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Preventing Violence and Related Health-Risking Social Behaviors in Adolescents

Summary

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Introduction

Over the last two decades of the 20th century, violence emerged as one of the most significant public health problems in the United States (Administration for Children and Families, 2004). While recent trends have been encouraging, homicide remains the second leading cause of death among adolescents (National Center for Injury Prevention and Control, 2004). During this period, an increasing number of research studies have sought to characterize youth violence and the contexts in which it occurs, as well as risk and protective factors associated with such violence. At the same time, a myriad of prevention interventions have been developed and evaluated with multiple youth populations and in a range of settings.

In the fall of 2004, the National Institute of Mental Health (NIMH) will convene a State-of-the-Science Conference on "Preventing Violence and Related Health-Risking Social Behaviors in Adolescents." The purpose of this consensus conference is to provide a forum to present and review what is currently known about preventing youth violence. In preparation for this meeting, the Office of Medical Applications of Research (OMAR) and the National Institute of Mental Health (NIMH) nominated and supported the topic for an Agency for Healthcare Research and Quality (AHRQ)-sponsored systematic review and analysis of the evidence. AHRQ awarded this project to the Southern California Evidence-based Practice Center (SC-EPC) and its partner, Childrens Hospital Los Angeles, to conduct the review and summarize the findings in an evidence report. Researchers were to review longitudinal risk factor research to identify the role of individual, family, school, community and peer-level influences as well as interventional research to evaluate prevention intervention effectiveness.

This evidence report addresses the following six key questions:

1. What are the factors that contribute to violence and associated adverse health outcomes in childhood and adolescence?
2. What are the patterns of co-occurrence of these factors?
3. What evidence exists on the safety and effectiveness of interventions for violence?
4. Where evidence of safety and effectiveness exists, are there other outcomes beyond reducing violence? If so, what is known about effectiveness by age, sex, and race/ethnicity?
5. What are commonalities of the interventions that are effective, and those that are ineffective?
6. What are the priorities for future research?

For the purpose of this evidence review, we used the Centers for Disease Control and Prevention's definition of violence: "threatened or actual physical force or power initiated by an individual that results in, or has a high likelihood of resulting in, physical or psychological injury or death" (National Center for Injury Prevention and Control, 2004). We made the decision to include only the following types of violent behavior: murder or homicide, aggravated assault, non-aggravated assault, rape or sexual assault,

robbery, gang fight, physical aggression, psychological injury or harm, and other serious injury or harm. Thus, we did not review the growing literature that reports on studies of suicide, verbal aggression, bullying, arson, weapon carrying, externalizing behaviors (e.g., acting out), attitude about violent behavior, youth crime against property or materials (such as burglary, theft), or intent to commit violence as outcomes. These related behaviors and attitudes are included in this report only to the extent that they have been proposed as risk factors for the forms of violence on which this report focuses.

The definition of violence prevention interventions that we used was developed for and published in the *Surgeon General's Report on Youth Violence* (Satcher, 2001). According to this definition, "Primary prevention interventions are those that are universal, intended to prevent the onset of violence and related risk factors; secondary prevention interventions are those implemented on a selected scale for children/youth at enhanced risk for youth violence, intended to prevent the onset and reduce the risk of violence; and tertiary prevention interventions are those that are targeted to youth who have already demonstrated violent or seriously delinquent behavior."

Methods

Analytic Framework

To complete the project with the resources available, it was necessary to narrow the focus of this evidence review. To this end, we limited our review to peer-reviewed articles published in 1990 or later and retrievable within four search engines—MEDLINE®, PsychINFO, SocioAbstracts, and ERIC. We also limited the review to studies conducted in the United States and focused on violent behavior perpetrated by adolescents, ages 12 through 17 years. Thus, this review excluded studies of violence perpetrated by children, pre-adolescents, and young adults.

To assist project staff in conducting the evidence review, a nine-member multidisciplinary Technical Expert Group (TEG) was established, comprising individuals with both content and methodological expertise. Specifically, the TEG brought to this review a diverse set of expertise from a range of fields and disciplines, including early childhood development, adolescent development, juvenile justice, child abuse and neglect, anthropology, psychology, sociology, social work, public health, and public policy.

We created a list of potential risk and protective factors organized by domain—i.e., individual, family, school, peer, community, and social domains—to inform data abstraction and synthesis. We also developed a conceptual and analytical framework to examine the associations among risk factors, violent behavior, and interventions to guide the analysis. As these background materials were being developed, we shared them with the NIH Panel Chair and our Task Order Officer, discussed them with members of our TEG, and made numerous revisions based on the feedback that we received.

Search

The National Library of Medicine (NLM) performed all searches. Librarians from NLM met with project staff via teleconference to discuss the scope, the key questions, and the search strategy. The librarians also worked with project staff to select the databases that were ultimately used and to evaluate the search strategies that had been developed by the project team.

NLM searched four electronic databases—MEDLINE®, PsychINFO, SocioAbstracts, and ERIC—in April/May of 2003 and again in October/November 2003. For "youth," the following search terms were used: adolescent, teen, juvenile, and youth. For "violence," the following terms were used: violence, school violence, dangerous behavior, rape, homicide, domestic violence, courtship violence, dating violence, interpersonal violence, date rape, raping, rapes, rapist, bully, bullies, bullied, bullying, physical assault, physical attack, physical aggression, direct aggression, overt aggression, knifing, stabbing, gunshot, brutality, bludgeoning, and murder.

Study Selection

Three inclusion criteria were applied for citations and manuscripts: published in 1990 or thereafter, related to the range of risk and protective factors associated with perpetrators of youth violence and violence-related crimes between ages 12 and 17 years, and conducted in the United States only. Excluded were case reports, unpublished program evaluations, editorials, letters, reviews, practice guidelines, non-English language publications, and papers from which data could not be abstracted.

For the questions on risk factors, we based our assessment on prospective longitudinal cohort studies, because of the general consensus that cross-sectional studies would not allow us to identify temporal predictors of youth violence (Heimer, 1997; Herrenkohl, Guo, 2001). For the evaluation of the effectiveness of interventions, we examined the findings from randomized controlled trials (RCTs) as well as non-RCTs or single-group time series in which a control group was used either concurrently or prospectively.

Evaluation of Study Quality

We evaluated the quality of individual studies using the criteria set forth in the Procedures for EPC Reports for Office of Dietary Supplements (ODS) and OMAR (ODS and

OMAR, 2003). Because all the prospective longitudinal cohort studies included in our review satisfied four of the seven criteria in the same ways, we used the three remaining criteria—followup rate of 80 percent or more, valid and reliable instruments used, and appropriate control of confounding factors—to assess the quality of individual studies. For studies that assessed the effectiveness of interventions, we used the OMAR criteria for RCTs and observational studies.

According to OMAR guidelines (ODS and OMAR, 2003), the rating of the strength of scientific evidence remains the prerogative of the Consensus Panel. However, we conducted two sensitivity analyses to assist the Consensus Panel to assess the strength of the scientific evidence in our review. First, we re-analyzed the data excluding the studies with sample size below the thresholds set at 1,100 for the general population and 500 for the at-risk population, to restrict the analyses to the studies with the greatest power to detect significant predictors. Second, we re-assessed the findings using only studies with good quality.

Data Abstraction

For primary screening, two members of the team independently reviewed each title or abstract: one reviewer was a member of the faculty with specific expertise related to adolescent development and/or youth violence, and the other reviewer had a master's degree in public health or was a doctoral student in the field of psychology, public health, or prevention research. The Task Order Manager or the Task Order Coordinator compared the screening results of the two reviewers and resolved discrepancies. The same procedure was followed for secondary screening of full-length articles. For articles selected for inclusion, data were abstracted by a member of the project team onto a specially prepared form. Completed forms were checked by the Task Order Manager.

Data Synthesis

Risk factor identification. To identify homogeneous subgroups for data pooling, we stratified the eligible studies according to the following criteria: demographics of the study population; characteristics of the study; outcomes; and type of analysis. We used a systematic approach to summarize the findings. When findings for a single cohort were reported in multiple articles, the cohort was considered the unit of analysis. In the summary, findings for one cohort that were reported in more than one article were counted as only one article. However, if several articles reported findings for one cohort but each reported the findings for different outcome measures, each was counted. When a risk factor was assessed using both bivariate and multivariate analysis, the results of the multivariate analysis took precedence. Findings were considered significant if the p statistic was less than 0.05.

For summarizing the evidence, we considered a factor to be consistently associated with violence if 75 percent or more of the cohort studies reported a significant association for the factor. Likewise, factors reported not to be associated with violence in at least 75 percent of the studies under consideration were considered not associated with violence. Otherwise, the findings were considered inconclusive. We evaluated consistency for factors that were reported in two or more cohort studies. Evidence was considered inadequate if the results for a particular factor were reported in only one cohort study.

For evaluating the effectiveness of interventions. We stratified the accepted studies by the level of intervention and the type of study design. Initially, we planned to stratify the studies further by the various characteristics of interventions that might ultimately contribute to the effectiveness of the intervention (such as intervention setting and target population). However, many of the reports omitted mention of these study characteristics.

Because of the diversity of the studies, we did not pool findings across studies. Instead, we summarized the findings of the programs as effective or ineffective. We considered an intervention to be effective if one or more violence outcome indicators was reported to be significantly different at the $p<0.05$ level, based on the findings reported in the article(s). If none of the violence outcome indicators was reported to be significantly different, we considered the program ineffective.

Results

We screened 11,196 titles and abstracts, reviewed 1,612 full-length articles, and included 67 articles in our evidence assessment (35 for the risk factor questions and 32 for the intervention questions).

Factors Contributing to Youth Violence (Key Question #1)

The 35 articles that addressed risk factors contributing to youth violence were based on 23 prospective cohort studies covering 11 study populations defined by gender, race/ethnicity, and at-risk population. Findings for specific racial/ethnic groups suffered from small numbers of cohorts or small numbers of subjects.

Across all studies, only one risk factor, male gender, was consistently reported to be significantly associated with youth violence perpetration (Rivera and Widom, 1990; Roitberg and Menard, 1995; Saner and Ellickson, 1996; Komro, Williams, 1999; Foshee, Bauman, 2000; Herrenkohl, Guo, 2001;

McCloskey and Lichter, 2003). Low family socioeconomic status (SES) was consistently reported not to be an independent risk factor for youth violence (Roitberg and Menard, 1995; Saner and Ellickson, 1996; Herrenkohl, Egolf, 1997; Brezina, 1999; Herrenkohl, Guo, 2001; Herrera and McCloskey, 2001). Co-occurrence of family SES with other risk factors was associated with youth violence. There was very little consistency of reported significance or non-significance for all other risk factors. Few studies examined a comparable set of risk factors (i.e., risk factors were often examined only by a single study) limiting our ability to draw conclusions based on the available evidence. Among studies that specifically focused on adolescent males, a consistent finding was the significant association between violence and anger (Felson, 1992; Foshee, Linder, 2001), cigarette smoking (Dornbusch, Lin, 1999; Ellickson, Tucker, 2001) and non-violent delinquency (Becker and McCloskey, 2002; Saner and Ellickson, 1996). For adolescent females, a consistent finding was the significant association between violence and non-violent delinquency (Becker and McCloskey, 2002; Herrera and McCloskey, 2003; Saner and Ellickson, 1996). For research conducted with at-risk youth populations, a consistent finding was the significant association between being Latino and repeated physical aggression among adolescent males (Loeber, Wei, 1999; Loeber, Wung, 1993); there were no consistent findings for research conducted with at-risk adolescent females.

Patterns of Co-occurrence of These Factors (Key Question #2)

In addition to our search for independent risk factors that have a high likelihood of leading to youth violence, we were also interested in clusters of risk factors that may lead to youth violence. A number of factors that were found to be statistically significant when no other risk factors were taken into account were found not to be significant when other risk factors were taken into consideration. For example, low SES or low family income was reported as a significant risk factor associated with youth violence when the co-occurrence of other risk factors was not taken into consideration. But when the effect of other risk factors was taken into consideration, its significance disappeared, implying that the other risk factor(s) were stronger predictor(s) of youth violence than was low SES. (Roitberg and Menard, 1995; Saner and Ellickson, 1996; Herrenkohl, Egolf, 1997; Brezina, 1999; Herrenkohl, Guo, 2001; Herrera and McCloskey, 2001).

We defined co-occurrence of factors as the simultaneous presence of two or more risk or protective factors that together predict violence in an individual. We identified five articles on four cohort studies that addressed different aspects of co-occurrences. These articles reported the following findings.

Pre/perinatal risk exposure combined with disadvantaged familial environment at age 7 increased the chances of criminal offending during early adulthood among a high-risk, inner-city group (Piquero and Tibbetts, 1999). Polydrug use was associated with increased violence in both boys and girls, a finding not identifiable from analyses that focused on the use of a specific drug (Dornbusch, Lin, 1999). Youth exposed to multiple risk factors were found to be more likely than others to engage in later violence (Herrenkohl, Egolf, 1997). The co-occurrence of parent-family connectedness, school connectedness/parental presence, and grade point average in both boys and girls significantly decreased the risk of youth violence (Borowsky, Ireland, 2002). Beyers et al. (Beyers, Loeber, 2001) reported the following combinations of risk factors associated with repeated youth violence: (a) living in a low-SES neighborhood, lack of guilt, sexual activity, carrying a hidden weapon, and poor communication at home and (b) living in a high-SES neighborhood and physical aggression. The following combinations of risk factors were reported not to be associated with repeat youth violence: (a) living in a low-SES neighborhood and any or a combination of the following: age, impulsive/hyperactive behavior, low school motivation, positive attitude toward problem behavior, boy not involved at home, poor parental supervision, peer delinquency, or bad friends and (b) living in a high-SES neighborhood plus any or a combination of the following: impulsive/hyperactive behavior, lack of guilt, positive attitude toward problem behavior, sexual activity, or peer delinquency.

Effectiveness of Interventions for Violence (Key Questions #3, #4, and #5)

We identified 32 intervention evaluation studies, of which 13 employed randomized controlled trial (RCTs) design and 19 employed other study designs. The following provides a summary of the key findings.

Effectiveness by level of intervention. Direct within-study comparisons of the effectiveness of interventions by the level of intervention (primary, secondary, tertiary) were not identified, but some measure of the effectiveness of interventions by level can be made by simply comparing the proportion of studies at each level that report beneficial effects. Not considering the study design and excluding one inconclusive study, effectiveness was reported in five of 15 (33 percent) primary interventions, four of 10 (40 percent) secondary interventions, and five of six (83 percent) tertiary interventions. When only RCTs were considered, effectiveness was reported in one of five (20 percent) primary intervention, three of six (50 percent)

secondary intervention, and two of two (100 percent) tertiary interventions.

Effectiveness by age, gender, and race/ethnicity. The focus of this assessment was on adolescents ages 12 through 17; thus, all programs determined to be effective reduced violent behavior in this age group. The data did not permit further analysis according to age. Similar to our assessment with the level of interventions, within study comparisons are the strongest analytic approach to study differential effectiveness by demographic groups. However, none of the studies provided the information needed to evaluate differential effectiveness by age, gender, or race/ethnicity. Instead, effectiveness was reported primarily within each gender or ethnic group.

Effectiveness by selected characteristics of intervention programs. Overall, we did not observe any differences in program effectiveness among different settings, between single or multimodal programs, among programs with different durations, or among programs implemented at different school levels. However, we observed that four of four (100 percent) secondary interventions that lasted a year or longer were effective (four of four), whereas five of five (100 percent) secondary interventions that lasted less than 6 months were ineffective.

Discussion

The overarching goal of this review was to bring greater scientific rigor to the evaluation process to identify the highest quality research findings in the field of youth violence. With the severely restricted scope of the project, much of the value of this report was the identification of the current status of research on youth violence, the existing research gaps and inconsistencies, and the need for additional scientifically rigorous studies. Despite the limited scope, we identified a voluminous literature that is rather fragmented in nature. We found little agreement with respect to the definitions used to measure youth violence and the ways in which risk/protective factors are conceptualized, operationally defined, measured, analyzed, and reported. As a result, the findings showed little consistency across individual studies and the research literature is not growing cumulatively. Consequently, we are limited in our ability to draw conclusions and make recommendations.

Specifically, for the review of risk factors contributing to youth violence, we were unable to perform a quantitative synthesis for the risk factors by developmental stages, by type of at-risk population, by type of violent outcome, and by type of statistical analysis due to the limited number of prospective cohort studies. Efforts to examine the effects of co-occurrence of risk factors have been limited, although some efforts have been made to examine the multifactorial nature of risk and protective factors contributing to youth violence.

With respect to the review of the effectiveness of prevention interventions, the number of studies was too small for the detection of any systematic differences among programs with different characteristics. The characterization of intervention programs was not consistently or uniformly reported in published articles, making it difficult to evaluate program effectiveness by program characteristics.

Priorities for Future Research (Key Question #6)

Risk factors contributing to youth violence. Considerable effort is needed to develop uniformity in the ways in which youth violence and violence-related outcomes are both defined and operationalized, and these definitions should be incorporated into future research to begin to build some consistency and uniformity in study findings. We therefore recommend initiation of a national effort to develop comparable approaches to defining, measuring, and analyzing research data related to youth violence, and the funding of new initiatives to facilitate the collection of comparable data across multiple sites and with multiple youth populations. Such multi-site cooperative agreement studies would permit the use of a combined prospective cohort from which a common standardized dataset could be assembled and analyzed.

Further, additional research is needed to examine both sequential and simultaneous co-occurrences of risk factors that contribute to youth violence. Future research should concentrate on minimizing both non-participation and attrition in longitudinal studies.

Natural prospective cohorts must be established, pseudo prospective cohorts could also be considered. We have identified many prospective cohort studies focused on various stages of development, different types of study population, and different types of outcomes that could be coordinated and assembled to form a pseudo prospective cohort from which a common dataset could be assembled and advanced statistical analysis conducted. Such an effort would require strong central support, cooperation from all parties involved, and long-term financial commitments.

Interventions for the prevention of youth violence. More randomized controlled interventions are needed to evaluate program effectiveness in general and for various groups of youth in particular, e.g., those of different ages, both genders, all ethnicities/races, and possessing the various characteristics that appear to increase risk. We therefore recommend that researchers increase the scientific rigor, including the use of control populations and extended followup, to evaluate the

sustained effectiveness of youth violence prevention interventions. While RCTs with individual subjects are ideal, they are difficult to implement in "real world" settings, especially for the behavioral and social sciences, and group RCTs are the best alternatives. Therefore, it is important that more research effort be focused on the design, implementation, and analysis of group RCTs. Research in this area will contribute greatly to the scientific methods in the social sciences.

A national consensus building effort is also needed to identify and clarify the science related to (a) the use of conceptual frameworks and causal pathways related to youth violence; (b) risk factors and mechanisms leading to violent outcomes; (c) strategies and interventions to reduce violent outcomes; (d) methodologies and scientifically grounded approaches that should ideally be used to evaluate prevention interventions; (e) the effective use of policy to reduce youth violence; and (f) methodologies for evaluating such policies.

Rating of study quality. For prospective longitudinal studies, we have shown that a high retention rate alone is inadequate to measure sample bias. We believe that the participation rate, followup or retention rate, and proportion of participants with complete data should be considered when assessing the possibility of bias in the study sample, especially for outcomes such as violence. For intervention studies, we do not believe that the OMAR study quality criteria truly assessed the quality of the studies we reviewed because they were derived primarily from clinical studies. Unlike many clinical interventions for medical conditions, youth violence interventions are often multifaceted, involve the efforts of multiple parties (e.g., teachers, parents, school administrators, and so on), are conducted over long periods of time, and can be adversely affected by factors that cannot be anticipated, characteristics that make the studies difficult to evaluate. The nature of the interventions in social science studies can also preclude some of the methodological components critical to clinical trials. The need to develop valid instruments to evaluate the quality of studies in the social sciences is apparent.

Quality of publications. Special efforts are needed to improve the quality of publications, including the consistency and adequacy with which the study characteristics, such as research questions, conceptual framework, study design, and description of the study population, are specified.

Evidence assessment methods. Because of the multi-factorial nature of the factors contributing to youth violence, alternatives to quantitative synthesis of published information should be sought. Unlike many clinical interventions, interventions to prevent or stop youth violence are often multi-faceted, involving the efforts of multiple parties (e.g., teachers, parents, and school administrators), requiring long time commitments, and being sensitive to factors that cannot be anticipated. We propose that social science researchers consider an "individual-level-data-meta-analysis" method (Olkin and Sampson, 1998; Mathew and Nordstrom, 1999; Stewart and Clarke, 1995; Stewart and Parmar, 1993; Nagin and Tremblay, 1999) for future systematic reviews to identify both independent predictors and clusters of predictors that lead to youth violence. The method is described further in the report.

Availability of the Full Report

The full evidence report from which this summary was taken was prepared for the Agency for Healthcare Research and Quality (AHRQ) by the Southern California Evidence-based Practice Center, under Contract No. 290-02-0003. It is expected to be available in October 2004. At that time, printed copies may be obtained free of charge from the AHRQ Publications Clearinghouse by calling 800-358-9295. Requesters should ask for Evidence Report/Technology Assessment No. 107, *Preventing Violence and Related Health-Risking Social Behaviors in Adolescents.* In addition, Internet users will be able to access the report and this summary online through AHRQ's Web site at www.ahrq.gov.

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References

Administration for Children and Families. Toward a blueprint for youth. Accessed: May 2004. http://www.acf.hhs.gov/programs/fysb/youthinfo/blueprint2.htm.

Becker KB, McCloskey LA. Attention and conduct problems in children exposed to family violence. Am J Orthopsychiatry 2002;72(1):83-91.

Beyers JM, Loeber R, Wikstrom PO, et al. What predicts adolescent violence in better-off neighborhoods? J Abnorm Child Psychol 2001;29(5):369-81.

Borowsky IW, Ireland M, Resnick MD, et al. Violence risk and protective factors among youth held back in school. Ambul Pediatr 2002;2(6):475-84.

Brezina T. Teenage violence toward parents as an adaptation to family strain: Evidence from a national survey of male adolescents. Youth Soc 1999;30(4):416-44.

Dornbusch SM, Lin I-C, Munroe PT, et al. Adolescent polydrug use and violence in the United States. Int J Adolesc Med Health 1999;11(3-4):197-219.

Ellickson PL, Tucker JS, Klein DJ. High-risk behaviors associated with early smoking: results from a 5-year follow-up. J Adolesc Health 2001;28(6):465-73.

Felson RB. "Kick 'em when they're down": Explanations of the relationship between stress and interpersonal aggression and violence. Sociol Q 1992;33(1):1-16.

Foshee VA, Bauman KE, Greene WF, Koch GG, Linder GF, MacDougall JE. The Safe Dates program: 1-year follow-up results. Am J Public Health 2000 Oct;90(10):1619-22.

Foshee VA, Linder F, MacDougall JE, et al. Gender differences in the longitudinal predictors of adolescent dating violence. Prev Med 2001;32(2):128-41.

Heimer K. Socioeconomic status, subcultural definitions, and violent delinquency. Soc Forces 1997;75(3):799-833.

Herrenkohl RC, Egolf BP, Herrenkohl EC. Preschool antecedents of adolescent assaultive behavior: a longitudinal study. Am J Orthopsychiatry 1997;67(3):422-32.

Herrenkohl TI, Guo J, Kosterman R, et al. Early adolescent predictors of youth violence as mediators of childhood risks. J Early Adolesc 2001;21(4):447-69.

Herrera VM, McCloskey LA. Gender differences in the risk for delinquency among youth exposed to family violence. Child Abuse Negl 2001;25(8):1037-51.

Loeber R, Wei E, Stouthamer-Loeber M, et al. Behavioral antecedents to serious and violent offending: Joint analyses from the Denver Youth Survey, Pittsburgh Youth Study and the Rochester Youth Development Study. Stud Crime Crime Prev 1999;8(2):245-63.

Loeber R, Wung P, Keenan K, et al. Developmental pathways in disruptive child behavior. Dev Psychopathol 1993;5(1-2):103-33.

Mathew T, Nordstrom K. On the equivalence of meta-analysis using literature and using individual patient data. Biometrics 1999;55(4):1221-3.

McCloskey LA, Lichter EL. The contribution of marital violence to adolescent aggression across different relationships. J Interpers Violence 2003;18(4):390-412.

Nagin D, Tremblay RE. Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. Child Dev 1999;70(5):1181-96.

National Center for Injury Prevention and Control. Youth violence: Overview. Accessed: May 2004. http://www.cdc.gov/ncipc/factsheets/yvfacts.htm.

ODS and OMAR. Procedures for EPC Reports for ODS and OMAR. 2003.

Olkin I, Sampson A. Comparison of meta-analysis versus analysis of variance of individual patient data. Biometrics 1998;54(1):317-22.

Piquero A, Tibbetts S. The impact of pre/perinatal disturbances and disadvantaged familial environment in predicting criminal offending. Stud Crime Crime Prev 1999;8(1):52-70.

Rivera B, Widom CS. Childhood victimization and violent offending. Violence Vict 1990;5(1):19-35.

Roitberg T, Menard S. Adolescent violence: A test of integrated theory. Stud Crime Crime Prev 1995;4(2):177-96.

Saner H, Ellickson P. Concurrent risk factors for adolescent violence. J Adolesc Health 1996;19(2):94-103.

Satcher D. Youth violence: A report of the surgeon general. Accessed: May 2004. http://www.surgeongeneral.gov/library/youthviolence/.

Stewart LA, Clarke MJ. Practical methodology of meta-analyses (overviews) using updated individual patient data. Cochrane Working Group. Stat Med 1995;14(19):2057-79.

Stewart LA, Parmar MK. Meta-analysis of the literature or of individual patient data: is there a difference? Lancet 1993;341(8842):418-22.

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