading sex for money, drugs, or food were treated as indicators of delinquency. School suspension (lifetime, in primary education, in junior high, and in high school) and repeating grades were evaluated as indicators of school problems. Finally, lifetime history of honor rolls, scholarships, and honor society memberships were indicators of school excellence. Delinquency, school problems, and excellence data were collected retrospectively during face-to-face interviews by trained researchers masked to LBW status. Information about repeating a grade at ages 5 to 8 years and lifetime history were obtained by child psychologist interviews with mothers when children were 8 years old and via self-report in adulthood, respectively. All the questions were answered yes or no, except for number of repeated grades.

Adult Physical and Psychological Well-being and Quality of Life

The G2 were asked about their health in general, physical health, and emotional well-being via a face-to-face interview. Rating options were 1 (terrible), 2 (unhappy), 3 (mostly dissatisfied), 4 (mixed), 5 (mostly satisfied), 6 (pleased), and 7 (delighted). The G2 rated their quality of life by answering, “How is your life now?” with 10 rating options ranging from 1 (worst possible) to 10 (best possible). Sense of success was assessed using the following question: “To what degree would you say you have been successful in life?” Four rating options were given: 1 (very successful), 2 (fairly successful), 3 (slightly successful), and 4 (not successful at all).

Adult Medical Illness and Psychopathologic Features

Given the underlying assumption that LBW would be associated with biophysiological changes associated with psychopathologic conditions (related to emotion) and medical illness (related to physiologic reactivity), we focused primarily on depression, social dysfunction, and somatization as psychiatric outcomes and on asthma and hypertension as medical outcomes. Lifetime history of medical illness was collected using the RAND Health Status Inventory,41-43 which has established good reliability44-46 and validity.47,48

Adult psychiatric status was measured using the General Health Questionnaire-28.48 Depression, social dysfunction, and somatization were each assessed by means of 7 questions, with response options ranging from 1 (better than usual) to 4 (much worse). Using the scoring method in the manual, a choice of 1 or 2 was recoded as “0” and 3 or 4 as “1.” Based on the sum of the responses, dichotomous indices for each variable were created, with a score of 4 or more indicating the presence of each variable. Internal consistency of the General Health Questionnaire, evaluated by testing split-half reliability, was 0.95.49 The General Health Questionnaire has compared favorably, with higher sensitivity (92%) and specificity (90%), with the 3 most commonly used instruments for identifying psychiatric illness (the Center for Epidemiological Studies—Depression Scale, the Beck Depression Inventory, and the Hospital Anxiety and Depression Scale) in terms of identifying psychiatric illness.50

Potential Confounders and Missing Values

Sociodemographic and obstetric confounders include mother’s income at the birth of the child; poverty level of the family at 7 years of age: mother’s education, marital status, age, and parity; and children’s age, sex, and race. Poverty level represented the ratio of the mother’s annualized income to the poverty level based on the Social Security Bulletin Annual Statistical Supplement51 and was calculated by the Johns Hopkins Collaborative Perinatal Study researchers.52 All the confounders, except the child’s age, were based on the mother’s self-report. Child age was calculated from birth dates. The frequency of missing data was negligible for most confounder variables except for maternal income and education at the time of the child’s birth (2.2%). Missing data on LBW (0.4%), adult illness (all <0.2%), and functioning and attainment (all <0.1%) are negligible, except for individual and adult household income. Five percent of the children refused to pro-
Additive interaction exists when the risk of the 2 early adversities completely in-
dependently.55,56,60 Additive interaction can be justed using the Holm correction.54
errors due to multiple testing, the level of significance was ad-
justed using the Holm correction.54
ences, pairwise comparisons were conducted. To avoid type I
errors due to multiple testing, the level of significance was ad-
justed using the Holm correction.54
functioning, well-being, quality of life, and socioeconomic sta-
tus among the 4 groups. After an overall test of group differ-
ences in continuous outcomes, that is, adult
come measures such as adolescent delinquency, academic prob-
lems, and evidence of synergy by the 2 adversities (LBW and
abuse) were examined.

Logistic regression with potential confounders was used to study
the association between LBW and abuse and dichotomous out-
come measures such as adolescent delinquency, academic prob-
lems, and excellence. Analysis of covariance (ANCOVA) fol-
lowed by multivariate analysis of covariance (MANCOVA) was
used for the differences in continuous outcomes, that is, adult
functioning, well-being, quality of life, and socioeconomic sta-
tus among the 4 groups. After an overall test of group differ-
ences, pairwise comparisons were conducted. To avoid type I
errors due to multiple testing, the level of significance was ad-
justed using the Holm correction.54

We also evaluated the amount of excess risk resulting from
the synergy of having both LBW and abuse. Using a logistic re-
gression model, we tested the risk of psychiatric and medical
problems among the 4 groups using the group with neither form
of adversity as the reference group. Potential confounders were
statistically controlled for in all analyses. First, the increased
risk and evidence of synergy by the 2 adversities (LBW and
abuse) was examined.

Additive interaction, based on the Rothman “index of syn-
ergism,” was evaluated55-59 because it is more appropriate not
to consider the effects of the 2 early adversities completely in-
dependently.39,80,81 Additive interaction exists when the risk of
having 2 adversities exceeds the sum of the risk of LBW and
abuse. The presence/absence of an additive interaction can be
examined using an index: attributable proportion due to in-
teraction (AP). The 95% confidence interval (CI) was esti-
mated based on the Hosmer-Lemeshow CI estimation of inter-
action.61 An AP exceeding 0 indicates that the increased risk is
due to the joint exposure to the 2 risk factors. Thus, the 95% CI
for an AP that does not include a value of 0 indicates sta-
tistical significance.

**RESULTS**

**DEMOGRAPHIC CHARACTERISTICS**

There were no significant differences among the 4 groups on demographic variables. Mean (SD) age was 34 (1.5) years, and 54% were female. Of all the participants, 81.5% were African American, 18.3% were white, and the remaining were Asian. We grouped offspring by LBW and abuse status. Approximately 70% of G2 had neither LBW nor abuse, 14% had only LBW, 13% had only abuse, and 3% had both.

**CHILDHOOD/ADOLESCENCE DELINQUENCY AND ACADEMIC PROBLEMS**

Table 1 provides the rates of childhood/adolescent de-
linquent behaviors, academic problems and excellence, overall difference, and pairwise comparisons among the 4 groups. With a few exceptions, children with both LBW and abuse exhibit the highest rates of problems, such as

<table>
<thead>
<tr>
<th>Table 1. Rates of Problems and Success in Childhood/Adolescence Among the 4 Groups of Children by LBW and Childhood Abuse Status*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>Delinquency, No. (%)</td>
</tr>
<tr>
<td>Run away from home</td>
</tr>
<tr>
<td>High school dropout</td>
</tr>
<tr>
<td>Traded sex for money/drugs/food</td>
</tr>
<tr>
<td>School suspension, No. (%)</td>
</tr>
<tr>
<td>Lifetime history</td>
</tr>
<tr>
<td>In primary education</td>
</tr>
<tr>
<td>In junior high school</td>
</tr>
<tr>
<td>In high school</td>
</tr>
<tr>
<td>Repeating grades—lifetime, No. (%)]</td>
</tr>
<tr>
<td>No. of repeated grades, mean (SD)</td>
</tr>
<tr>
<td>Honor roll 641 (52.0)</td>
</tr>
<tr>
<td>Honor society 151 (12.3)</td>
</tr>
<tr>
<td>Scholarship 196 (15.9)</td>
</tr>
<tr>
<td>Honor society 151 (12.3)</td>
</tr>
<tr>
<td>Repeating grades—lifetime, No. (%)]</td>
</tr>
<tr>
<td>No. of repeated grades, mean (SD)</td>
</tr>
<tr>
<td>Honor roll 641 (52.0)</td>
</tr>
<tr>
<td>Honor society 151 (12.3)</td>
</tr>
<tr>
<td>Repeating grades—lifetime, No. (%)]</td>
</tr>
<tr>
<td>No. of repeated grades, mean (SD)</td>
</tr>
<tr>
<td>Honor roll 641 (52.0)</td>
</tr>
<tr>
<td>Honor society 151 (12.3)</td>
</tr>
</tbody>
</table>

Abbreviation: LBW, low birth weight.

*Unadjusted analysis was based on χ² analysis for dichotomous outcomes and analysis of variance for continuous outcomes. Adjusted analysis was based on logistic regression for dichotomous outcomes and analysis of covariance for continuous outcomes.

†Numbers denote group numbers.

‡P<.001.

§P<.01.

¶Based on self-report in adulthood.

#P<.05.

*P<.10.

**P<.01.

††P<.05.

*P<.01.

**P<.01.

††P<.05.

*P<.01.

**P<.01.

††P<.05.

*P<.01.

**P<.01.

††P<.05.

*P<.01.

**P<.01.

††P<.05.

*P<.01.

**P<.01.

††P<.05.

*P<.01.

**P<.01.

††P<.05.

*P<.01.
suspension in junior high school (63.6%), and the lowest rates of academic excellence, such as being on the honor roll (27.3%). The G2 with abuse alone (group 3) also had higher rates of problems than those with LBW alone (group 2) and those with neither (group 1). More specifically, relative to groups 1 and 2, groups 3 and 4 had higher rates for ran away from home; high school dropout; trading sex for money, food, and drugs; lifetime history of school suspension and more repeated grades; and lower rates of honor society memberships. Taken together, groups 3 and 4 generally reported many more difficulties during childhood and adolescence compared with groups 1 and 2.

ADULT FUNCTIONING, WELL-BEING, AND GENERAL HEALTH STATUS

Table 2 provides rates of adult functioning, well-being, and perceived health status. There were significant differences among the 4 groups in sense of success in life; quality of life; general, physical, and mental health; and emotional well-being after controlling for confounders (P < .001 for all). As in childhood and adolescence, pairwise comparisons confirmed that groups 3 and 4 had poorer adult functioning, well-being, and health in general than groups 1 and 2. Children in groups 1 and 2 did not differ in sense of success in life, quality of life, satisfaction with life, and general, physical, and mental health. The last column of the Table 2 displays the results from the MANCOVA wherein the correlations between the predictors were taken into account. Results were unchanged (P < .001 for all).

ADULT SOCIOECONOMIC STATUS

Table 3 provides significant differences in adult family incomes, individual incomes, and education in the 4 groups based on ANCOVA and multivariate ANCOVA. Offspring with neither adversity reported the highest household ($33,126) and individual ($17,119) incomes. Offspring with LBW alone and abuse alone had the next highest household and individual incomes. The pairwise comparisons confirmed that offspring with both adversities showed substantially lower family ($19,114) and individual incomes ($9,596).
and individual ($9596) incomes than the other groups. Groups 3 and 4 reported significantly fewer years of education than groups 1 and 2.

ADULT PSYCHIATRIC AND MEDICAL ILLNESS

We examined the risk of depression, social dysfunction, somatization, hypertension, and asthma in adulthood among the 3 risk groups relative to the reference group, controlling for the effects of potential confounders. Figure 1 shows that relative to group 1, group 4 had nearly a 10-fold increased risk of depression ($P<.001$) and group 3 had an approximately 3-fold increased risk ($P<.007$), but group 2 was not at increased risk for depression. Similarly, relative to group 1, group 4 had a more than 7-fold increased risk of social dysfunction and a 4-fold increased risk of somatization ($P<.001$ for both). There was no difference in illness rates between groups 2 and 1. Group 3, relative to group 1, also showed a significant 2- to 3-fold increased risk of psychiatric problems and an almost 2-fold increased risk of asthma ($P=.008$).

We formally evaluated whether there was a synergistic increased risk of adult illness associated with the 2 adversities. Clear evidence of synergy was found for psychiatric (Figure 1) but not medical (Figure 2) problems. The 95% CI for AP confirmed a significant synergistic increase in risk of depression and somatization among offspring with both adversities. The AP for social dysfunction was 0.81, suggestive evidence for synergy that did not reach statistical significance.

COMMENT

There are 3 main findings. First, the conjoined effects of LBW and abuse significantly increased the risk of poorer adjustment as documented in higher rates of delinquency, problems with school functioning, poorer physical health, lower quality of life, and lower socioeconomic status in adulthood. Second, offspring who experienced abuse alone also demonstrated poorer adaptation and quality of life. In contrast, offspring with LBW alone demonstrated comparable outcomes as the reference group. Third, there was a synergistically increased risk of psychiatric problems for offspring with both LBW and abuse, but there was no synergy for medical illness.

To our knowledge, this is the first study to examine the conjoined effects of LBW and child abuse on problems during adolescence and adulthood. The community-based sample comprised a full range of birth weights, in contrast to previous studies that examined clinical samples of very LBW (<1500 g) or extremely LBW (<1000 g). This study is also the first to document a synergistic increase in the risk of psychiatric problems among adults with both LBW and abuse.

The 1970s was a period of much improved neonatal intensive care, and survivors from that time are now reaching adulthood. Research has begun to elucidate what the long-term adverse effects of LBW are on social, educational, psychiatric, and medical problems. Although such studies have great public health significance, their findings are still inconclusive. For example, although Hack et al. and Ericson and Kallen found that compared with normal-birth-weight children, fewer very LBW children graduated from high school and were in postgraduate degree programs, a recent study by Saigal et al. found no differences in educational attainment between the extremely LBW and control subjects. Hack and Klein suggested that differences in “contextual factors” might explain the discrepancy between their findings and those of Saigal et al., arguing that the respective cohorts may have differed in the amount of subsequent adversity experienced. The cohort of Hack et al. consisted largely of poor urban African American individuals, with 41% of their mothers being unmarried. In contrast, the cohort of Saigal et al was predominantly white, with approximately 80% middle class and with 80% living in 2-parent households.

The present data suggest that children born with LBW did as well as their counterparts as long as they did not face serious adversity, such as child abuse. However, when
faced with both adversities, these children had substantially poorer outcomes than children facing either adversity alone. Although these results focused on child abuse, further research should examine the conjoined effects of other environmental adversities.

These findings also need to be considered in the context of the severity of perinatal problems. The sample was drawn from a general community where the prevalence of very (1.5%) and extremely (1.2%) LBW was low. Compared with the cohorts of Hack et al62 and Saigal et al,64 the present LBW children may have milder forms of biological vulnerability. For example, only 1.3% of the sample had neurologic abnormality reported by pediatric neurologists at age 1 year. We reanalyzed all of the models to assess the possible impact of such abnormalities on the findings. Results were unchanged by adding this variable. However, the use of a community sample is advantageous. First, we demonstrated that LBW children, if exposed to child abuse, would experience psychiatric problems beyond what one single risk would do in adulthood. Second, it affords greater generalizability of the results.

It is of potentially great public health importance to find significant synergy on all psychiatric problems in adults with LBW and abuse. For example, relative to children with neither adversity, those with both had a more than 10-fold increased risk of depression, whereas those with LBW had no significant increased risk. Those with abuse alone had a 2-fold increased risk compared with the reference group.

This pattern of synergy was not found with asthma or hypertension. Thus, the results suggest that the synergistic increased risk of LBW and abuse among adult offspring may be relatively specific to psychiatric problems. The reason for this possible specificity is not known. Elucidation of possible pathways needs to be informed by future studies.

The present findings have potential policy implications. They suggest that LBW infants should receive continued public health surveillance and that their caretakers should receive targeted support to mitigate the effects of subsequent environmental adversities on child adaptation and productivity. For example, it may be possible to develop and implement selective prevention interventions aimed at ameliorating stress in the families of children with LBW and encouraging effective parenting as a means of preventing childhood abuse by providing services to their caregiving parents. Extreme adversity, such as abuse, does not occur in isolation from a parent’s own psychopathologic features, the rearing disciplines the parent received, current hardship with their spouse, or financial difficulties. Weissman and her group elegantly demonstrated that mental health services to mothers not only improved mothers’ depression status but also drastically improved their offspring’s externalizing and internalizing problems. Perhaps monitoring mothers’ well-being, offering preventive mental health services to mothers with LBW children, and monitoring LBW children to provide early intervention together could protect such children from subsequent child abuse. This study provides hope and a warning to all those working to create a better future for children with LBW.

Accepted for Publication: August 17, 2006.
Correspondence: Yoko Nomura, PhD, MPH, One Gustave L. Levy Place, Box 1230, New York, NY 10029 (yoko.nomura@msm.edu).

Author Contributions: Dr Nomura has full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Nomura and Chemtob. Analysis and interpretation of data: Nomura. Drafting of the manuscript: Nomura and Chemtob. Critical revision of the manuscript for important intellectual content: Nomura and Chemtob. Statistical analysis: Nomura. Obtained funding: Nomura and Chemtob. Administrative, technical, and material support: Chemtob. Study supervision: Nomura and Chemtob.

Financial Disclosure: None reported.

Funding/Support: This study was supported by grants R03 MH067761 (Dr Nomura) and 5R24MH063910 (Dr Chemtob) from the National Institute of Mental Health; a Young Investigator Award from the National Alliance for Research on Schizophrenia and Depression (Dr Nomura); and the Erna Reich Fund of the UJA Federation of New York.

Acknowledgment: We thank Janet Hardy and Sam Shapiro, principal investigators of the original study, Pathway to Adulthood: A Three-Generation Urban Study, 1960-1994, for allowing us to use their data; the mothers and their children who participated in the study; the helpful comments of Charles Davey, BA, Avi Reichenberg, PhD, Jacob Ham, PhD, Carl Hochhauser, PhD, and Jeffrey H. Newcorn, MD, on an earlier version of the manuscript; and Scott Miller, PhD, and Karen Feit, BA, for their assistance with statistical analysis.

REFERENCES

12. Osler M, Nordentoft M, Andersen AM. Childhood social environment and risk of...
23. McHolm AE, MacMillan HL, Jamieson E. The relationship between childhood physi-
24. Heim C, Nemeroff CB. The role of childhood trauma in the neurobiology of mood
17. Hetzel MD, McCanne TR. The roles of peritraumatic dissociation, child physical
16. Woods SJ, Wineman NM, Page GG, Hall RJ, Alexander TS, Campbell JC. Pre-
14. Harkness KL, Monroe SM. Childhood adversity and the endogenous versus non-
13. Dube SR, Felitti VJ, Dong M, Chapman DP, Giles WH, Anda RF. Childhood abuse,
19. Penza KM, Heim C, Nemeroff CB. Neurobiological effects of childhood abuse:
32. Straus MA, Hamby SL, Finkelhor D, Moore DW, Runyan D. Identification of child-
60. Finney DJ.
58. Darroch J. Biologic synergism and parallelism.
54. Holm S. A simple sequentially rejective multiple test procedure.
44. Boyle MH, Furlong W, Feeny D, Torrance GW, et al. Multitrait and single-attribute util-
37. Holmes WC, Sammel MD. Brief communication: physical abuse of boys and possible
36. Hillis SD, Anda RF, Felitti VJ, Nordenberg D, Marchbank PA. Adverse childhood
38. Holmes WC, Sammel MD. Brief communication: physical abuse of boys and possible
45. Jones CA, Feeny D, Eng K. Test-retest reliability of Health Utilities Index scores: evi-
40. Finney DJ. Commentary on Jack Dawie. “Decision validity should determine whether a
generic or condition-specific HRQOL measure is used in health care decisions.”
47. Thoma A, Sprague S, Velti K, Duku E, Furlong W. Methodology and measure-
35. Kwong MJ, Bartholomew K, Henderson AJZ, Trinke SJ. The intergenerational trans-
36. Hills DD, Anda RF, Felitti VJ, Nordenberg D, Marchbank PA. Adverse childhood
37. Holmes WC, Sammel MD. Brief communication: physical abuse of boys and possible
35. Kwong MJ, Bartholomew K, Henderson AJZ, Trinke SJ. The intergenerational trans-
32. Straus MA, Hamby SL, Finkelhor D, Moore DW, Runyan D. Identification of child-
31. Straus MA. Measuring intrafamily conflict and violence: the Conflict Tactics (CT)
30. Straus MA, Hamby SL, Finkelhor D, Moore DW, Runyan D. Identification of child-
maltreatment with the parent-child conflict tactics scales: development and psy-
29. Schumm WR, Martin MJ, Bollman SR, Jurich AP. Adolescent perspectives on
28. Straus MA. The Conflict Tactics Scales and its critics: an evaluation and new data on
27. Newport DJ, Heim C, Bonsall R, Miller AH, Nemeroff CB. Pituitary-adrenal re-
26. Newport DJ, Heim C, Donsald R, Miller AH, Nemeroff CB. Pituitary-adrenal re-
24. Newport DJ, Heim C, Bonsall R, Miller AH, Nemeroff CB. Pituitary-adrenal re-
23. McHolm AE, MacCanne TR. The roles of peritraumatic dissociation, child physical
22. Straus MA, MacMillan HL, Jamieson E. The relationship between childhood physi-
21. Straus MA. Measuring intrafamily conflict and violence: the Conflict Tactics (CT)
20. Grilo CM, Sanislow C, Fehon DC, Martos S, McGlashan TH. Psychological and be-
19. Penza KM, Heim C, Nemeroff CB. Neurobiological effects of childhood abuse:
18. Newport DJ, Heim C, Donsald R, Miller AH, Nemeroff CB. Pituitary-adrenal re-
17. Hetzel MD, McCanne TR. The roles of peritraumatic dissociation, child physical
16. Woods SJ, Wineman NM, Page GG, Hall RJ, Alexander TS, Campbell JC. Pre-
15. Ford JD, Kidd F. Early childhood trauma and disorders of extreme stress as pre-
14. Harkness KL, Monroe SM. Childhood adversity and the endogenous versus non-
13. Dube SR, Felitti VJ, Dong M, Chapman DP, Giles WH, Anda RF. Childhood abuse,
12. Straus MA, Hamby SL, Finkelhor D, Moore DW, Runyan D. Identification of child-
11. Hetzel MD, McCamne TR. The role of peritraumatic dissociation, child physical
10. Penza KM, Heim C, Nemeroff CB. Neurobiological effects of childhood abuse:
7. Strauss MA. The Conflict Tactics Scales and its critics: an evaluation and new data on
5. Kwon MJ, Bartholomew K, Henderson AJZ, Trinks SJ. The intergenerational trans-