Western University
Scholarship@Western

2008

Childhood Predictors of Adult Criminality: A Meta-Analysis Drawn from the Prospective Longitudinal Literature

Alan W. Leschied Dr.
Western University, leschied@uwo.ca

Debbie Chiodo
Western University

Elizabeth Nowicki
Western University

Susan Rodger
Western University

Follow this and additional works at: https://ir.lib.uwo.ca/edupub

Part of the Criminology Commons, Education Commons, and the Psychology Commons

Citation of this paper:

Leschied, A.W., Chiodo, D., Nowicki, E., & Rodger, S. (2008). Childhood predictors of adult criminality: A meta analysis. Canadian Journal of Criminology and Criminal Justice, 50, 435-468

Childhood Predictors of Adult Criminality:
A Meta-Analysis Drawn from the Prospective Longitudinal Literature[1]

Alan Leschied
The University of Western Ontario
Debbie Chiodo
Centre for Addiction and Mental Health

Elizabeth Nowicki and Susan Rodger
The University of Western Ontario

Résumé
Il existe maintenant suffisamment de recherches dans la littérature de la psychologie du comportement criminel pour évaluer les répercussions des expériences vécues pendant la petite enfance et l'adolescence sur les comportements à l'âge adulte. Dans la présente méta-analyse, trente-huit études prospectives et longitudinales répondaient aux critères de sélection. Elles portaient sur divers facteurs liés à la petite enfance et à la famille permettant peut-être de prédire la participation éventuelle à un délit ou un crime à l'âge adulte. Les principaux résultats révèlent que des prédicateurs dynamiques versus statiques sont liés à la participation éventuelle à la criminalité à l'âge adulte. Plus les enfants étaient âgés au moment où on a observé le prédicateur, plus leur tendance à commettre un délit à l'âge adulte était grande. Parmi les facteurs dynamiques, ceux observés chez les enfants et les adolescents qui ont obtenu la plus haute cote comprenaient une variété de composantes du comportement, notamment l'identification précoce de l'agression, des troubles de l'attention, de l'agitation et un besoin d'attention. Les composantes émotionnelles correspondant à la dépression, y compris le repli sur soi, l'anxiété, l'autodévalorisation et l'aliénation sociale, faisaient aussi parti du nombre. Il y avait aussi des descripteurs familiaux comme diverses stratégies parentales négatives, notamment les pratiques coercitives, les comportements autoritaires, le manque de supervision de l'enfant et la structure familiale, ou encore être témoin de violence, les conflits entre parents, certains facteurs de stress familiaux et le manque de communication. Les résultats obtenus sont passés en revue, de même que les stratégies de prévention relatives aux services ciblés qui influent sur la probabilité de voir chez les adultes des comportements antisociaux décelés durant leur jeunesse.

Abstract
Sufficient research now exists in the psychology of criminal conduct literature to address the long-term impact of early childhood and adolescent experiences on later adult outcomes. In the present meta-analysis, selected studies were prospective and longitudinal, tracking a variety of early childhood and family factors that could potentially predict later involvement in the adult criminal justice system. Thirty-eight studies met the selection criteria. Major findings indicate that dynamic versus static predictors are related to later adult criminal justice involvement. The older the child was at the time the predictor was measured, the stronger was the relationship to adult offending. Within the set of dynamic predictors, childhood and adolescent factors that rate most highly include a variety of behavioural concerns including early identification of aggression, attentional problems, motor restlessness, and attention seeking. Emotional concerns consistent with depression including withdrawal, anxiety, self-deprecation, and social alienation are also represented. Predictors also included family descriptors such as a variety of negative parenting strategies including coerciveness, authoritarian behaviours, lack of child supervision,

and family structure variables such as witnessing violence, inter-parental conflict, family stressors, and poor communication. Results are discussed in relation to prevention strategies for targeted services that influence the probability of antisocial outcomes for children into adulthood.

Introduction

Numerous commentaries have appeared, particularly over the past ten years, noting the important contributions of developmental criminology in adding to both our theoretical and practical understanding of the life course of crime for children and adolescents that can continue into adulthood. Farrington (1997) suggests that an understanding of developmental constructs in the context of criminal behaviour contributes to an appreciation of the interaction and implications of life events at different ages that have certain predictable outcomes, characterized as factors that either relate to desistance or exacerbation of antisocial behaviour. Le Blanc and Loeber (1998) suggest that "the application of developmental perspectives to the study of offending is likely to advance current understanding of offending's causes and courses" (115-116).

The implications of such a developmental appreciation of life course trajectories can contribute considerably to our understanding of the effectiveness of prevention and intervention. A social developmental framework that integrates the major theoretical orientations of our current psychologically informed understanding of criminal behaviour, personal, familial, and structural variables can be identified that can guide the understanding of both "causal and mediating processes hypothesized to predict behavior over the course of development" (Andrews and Bonta 2007, 95). Farrington and Welsh (2007) more recently suggest that a social developmental framework can guide the selection of risk-focused targets in prevention and intervention.

Coincidentally, while social developmental theory has contributed to an understanding of life course trajectories for antisocial behaviour, a number of longitudinal studies have appeared reporting on empirical findings related to the early life experiences for children and youth and their relationship to adult antisocial outcomes. Such data are a critical part of theory building related to risk prediction and can enhance viewing risk as a construct based on longitudinal studies within a developmental framework. This area, referred to as *developmental criminology*, holds the potential for refining our understanding of how risk factors may work at different ages and stages within the lives of children and their families to predict offending into the adult years. The present meta-analysis drew on the prospective, longitudinal literature in child development in identifying childhood and youth predictors for later adult offending.

Literature review

Longitudinal studies now report on the link between early child experience and subsequent antisocial behaviour. These findings suggest that parental inability to foster self-control in their children, neuropsychological disorders, a variety of negative parenting practices, coercive family interactions, and an inability of children to develop age-appropriate social skills (Lacourse, Cote, Nagin, Vitaro, Brendgen, and Tremblay 2002) appear promising in providing a basis for planning for prevention. The research on developmental disorders in children has reflected a range of findings from viewing children in isolation to understanding the impact of the social contexts that contribute to a child's potential for risk. Current findings from the longitudinal literature suggest that certain childhood disorders such as in the development of antisocial orientation will have different developmental trajectories, influenced by different systemic variables (Silk, Nath, Seigel, and Kendall 2000). And while Loeber and Farrington (2000: 746) suggest that "[t]he majority of childhood disorders reflect age normative problem behaviors which most children give up as they grow up," the challenge for developmental researchers is to identify which behaviours identified early in childhood are not transient developmental reactions but rather relate to later difficulty. Within the criminogenic risk context, early warning signs of protracted difficulty identified by a number of researchers suggest that such childhood factors as temperament, impulsivity, social withdrawal, aggression and hyperactivity associated with disruptive behaviour, family-based factors reflecting poor parenting practices, low supervision, physical punishment, neglect and poor communication, age, and gender (Loeber and Farrington; Hanish and Guerra 2002; Lacourse et al. 2002; Moffitt, Caspi, Harrington, and Milne 2002) all are factors that can play a role in the early prediction of later criminal conduct.

Relevance of theory

Social developmental theory can assist in creating a conceptual framework for identifying appropriate targets for intervention. For example, therapeutic progress is more likely to occur when theory is emphasized in intervention (Conduct Problems Prevention Group 2002; Kazdin 1997). In addition, as emphasized in the risk-predication literature by Andrews and Bonta (2007), a differential understanding of disorders that are influenced by dynamic over static characteristics and the timing or influence of systemic factors that can differentially affect childhood and adolescent outcomes will provide critical input to the understanding of prevention and early intervention.

The science of criminal conduct is now mature to the point where sufficient studies exist reporting on the long-term outcomes for children who experience early disruptions that can lead to later persistent involvement in both the youth and adult criminal justice systems. While small relative to the cross-sectional literature related to risk, the number of longitudinal studies is now adequate such that general findings drawn together through meta-analysis can provide policy makers, practitioners, and researchers with important findings on the identification of factors placing children and youth at risk. The importance of testing the predictive adequacy of early childhood experience within such a methodological framework lies in the increased reliability and validity of findings based on longitudinal studies. Acknowledging the contributions of meta-analysis, particularly within the criminal justice literature (Lipsey and Wilson 1998), this meta-analysis drew on the prospective longitudinal literature in risk prediction to examine static and

dynamic risk factors that relate to children and youth who progress into the adult criminal justice system.

Method

Studies were identified relating predictors of criminogenic risk for youths to their eighteenth birthday, or the age of majority, in determining entry into the adult criminal justice system in the country where the study took place. Only studies that were prospective and longitudinal were included. This is a methodological improvement over the use of cross-sectional studies used in most meta-analyses, which are less able to account for previous experiences of the subjects in the studies and how these might affect the findings. Longitudinal studies, particularly where concern is focused on developmental risk, will be more sensitive to within-subject comparisons. Relevant literature both published and unpublished from the major electronic databases was included: Psychinfo, ERIC, Social Work Abstracts, Medline, and Criminal Justice Abstracts. Searches were limited by date of publication from 1994 to 2004 - a period during which the major prospective, longitudinal studies have appeared. The population was limited to *childhood, school age*, and *adolescence*. If the database did not allow for population limits, the keyword *youth* was included in each search. Thirty-seven literature searches were performed on each database. Each search reflected a variation in the combination of 17 keywords: *meta-analysis, longitudinal, crime, criminality, criminal, involvement, prediction, predictors, trajectories, risk and risk factors, at risk populations, determinants, delinquency, offending, young offenders*, and *recidivism*. The keywords were selected on the basis of reviews and meta-analyses in the area. Indexed databases that generated keywords for searches were also included. References of each study were reviewed to ensure all relevant studies were reflected by the search. Search terms generated 48 studies of which 38 contained data that were reported in a format that was amenable for the analysis.

Coding of studies

Prior to statistical analysis, data from the selected studies were coded into categories including authorship and cohort name to ensure non-duplication of the data source. Studies were also coded according to predictor variables that were assigned to one of two major categories: (1) family factors that included static risk, parental mental health, parental management, family structure, and adverse family environment; and (2) child factors including static risk, internalizing, externalizing, social interpersonal, and developmental concerns, child-specific school and learning issues, pro-social behaviour, and criminal history.

For both family and child factors, static risk was defined as one that had occurred in the past and could not be reversed or changed. For family factors this included parents' criminal history and complications during pregnancy; for child factors this included the age of onset of both the child's criminal behaviour and drug use. Dynamic risk characterizes factors in the lives of children/youth that are changeable over time and will be most amenable to intervention. In family factors, this includes parental management; for child factors, dynamic factors include lack of control and truancy.

Adult outcomes for each study were coded for official conviction or self-report. A further category focused on the age of participants prior to reaching the age of majority, and data were coded as early (birth to 6 years), mid (7 to 11 years), or late childhood/adolescence (12 to age of majority).

Demographic summary

Sample sizes were summed across the 38 studies reflecting 66,647 participants. There were 43,586 males (65.4%), 19,233 females (28.9%), and 3,828 (5.7%) participants not identified by gender. Half of all participants were from Scandinavian countries ($n = 33,384$ or 50.1%), with the next largest group from the United States ($n = 16,455$ or 24.7%). Other geographical areas included Denmark ($n = 10,459$ or 15.7%), Australia and New Zealand ($n = 3,247$ or 4.9%), Holland ($n = 1,452$ or 2.2%), and the United Kingdom ($n = 1,650$ or 2.5%).

The overall mean age at the initial data-tracking assessment was 10.5 years ($SD = 5.0$). Twenty-five studies provided mean ages, with 13 providing age ranges. In order to calculate an overall mean, the midpoint of each age range was used. The same procedure was used to determine mean age at follow-up ($M = 24.6$, $SD = 5.6$) and the average number of years between childhood and adult assessments ($M = 13.3$, $SD = 7.4$).

Estimating program effects

Using Comprehensive Meta-analysis (version 2), effect size (*ES*) estimates were derived from 38 studies. *ES* was measured as the impact of the independent variable (e.g., behavioural predictor) on the dependent variable (e.g., official conviction). Because the dependent variable is often measured differently from one study to another (e.g., self-report, official convictions, violent versus non-violent offences), it was necessary to transform the reported data to a common metric (similar to a Z score) before calculating the mean ES. In meta-analytic studies, data are statistically combined to provide an estimated ES, in this case, the impact of a given predictor such as the child's behaviour on a measure of adult criminality. Information was entered according to the categories previously mentioned. *ES* was entered directly if provided within a study, or was computed after relevant summary data were entered. The program calculated weighted effect sizes and significance, 95% confidence intervals (*CI*), tests of the null hypotheses, and heterogeneity statistics (*Q*).

As a general guideline, Cohen (1988) proposed small, medium, and large values for *ES*. A "medium" *ES* (0.50) was defined by Cohen to represent an effect likely to be visible to the naked eye of a careful observer. In fact, medium *ES* approximates the average size of observed effects in various fields. Cohen set a "small" *ES* (.20) as one that is noticeably smaller than a medium *ES* but not so small as to be trivial. Finally, a "large" *ES* (0.80) was described as the same distance above medium as small was below it. While these conventions are useful and a valid way to summarize results, Weisz, Sandler, Durlak, and Anton (2005) argue that proper interpretation of *ES* values may differ, depending on the particular independent variable examined, and practical significance must always be weighed into the judgment. Thus, in the current meta-analysis, even a statistically "small" *ES* could be interpreted as having an impact in predicting adult convictions, given that adult convictions in general are relatively low-base-rate phenomena.

Effect sizes were calculated in a similar manner for all studies such that positive values always meant that the independent variable (e.g., behavioural concerns) was a predictor of adult criminality. Negative values indicate that the independent variable was a predictor in the control group rather than the experimental group (or for single group studies, prediction was in the opposite direction).

Most studies compared predictors on more than one type of outcome measure. Because multiple *ES* values derived from the same study may not represent statistically independent observations, multiple *ES* values obtained from individual measures within the same study were averaged to obtain a single *ES* for the outcomes.

Results

Results are presented in five sections: descriptive characteristics of the studies, overall meta-analysis across all outcomes and predictors for child factors, separate analyses for each child predictor, an overall meta-analysis across all outcomes and predictors for family factors, and separate analyses for each family predictor. Reported results are for a random effects analysis, which is appropriate as a result of the recognized variability within the sampling of studies (Borenstein and Rothstein 1999).Weighted effect sizes are reported for all analyses, since this approach gives greater weight to *ES* values from larger samples. It has been suggested that, where possible, weighted *ES* values are preferable to unweighted calculations, where *ES* values are given equal weight, regardless of the sample size (Wolfe 1986).

Overall effect of all outcomes and predictors for child factors

The 29-study database of child factor studies yielded 274 *ES* measurements (see Tables 1 and 2). Child factors included static risk (e.g., age, gender), internalizing concerns (e.g., depressive symptoms, anxiety), externalizing concerns (e.g., aggression, antisocial behaviour), social and interpersonal concerns (e.g., social skills), developmental concerns (e.g., speech and motor development), and school/ learning child-specific concerns (e.g., academic achievement). The weighted overall *ES* across all mean *ES* measurements was calculated. Overall, the child predictors examined by this synthesis appear to modestly predict adult criminality. Regardless of the type of child factor examined, the overall *ES* was .29 (*CI* = .17-.40), which is significant (Z_c = 4.93, *p* < .001). This suggests that child factors in general have a modest effect in predicting adult correctional outcomes.

Table 1.
Alphabetized listing by first author summarizing study characteristics: Predictors, sample, and outcome type

Table 2.
Child factors comparisons for all outcomes x timepoint - randommodels

The highly heterogeneous nature of the distribution suggests large differential effects across studies (Q_t = 242.52, *df* = 28, *p* <.001). These findings are not surprising, given the varied methodologies reported across studies, the differences in the measurement of predictors, and the

heterogeneous nature of the samples. Thus, any attempt to interpret the overall average *ES* may be misleading, and hence a closer examination of factors that may moderate the *ES* is warranted.

Two potential sources of variation in *ES* values across studies were the type of child predictor measured and the age at which the factors were measured. While gender would have been an obvious source of variation, most studies were conducted on males ($n = 17$, 59%) and of those studies that examined both genders ($n = 12$), few of these studies included female participants in the analyses because often there were too few subjects to examine statistically.

Childhood risk factors

Overall, the findings related to child factors showed that the older the child was displaying a risk factor, the more reliable the factor was in predicting an adult criminogenic outcome. The child factors measured during early childhood (age range = birth to six years) were not significant predictors of adult criminality ($Z_c = 1.84$, $p > .05$). The *ES* for all child factors measured during mid-childhood (age range = 7-11 years) predicting adult criminality was .18 ($CI = .01-.36$), which was significant ($Z_c = 2.09$, p < .05). This is suggestive of a small *ES*. In contrast, the *ES* for child factors measured during adolescence (age range = 12 years and older) was .40 ($CI = .25-.55$), which was significant ($Z_c = 5.22$, $p < .001$). An *ES* of this magnitude is noteworthy, suggesting overall that the child factors measured during adolescence are strong and reliable predictors of adult criminality.

Analyses by child predictor

The overall analyses examining all child risk factors show that, regardless of the type of predictor examined (e.g., internalizing or externalizing concerns), on average these factors modestly predict adult criminality. It is, however, more meaningful to examine individual child factors that relate to predicting adult correctional outcomes. These individual predictors are divided between static and dynamic predictors.

Static risk

As mentioned, child static risk includes predictors that are historical and cannot be changed, and include variables such as race, gender, and the age at which the child began engaging in crime and drug use. Regardless of the age at which the static risk predictors were measured (i.e., early childhood, mid-childhood, or adolescence), the overall ES was not significant ($Z_c = .53$, $p > .1$). Although early initiation of violent and criminal behaviour has been associated with more serious and chronic violent behaviour (e.g., Farrington 1995), there were only two studies (Benda, Corwyn, and Toombs 2001; Eklund and Klinteberg 2003) included in this analysis examining this relationship. Age of onset in regards to the nature of offending has been studied most extensively in the area of risk prediction, and there substantial evidence suggests that those most at risk for adult antisocial behaviour are those with early age onset antisocial behaviour. It is therefore premature to suggest these factors are not reliable predictors of adult criminality on the basis of only two studies and the previous available evidence. Criminal history factors such as prior incarcerations, type of crime, or number of victims were measured only in adolescence.

The results of this analysis indicate that the ES for criminal history factors was .38 (CI = .07-.69), which was significant (Z_c = 2.4, p <.02).

Dynamic risk

These risk factors, as outlined earlier, include factors in the lives of children/youth that are changeable over time and will be most amenable to intervention. The strongest associations were identified with behavioural concerns across all age groupings, where the *ES* was .39 (CI = .16-.62; Z_c = 3.36, p <.01). The *ES* for externalizing concerns (e.g., lack of control, antisocial behaviour) measured in early childhood was .20 (CI = .1-.3; Z_c = 3.81, p < .001). This suggests that the externalizing concerns measured during early childhood in this review are a satisfactory predictor of adult criminality, as they are in mid-childhood, with an *ES* of .31 (CI = .03-.59), and adolescence, with an *ES* of .52 (CI = .14-.90). These behavioural predictors reflect a variety of concerns including hyperactivity, aggression, and conduct disorder. Internalizing concerns, including depressive symptoms and anxiety, during childhood and adolescence are a modest predictor, where the *ES* was .22 (CI = .009-.43; Z_c = 2.04, p < .05). No significant outcomes were associated with social and interpersonal concerns, developmental disorders, or school-related problems.

 Table 3.
Family factors comparisons for all outcomes x timepoint - randommodels

Overall effect of all outcomes and predictors for family factors

The 19-study database of family factor studies yielded 188 *ES* measurements (see Table 3). Family factors included static risk (e.g., mother's age at the time of the child's birth), parental mental health (e.g., substance use), parental management (e.g., super-vision, discipline), family structure (e.g., size of the family, family separation), and adverse family environment (e.g., family conflict, abuse, neglect). The weighted overall *ES* across all mean *ES* measurements was calculated. Overall, the family predictors examined by this synthesis modestly predict adult criminality. Regardless of the type of family factor examined, the overall *ES* was .25 (CI = .14-.35; Z_c = 4.7, p < .001). This suggests that family factors in general have a modest effect in predicting adult criminality. Although the overall mean ES in the current analysis provides evidence that the family predictors were, on average, modest predictors of adult criminality, the nature of the distribution suggests some differential effects across studies (Q_t = 98.38, df = 19, p <.001), although this variation was much less, compared to the child factor studies. Again, this is not surprising, given the varied methodologies reported across studies, the differences in the measurement of predictors, and the heterogeneous nature of the samples. Thus, any attempts to interpret the overall average *ES* may be misleading, and hence a further exploration is required in identifying which of the factors is accounting for the effect.

A closer examination of the individual age groups examined across all predictors revealed an *ES* for family factors measured during early childhood (age range = birth to six years) was .13 (CI = .07-.18), which was significant (Z_c = 4.59, p <.001). An *ES* of .13, however, suggests that family factors measured in early childhood are a weak predictor of adult criminality. While the *ES* for family factors measured during mid-childhood was modestly high at .30 (CI = -.04-.65), this effect only approached significance (Z_c = 1.73, p <.08). On the other hand, the *ES* for family

factors measured in adolescence (age range = 12 years and older) was .31 (CI = .13-.48), which was significant (Z_c = 3.45, p <.01).

Analysis by family predictor

Static risk

Family static-risk predictors include variables such as socio-economic status, mother's age at birth of child, birth and delivery complications, and parental criminal history. Regardless of the age groups at which the static risk predictors were measured (i.e., early childhood, **[End Page 455]** mid-childhood, or adolescence), the overall ES was .15, which was significant (CI=.05-.26, Z_c = 2.79, p < .01). An ES of .15, however, is small and, at least for the studies reviewed here, must be interpreted with caution. Static risk factors such as parental criminality, however, have been shown to be significant predictors of criminal acts in some studies (e.g., Farrington 1989), but this finding is not completely consistent across the literature (see Moffit 1987). The ES values for the three age groups (early childhood, mid-childhood, and adolescence) were not significant (all p > .1). However, because of the heterogeneity of the methodologies, measures, and outcomes reported in the various studies, an examination for the individual factors is considered more reliable in reflecting the prediction of adult criminality. These areas included parental mental health, parent management, family structure, and adverse family environment.

Dynamic risk

In terms of dynamic family risk, parent management that tends to be coercive, inconsistent, or lacking in supervision during mid-childhood emerged as a particularly strong predictor, with ES of .41 (CI = .17-.66; Z_c = 3.30, p < .001). Family structure variables such as whether a child was involved in the child welfare system and marital status of the parents, regardless of the age groups, was significant, with an overall ES of .48 (CI = .17-.80; Z_c = 2.98, p <.01). An ES of this magnitude is notable and suggests that family structure variables are important predictors of adult crime. Strikingly, the results of the family structure variables measured in adolescence were of particular importance (e.g., child welfare involvement, parental separation, marital status). The ES for these variables measured in adolescence was .67 (CI = .19-.15; Z_c = 2.71, p <.01).

Adverse family environment factors (e.g., family violence) were used as predictors of adult crime, and, regardless of the age groups at which the adverse family environment predictors were measured, the overall ES was .23 (CI = .08-.38; Z_c = 2.99, p < .001). Factors such as witnessing family violence and child maltreatment are modest predictors of adult crime. One would have expected, however, that the ES for factors such as child maltreatment would be stronger, given the established literature on child maltreatment and adult crime (Smith and Thornberry 1995). However, given the heterogeneous nature of the studies examining adverse family environments, and the varied definitions of family violence, the smaller ES may not be surprising.

Discussion

Meta-analysis has assisted the field of criminal justice in developing models of risk assessment. Such assessment strategies have supported efforts in refining program planning and service delivery. The field of developmental criminology in criminal justice has a particularly important role to play in this context as it reflects, within a developmental framework, those issues that children and youth contend with that can place them at ongoing risk for antisocial outcomes. This review employed longitudinal and prospective studies within a meta-analytic framework in examining predictors that relate to being involved in the adult criminal justice system. The results are interpreted against meta-analyses that employ cross-sectional studies, predictors in the context of developmental differences, child versus family predictors, and finally the relevance of the current findings to service utilization in prevention.

Relevance to cross-sectional predictors of risk

The following list of factors were identified as particularly strong predictors from the present analysis: behavioural difficulties including hyperactivity, aggression, and conduct disorder; emotional concerns including depression; family factors that include coercive, inconsistent parent management that also lacks supervision; marital status of the parents; and witnessing family violence and child maltreatment. From the summary provided by Borum (2000), predominant predictors from the cross-sectional literature that agree with the present findings include all factors noted from the present study. Hence, confidence should increase in appreciating the convergence of findings from the present longitudinal studies with previously reported cross-sectional results.

Developmental differences

The major area of contribution from the present meta-analysis lies in furthering the understanding of developmental differences and risk. Again, Borum (2000) suggests that precision in the assessment of risk increases as our appreciation increases of the developmental context in which a risk factor occurs. To review, the goal of this analysis was to examine the pervasive impact of risk as it relates to involvement in the adult criminal justice system. Major findings that emerge emphasized that certain factors become increasingly stable as predictors with the increasing age of the child. In other words, measures taken in adolescence are stronger predictors than those identified when a child is younger. In addition, and consistent with developmental and social learning theory, systemic factors of risk proved to be stronger predictors relative to individual child predictors. Hence, the nature of parent management viewed as inconsistent, harsh, or punitive, along with a child's experience with violence in the home, both as a witness and as a victim, proved to be particularly strong family-based predictors. This too would be consistent with the numerous commentaries extending from Bronfenbrenner to Henggeler, who emphasize the importance of systemic variables in understanding childhood development generally and risk prediction in particular.

In addition, and as underscored by Andrews and Bonta (2007), understanding of risk prediction and assessment strongly supports the view that it is the combination of factors as well as the intensity of a specific risk factor that leads to the overall potency of prediction. Within a developmental framework, some speculation can be made about the experience of children who are challenged with risk at different developmental periods. For example, child-specific risk -

including a variety of behavioural disorders *in combination with* being the recipient of harsh or inconsistent parenting and exposure and victimization of violence within the home that can co-occur or follow in a sequence of risk - can incrementally increase the accuracy of prediction. Studies that assist in this regard utilize a path analysis or hierarchical linear modelling to investigate the additive and sequential effects of risk exposure across developmental periods.

Relevance to service utilization

Risk prediction and assessment have assisted service planning in two ways. First, they have provided a context in which to consider the *intensity* of service. Based on risk-assessment models, the service paradigm supports the view that higher-risk cases will benefit from more intensive forms of service, with lower-risk cases benefiting from less-intensive service. Second, risk assessment has also served as the basis for the selection of and priority given to certain targets of service. Tolan (2001) suggests that, within a developmental-ecological framework, of which this meta-analysis is an example, service providers may increasingly be able to refine intervention decisions beyond the intensity and focused selection of treatment targets to move to decision making on the timeliness of intervention within a developmental framework.

Limitations and future directions

The value and contribution of any meta-analysis depends upon the number and quality of the studies that are available. The present analysis was ambitious in restricting the selection of studies to reflect longitudinal prospective studies that track children and youth to at least their eighteenth birthday or age of entering the adult criminal justice system in the country of origin. To a great degree, the results confirm the consistency in identifying the risk factors that have also been identified in the cross-sectional literature. Where inconsistencies do occur, caution should be used in not interpreting the lack of evidence as undermining those findings based on the longitudinal literature.

This is an evolving database from which to draw, and this meta-analysis represents an early attempt to restrict the selection of studies to longitudinal studies only as the sole source for the meta-analysis. Although it is encouraging that 38 studies met our selection criteria, the scope of dependent and independent variables addressed in the literature presented some limitations in how we conducted our analyses. It would have been informative, for example, to focus on differences in effect sizes for important predictors across developmental stages, or between males and females. To focus a study on a single set of predictors such as substance abuse or depressive symptoms could provide the necessary details needed to inform clinical practice, interventions, and public policy. It would also be important to distinguish between self- and official reports, and to determine if significant differences in effect sizes exist for these different sources of data. However, given the relatively large number of dependent variables in the current literature base, limitations in how studies reported data pertaining to independent variables, and the comparatively small number of studies that fit our rigorous selection criteria, we were not able to carry out more detailed analyses. We hope that the limitations of our study can be addressed in future meta-analyses that will have access to a larger pool of research.

Viewing youth prevention within a developmental framework

Recent work in the area of child and youth prevention has promoted a focus in two directions. The first examines the benefits of prevention relative to the costs of tracking the impact of certain outcomes that could have been prevented, had the services been in place. The work of the Washington State Institute for Public Policy (2004) characterizes its reviews of the effectiveness of prevention within this framework in two ways. First, risk in prevention promotes understanding about the impact of service, measuring the outcomes in relevant and useful terms. The second (which has captured the interest of policy makers and legislators in particular) is the importance of measuring the impact of service upon the costs of offering the service. In other words, when it comes to prevention in measuring the benefits of reducing offending in youth justice, how much community safety can be "purchased," factoring in the costs of service delivery?

The second focus in prevention, and the area where the current findings have the greatest relevance, lies in the increased emphasis given to viewing prevention within a social developmental framework. Dahlberg and Potter (2001) suggest that we can maximize the benefits of prevention by appreciating that risk factors will interact differentially at different developmental periods. Farrington and Welsh (2007) provided convincing evidence for the ability of service providers to intervene effectively when early risk factors are known. For example, in early childhood, family factors including coercive parenting and child maltreatment will play a more significant role than peer influence and substance use, which are among two of the more significance risk factors affecting adolescence. The relevance of this type of analysis, as suggested by Dahlberg and Potter, lies in "providing some indication of where to focus preventive efforts" (4). While some of the findings from the present study suggest that some predictors of risk are applicable across all age groupings such as behavioural indicators of aggression and an inability to focus attention, other risk factors are unique to specific developmental periods. Earlier indicators of risk that are developmentally sensitive reflect a child's reaction to systemic influences primarily within the family. Examples of these predictors for adult offending include early victimization through child maltreatment and the experience of vicarious trauma through family violence.

Specific to focusing prevention efforts to interrupt a trajectory that leads to involvement in the adult criminal justice system, a model that differentially focuses efforts at reducing risk would include the following:

- In early childhood a focus on factors related to violence in the family, either with a child being the victim of maltreatment or traumatized by violence between caregivers

- In middle childhood and adolescence an increasing focus on family-related risk such as supervision, the nature of parenting, and the impact of violence in the family

While such possibilities for increasing prevention effectiveness await empirical outcomes, the current meta-analysis adds to our increasing confidence in the potential to use a developmental framework within which to plan such prevention.

Note

References

(Studies included in the formal meta-analysis are indicated with an asterisk).

*Andersson, T., D. Magnusson and P. Wennberg 1997 Early aggressiveness and hyperactivity as indicators of adult alcohol problems and criminality: A prospective longitudinal study of male subjects. Studies on Crime and Crime Prevention 6: 7-20.

Andrews, D.A. and J. Bonta 2007 The Psychology of Criminal Conduct. 3rd ed. Cincinnati: Andersen.

*Barkley, R.A., M. Fischer, L. Smallish and K. Fletcher 2004 Young adult follow-up of hyperactive children: Antisocial activities and drug use. Journal of Child Psychology & Psychiatry & Allied Disciplines 45: 195-211. [CrossRef]

*Benda, B.B., R.F. Corwyn and N.J. Toombs 2001 Recidivism among adolescent serious offenders. Criminal Justice and Behavior 28: 588-613. [CrossRef]

Borenstein, M. and B. Rothstein 1999 Comprehensive meta-analysis: A computer program for research synthesis. Edgewood, NJ: Biostat. **[End Page 461]**

Borum, R. 2000 Assessing violence risk among youth. Journal of Clinical Psychology 56: 1263-1288. [CrossRef]

*Brennan, P.A., E.R. Grekin, E.L. Mortensen and S.A. Mednick 2002 Relationship of maternal smoking during pregnancy with criminal arrest and hospitalization for substance abuse in male and female adult offspring. American Journal of Psychiatry 159: 48-54. [CrossRef]

*Cannon, M., M.O. Huttunen, A.J. Tanskanen, L. Arseneault, P.B. Jones and R.M. Murray 2002 Perinatal and childhood risk factors for later criminality and violence in schizophrenia: Longitudinal, population-based study. British Journal of Psychiatry 180: 496-501. [CrossRef]

*Christoffersen, M.N., B. Francis and K. Soothill 2003 An upbringing to violence? Identifying the likelihood of violent crime among the 1966 birth cohort in Denmark. Journal of Forensic Psychiatry and Psychology 14: 367-381. [CrossRef]

Cohen, J. 1988 Statistical Power Analysis for the Social Sciences. Hillsdale, NJ: Erlbaum.

Conduct Problems Prevention Research Group 2002 Evaluation of the first 3 years of the Fast Track prevention trial with children at high risk for adolescent conduct problems. Journal of Abnormal Child Psychology 30: 19-35. [CrossRef]

Dahlberg, L.L. and L.B. Potter 2001 Youth violence: Developmental pathways and prevention challenges. American Journal of Preventive Medicine 20: 3-14.

*Donnellan, M.B., X. Ge and E. Wenk 2000 Cognitive abilities in adolescent-limited and life-course-persistent criminal offenders. Journal of Abnormal Psychology 109: 396-402. [CrossRef]

*Eklund, J.M. and B.A.F. Klinteberg 2003 Childhood behavior as related to subsequent drinking offences and violent offending: A prospective study of 11- to 14-year-old youths into their fourth decade. Criminal Behavior and Mental Health 13: 294-309. **[End Page 462]** [CrossRef]

*Ezell, M.E. and L.E. Cohen 1997 Age, crime, and crime control policies: A longitudinal analysis of youthful, serious, chronic offenders with implications for the "Three Strikes" legislation. Studies on Crime & Crime Prevention 6: 169-199.

Farrington, D.P. 1989 Early predictors of adolescent aggression and adult violence. Violence and Victims 4: 79-100.

Farrington, D.P. 1995 Key issues in the integration of motivational and opportunity reducing crime prevention strategies. In P.O. Wikstorm, R.V. Clarke and J. McCord (eds.), Integrating Crime Prevention Strategies: Propensity and Opportunity. Stockholm: National Crime Prevention Council.

Farrington, D.P. 1997 A critical analysis of research on the development of antisocial behavior from birth to adulthood. In D.M. Stoff, J. Breikling, and J.D. Maser (eds.), The Handbook of Antisocial Behavior. Chichester, UK: Wiley.

*Farrington, D.P. 2000 Psychosocial predictors of adult antisocial personality and adult convictions. Behavioral Sciences & the Law 18: 605-622. [CrossRef]

Farrington, D.P. and B.C. Welsh 2007 Saving children from a life of crime: Early risk factors and effective interventions. London, UK: Oxford University Press.

*Fergusson, D.M. and L.J. Woodward 1999 Maternal age and educational and psychosocial outcomes in early adulthood. Journal of Child Psychology & Psychiatry & Allied Disciplines 40: 479-489. [CrossRef]

*Hämäläinen, M. and L. Pulkkinen 1995 Aggressive and non-prosocial behavior as precursors of criminality. Studies on Crime & Crime Prevention 4: 6-21.

Hanish, L.D. and N.G. Guerra 2002 A longitudinal analysis of patterns of adjustment following peer victimization. Development and Psychopathology 14: 69-89. **[End Page 463]** [CrossRef]

*Henry, B., A. Caspi, T.E. Moffitt, H. Harrington and P.A. Silva 1999 Staying in school protects boys with poor self-regulation in childhood from later crime: A longitudinal study. International Journal of Behavioral Development 23: 1049-1073.

*Herrenkohl, T.I., B. Huang, R. Kosterman, J.D. Hawkins, R.F. Catalano and B.H. Smith 2001 A comparison of social development processes leading to violent behavior in late adolescence for childhood initiators and adolescent initiators of violence. Journal of Research in Crime and Delinquency 38: 45-63. [CrossRef]

*Hodgins, S. 1994 Status at age 30 of children with conduct problems. Studies on Crime & Crime Prevention 3: 41-62.

*Huesmann, L.R., L.D. Eron and E.F. Dubow 2002 Childhood predictors of adult criminality: Are all risk factors reflected in childhood aggressiveness? Criminal Behavior & Mental Health 12: 185-208. [CrossRef]

*Johnson, L.M., R.L. Simons and R.D. Conger 2004 Criminal justice system involvement and continuity of youth crime: A longitudinal analysis. Youth & Society 36: 3-29. [CrossRef]

*Kasen, S., P. Cohen and J.S. Brook 1998 Adolescent school experiences and dropout, adolescent pregnancy, and young adult deviant behavior. Journal of Adolescent Research 13: 49-72. [CrossRef]

Kazdin, A.E. 1997 A model for developing effective treatments: Progression and interplay of theory, research, and practice. Journal of Clinical Child Psychology 26: 114-129.

*Kjelsberg, E. 1999 Adolescence-limited versus life-course-persistent criminal behavior in adolescent psychiatric inpatients. European Child & Adolescent Psychiatry 8: 276-282. [CrossRef]

*Klein, K., R. Forehand, L. Armistead and P. Long 1997 Delinquency during the transition to early adulthood: Family and parenting predictors from early adolescence. Adolescence 32: 61-80.
[End Page 464]

Lacourse, E., S. Cote, D.S. Nagin, F. Vitaro, M. Brendgen and R.E. Tremblay 2002 A longitudinal-experimental approach to testing theories of anti-social behavior development. Development and Psychopathology 14: 909-924.

Le Blanc, M. and R. Loeber 1998 Developmental criminology updated. Crime and Justice 23: 115-198.

*Levenston, G.K. 2001 A longitudinal analysis of childhood externalizing and internalizing psychopathology as risk factors for criminal offending in adulthood. Dissertation Abstracts International 62: 5381.

Lipsey, M.W. and D.B. Wilson 1998 Effective intervention for serious juvenile offenders. In R. Loeber, and D.P. Farrington (eds.), Serious and Violent Juvenile Offenders. Thousand Oaks, CA: Sage.

Loeber, R. and D.P. Farrington 2000 Young children who commit crime: Epidemiology, developmental origins, risk factors, early interventions, and policy implications. Development and Psychopathology 12: 737-762.

Moffit, T.E. 1987 Parental mental disorder and offspring criminal behavior: An adoption study. Psychiatry 50: 346-360.

*Moffitt, T.E., A. Caspi, H. Harrington and B.J. Milne 2002 Males on the life-course-persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. Development & Psychopathology 14: 179-207.

*Nicholson, J.M., D.M. Fergusson and L.J. Horwood 1999 Effects on later adjustment of living in a stepfamily during childhood and adolescence. Journal of Child Psychology & Psychiatry & Allied Disciplines 40: 405-416. [CrossRef]

*Nisbet, I.A., P.H. Wilson and S.W Smallbone 2004 A prospective longitudinal study of sexual recidivism among adolescent sex offenders. Sex Abuse 16: 223-234.

*Overbeek, G., W. Vollebergh, W. Meeus, R. Engels and E. Luijpers 2001 Course, co-occurrence, and longitudinal associations of emotional disturbance and delinquency from adolescence to young [End Page 465] adulthood: A six-year three-wave study. Journal of Youth and Adolescence 30: 401-426. [CrossRef]

*Piquero, A.R. and N.A. White 2003 On the relationship between cognitive abilities and life-course-persistent offending among a sample of African Americans: A longitudinal test of Moffitt's hypothesis. Journal of Criminal Justice 31: 399-409. [CrossRef]

*Pulkkinen, L. and M. Hämäläinen 1995 Low self-control as a precursor to crime and accidents in a Finnish longitudinal study. Criminal Behavior & Mental Health 5: 424-438.

*Raine, A., P. Brennan and S.A. Mednick 1994 Birth complications combined with early maternal rejection at age 1 year predispose to violent crime at age 18 years. Archives of General Psychiatry 51: 984-988.

*Räsänen, P., H. Hakko, M. Isohanni, S. Hodgins, M.R. Jarvelin and J. Tihonen 1999 Maternal smoking during pregnancy and risk of criminal behavior among adult male offspring in the Northern Finland 1966 Birth Cohort. American Journal of Psychiatry 156: 857-862.

*Satterfield, J.H. and A. Schell 1997 A prospective study of hyperactive boys with conduct problems and normal boys: Adolescent and adult criminality. Journal of the American Academy of Child and Adolescent Psychiatry 36: 1726-1735. [CrossRef]

*Sauvola, A., O. Koskinen, J. Jokelainen, H. Hakko, M. Järvelin and P. Räsänen 2002 Family type and criminal behavior of male offspring: The Northern Finland 1966 Birth Cohort Study. International Journal of Social Psychiatry 48: 115-121. [CrossRef]

*Scholte, E.M. 1999 Factors predicting continued violence into young adulthood. Journal of Adolescence 22: 3-20. [CrossRef]

*Shepherd, J., D. Farrington and J. Potts 2002 Relations between offending, injury and illness. Journal of the Royal Society of Medicine 95: 539-544. [CrossRef]

Silk, J.S., S.R. Nath, L.R. Seigel and P.C. Kendall 2000 Conceptualizing mental disorders in children: Where have we **[End Page 466]** been and where are we going? Development and Psychopathology 12: 713-735.

Smith, C. and T.P. Thornberry 1995 The relationship between childhood maltreatment and adolescent involvement in delinquency. Criminology 33: 451-481.

*Smith, C.A. and D.P. Farrington 2004 Continuities in antisocial behavior and parenting across three generations. Journal of Child Psychology & Psychiatry & Allied Disciplines 45: 230-247. [CrossRef]

*Steiner, H., E. Cauffman and E. Duxbury 1999 Personality traits in juvenile delinquents: Relation to criminal behavior and recidivism. Journal of the American Academy of Child and Adolescent Psychiatry 38: 256-262. [CrossRef]

*Stevenson, J.R. and R. Goodman 2001 Association between behavior at age 3 years and adult criminality. British Journal of Psychiatry 179: 197-202. [CrossRef]

Tolan, P.H. 2001 Emerging themes and challenges in understanding youth violence involvement. Journal of Clinical Child Psychology 30: 233-239.

Washington State Institute for Public Policy 2004 Benefits and Costs of Prevention and Early Intervention Programs for Youth. Olympia: WA.

Weisz, J.R., I.N. Sandler, J.A. Durlak and B.S. Anton 2005 Promoting and protecting youth mental health through evidence-based prevention and treatment. American Psychologist 60: 628-648.

*Wennberg, P. and M. Bohman 2002 Childhood temperament and adult alcohol habits: Aprospective longitudinal study from age 4 to age 36. Addictive Behaviors 27: 63-74.

*Widom, C.P. and M.A. Ames 1994 Criminal consequences of childhood sexual victimization. Child Abuse & Neglect 18: 303-318.

Wolfe, D. 1986 Child Abuse: Implications for Child Development and Psychopathology. 2nd ed. Thousand Oaks, CA: Sage. **[End Page 467]**