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Risk assessment in criminology: basic issues, challenges, and perspectives

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Abstract

The article deals with some of the issues of criminological risk research and assessment that continue to pose a challenge. The focus is on individual-oriented risk assessment to illustrate the importance of linking risk assessment and interventions. Although some risk assessment tools have shown high predictive power in large studies, we should recognise that risk research is not an end in itself. It is about understanding the differences between *risk* and *danger*, because risk is seen as something that can be controlled and prevented by appropriate measures, whereas danger has the connotation of an uncontrollable threat. This leads to the question of risk management and the distinction between correlational risk factors, risk markers and causal factors. It should contribute to practical measures to reduce criminal developments and support evidence-based decisions in criminal justice. By adopting a comprehensive perspective that considers cumulative risk and protective factors, the links between risk assessment and intervention become essential for risk management.

Keywords: Risk assessment, risk management, intervention, prevention

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Risk assessment in criminology: basic issues, challenges, and perspectives

Introduction

It is a sad privilege and emotional duty to contribute to this thematic issue in memoriam of Professor David P. Farrington who passed away in November 2024. I will not repeat his outstanding achievements that made him a "giant in science" as I wrote in obituaries for the ESC and in a journal (Lösel, 2024, 2025). In memoriam of David, we also published an article in CBMH (Lösel et al., 2025) that contained a prospective longitudinal study on his Integrated Cognitive Antisocial Potential Theory that is presented by Jesus, Maia, Barqueira, Gocalves and Gomes in this issue Theory. Our study demonstrated the validity of the Cracow Risk/Needs Assessment Instrument that is described by Corrado and Champion in this issue. The editors of the present memoriam issue rightly selected research on risk assessment as a topic because David addressed this intensively within his extremely broad range of studies. His famous Cambridge Study in Delinquent Development (*CSDD*) of children from London he followed up into adulthood and also in the second and third generation (e.g., Farrington et al., 2023) contributed immensely to the validation of individual and social risk factors for criminal and violent behavior. This research formed the basis for his strong engagement on risk-based developmental prevention that aimed to save children from a life of crime (Farrington & Welsh, 2007). It was not only influential in Britain but became a model for research and practice in many parts of the world. Examples of early assessment are represented in this special issue by Augimeri and Pepler, Koegl, and Corrado and Champion. Another field where David dealt with risk assessment focused on personality disorders and biological risks of criminality. For example, he published on childhood predictors of adult psychopathy (e.g., Farrington & Bergstrom, 2023), a topic that is addressed in this issue by Skinner, Bergstrom, Jolliffe, Farrington and Zara. Biological risks like low resting heart rate have been repeatedly addressed by David (e.g., Portnoy & Farrington, 2015) and also with Anna Baldry from Italy who passed away much too early. Another part of David's risk-oriented research addressed long-term consequences of school bullying (Ttofi et al., 2012) and the effects of prevention programs (Ttofi & Farrington, 2011).

In this article I will not report a specific empirical study that is related to David's work. In contrast, I will address some issues of criminological risk research and assessment that (in spite of much progress) are still challenging. As other articles in this issue, I focus on individual-oriented risk assessment and not on population-oriented crime risks on the society level. I cannot go into details of risk assessment in specific fields but only mention a few examples (e.g., from developmental risk assessment or on recidivism of adult offenders). My selected topics should shed spotlight on issues that I experienced in my own research and practice in these fields. I will not discuss statistical details but refer more to the links between risk assessment and interventions. Even when there is strong predictive power of some risk assessment instruments in large studies, we should be aware that risk research is not an end in itself (Zara & Farrington, 2016). It should contribute to practical measures for reducing criminal developments and support evidence-based decisions in criminal justice. Therefore, the links between risk assessment and intervention are essential for risk-management. This was one of the key messages from David and is well represented in the contributions to this memoriam issue.

Risk factors and causation

As in medicine and other disciplines, risk factors are personal or social characteristics of an individual that predict an enhanced or high probability of a future undesirable outcome. In criminology, typical examples are later crime or violence in youth or recidivism after sentences in adulthood. More specifically, risk may also be assessed with regard to onset, persistence, or aggravation of the respective problems. Luhmann (2003) plausibly distinguished "risk" from "danger". Whereas "danger" has the connotation of an uncontrollable threat (e.g., a flash of lightning or a tsunami), "risk" is seen as something that can be controlled and prevented by taking adequate measures. In the practice of criminological risk assessment both connotations overlap when jurisdictions address "dangerous offenders" who are confined and treated in high security prisons or forensic clinics.

As mentioned, research on risk factors and risk assessment is not an end in itself but should enable effective measures to reduce the respective risks and undesirable outcomes. This leads to the question of causality. Risk factors are based on correlational data, but effective interventions need to have a causal influence. Therefore, various authors question the usefulness of risk factors in criminology. For example, P.-O. Wikström repeatedly argued against the concept of risk factors and emphasized that truly causal influences must be investigated and validated (e.g., Wikström & Kroneberg, 2022). This argumentation is important, particularly when we look on some publica-

tions of long lists of risk factors that are not derived from theory or conceptually interrelated.

However, we should not ignore basic problems. Like risk research, much research on "causes" of criminal behavior is also based on correlational designs because natural developments cannot be studied otherwise. Wikström's Situational Action Theory (SAT; Wikström & Treiber, 2024) is only one example in this field. Here, explicit theoretical hypotheses on causal propensities and situational characteristics have reduced problems of merely statistical risk-outcome-correlations. As Wikström and others mention, one may also ask about potential "causes of causes". Some neuroscientists view genetic, physiological, or anatomic characteristics as "fundamental" risks for cognitive, emotional, and social processes. However, epigenetic processes and interdependencies between biological dispositions, mental propensities, social and other developmental factors suggest that there are no linear causal relations or hierarchies. This is similar in theories like the General Aggression Model (GAM, Anderson & Bushman, 2002, 2018; see also the developmental concept of Lösel & Bender, 2006).

It must be taken into account that the empirical relations between various levels of explanation are not very strong. Most biological factors have only small to moderate relations to antisocial behavior. For example, meta-analyses on low resting heart rate (a theoretically plausible predictor of antisociality), showed a mean effect size of d = 0.20 to antisocial behavior (Portnoy & Farrington, 2015). The effect sizes for single social risk factors are in a similar range (see below). The difficulty of explicit hierarchical relations between levels of causality is not only relevant for biosocial interactions. For example, it is unclear to what extent corporal punishment in parenting is a cause of child behavior problems or a reaction of (stressed) parents to difficult child temperament. Longitudinal path analyses suggest that there are both directions of influence, but the direct parental impact seems to be stronger (Stemmler & Lösel, 2024). There are also relations between risk factors on the individual or micro level and those on the aggregate level (e.g., parenting traditions or poverty in the community). Again, the respective effect sizes are often small and make hierarchical causal hypotheses difficult. Accordingly, risk factors on different levels are often not hierarchically structured but investigated more or less independently from each other; see, for example, LaFree and Schwarzenbach (2021) on risks for extremism and terrorism or Lösel and Bender (2006) on risks for crime and violence in juveniles.

Overall, the distinction of risk factors and "real" causes in criminology is important, but bears a risk of too much polarizing. In principle, there are different aspects of causation (e.g., Bunge, 1979) and risk assessment needs a theoretically solid as well as pragmatic approach. A plausible differentiation has been proposed by Kraemer et al. (2005). These authors distinguish between merely correlational risk factors, risk markers, and causal factors. Risk markers have no direct influence on behavioral outcomes but indicate factors that may have a causal impact. For example, a low socio-economic level or poverty of a family is a risk marker for children's antisocial behavior, but does not exert a direct influence. It is associated with various risk factors and processes that may have a more proximate influence on child development (e.g., stressful home, mental health issues, and problematic parenting).

The best validation of risk factors requires sound experimental or quasi-experimental studies that show a causal influence in an intervention. Then the classical concept of causality can be applied: a) the risk factor correlates with the outcome, b) it antedates the outcome in time, and c) alternative explanations of an observed intervention effect can be ruled out. As there are numerous threats to validity in program evaluations (e.g., Cook & Campbell, 1979; Lösel, 2007) the exclusion of alternative explanations is more easily requested than achieved in practice. It is also not always possible to define exactly what factors in a multidimensional intervention are most relevant for the success or failure of a program. Therefore, beyond basic controversies about risk versus causal factors, sound criminological risk assessment should be based on a combination of theoretical hypotheses, empirical correlations, and proven effects of interventions that reduce correlational risk factors and antisocial outcomes. Examples for this approach are the central eight risk/need factors in offender treatment (Bonta & Andrews, 2023): 1) criminal history, 2) pro-criminal cognitions/attitudes, 3) antisocial personality patterns, 4) pro-criminal associates, 5) education/employment, 6) family/marital, 6) school, 7) leisure/recreation, and 8) substance abuse. These factors are specified in detail and supported by cognitive-social learning theories of criminality (Bonta & Andrews, 2023). But the mean effect sizes for these factors are not always above the "satisfactory" threshold of an Area under Curve (AUC) above 0.70 and there are differences between the first and second four factors (e.g., Grieger & Hosser, 2014).

Aggregation of risk factors

Already the comprehensive review of risk factors for juvenile violence and crime of Lipsey and Derzon (1998) showed that most single risks have only a small effect size. Of 276 variables only 13.4% had a correlation of r = 0.21-0.30, and only 1.5% were above 0.30 (Lösel, 2002). Low effect sizes of single constructs/variables are typical in criminology and other social sciences. They are also often found in LISREL models or hierarchical regressions. Basic criminological research tries to disentangle the specific contribution of a variable to an outcome, what can be sometimes artificial when there are only small univariate differences between variables that are entered first versus later in a model. Risk assessment research has to go in the opposite direction and accumulate more or less independent single factors to achieve sufficient predictive power. A comprehensive meta-analysis of Basto-Perreira and Far-

rington (2022) can guide a meaningful selection as it revealed the most powerful core risk variables in developmental criminology. Treiber and Wikström (2025) showed that an accumulation of social risk factors has less predictive power than more proximal propensities in their sample. This is plausible and indirectly endorses practice-oriented risk assessment instruments that normally contain both kinds of data (e.g., Koegl et al. (2009) on child risk assessment).

Current crime and violence risk assessment instruments are designed for different ages, seriousness, purposes, and institutional contexts. They apply Structured Professional Judgement (SPJ; Hart et al., 2017) and contain relevant factors that are based on objective data or relatively valid expert ratings. For example, the Early Assessment Risk Lists for Boys and Girls (Augimeri et al., 2021; see also Augimeri et al. in this issue) contain three subscales on family, child, and responsivity items. The Cracow Risk/Need Assessment Instrument (Corrado et al., 2002; see also Corrado and Champion in this issue) is suitable for early and later risk assessment in children. It contains items in five subcategories (Environmental, Individual, Family, Interventions, and Externalizing Behavior) and has the particular characteristic that early assessments are also included in later ones. The HCR-20-Version 3 (Douglas et al., 2013) for violence risk assessment is widely used in the criminal justice system and in forensic contexts. It contains three subcategories of items (Historical, Clinical, Risk Management). The Psychopathy Checklist Revised (PCL-R; Hare et al., 1990) differentiates between the primary and secondary factor items and suggests a further four factors/facet model. Specific subcategories are also contained in other popular risk assessment instruments.

Most of these instruments have shown significant predictive validity in empirical studies what indicates the substantial progress of SPJ-based risk assessment. The overall discriminant validity of these instruments is mainly satisfactory. For example, the meta-analysis of Singh et al. (2011) revealed mean effects sizes (AUC) of 0.78 for SVR-20, 0.75 for SORAG, 0.74 for VRAG, 0.71 for SAVRY, 0.70 for HCR-20, 0.70 for SARA, 0.70 for Static-99, 0.67 for LSR-R, and 0.66 for PCL-R. Different numbers of studies, outcome criteria, lengths of follow-up, contexts, and other factors may have played a role in these findings and more recent ones may be slightly different. In a somewhat arbitrary classification, AUCs below 0.70 are viewed as not satisfactory, between 0.70 and 0.80 as satisfactory, above 0.80 as good, and above 0.90 as exceptional. Therefore, it is a realistic (and perhaps trivial) to conclude that even the best available assessment instruments are not yet optimal. The Receiver Operating Characteristic in AUC represents an overall validity, whereas in practice there may be particular attention for specificity (false positive rate) or sensitivity (true positive rate) in decision making. In medicine there is also a discussion about potential over-estimations of AUC (White et al., 2023).

To avoid misunderstanding, the above arguments do not at all question the many sound studies on the discriminatory ability of structured risk assessment instruments. In my view, these instruments function rather well. However, we may have reached basic thresholds for the practical predictability of specific behavioral outcomes under complex societal circumstances. In addition to the general validity data there is not yet enough attention to the specific subdimensions of the instruments in the planning and implementation of differentiated interventions. For example, with regard to the PCL-R it is often noted that Factor One (interpersonal/affective) refers to the core personality whereas Factor Two to social deviance. However, both factors are strongly correlated and Factor Two is a stronger predictor of criminal and violent behavior (Lösel, 1998). This shows problems of circularity and underscores the simple diagnostic experience that the best predictor of future behavior is past behavior in the respective field. Cooke et al. (2004) have disentangled the contents of the PCL-R and developed a more Comprehensive Assessment of Psychopathic Personality (CAPP). Similar challenges for differentiated interventions arise when we look on the Historical subscale of the HCR-20 that contains static items. Differentiated interventions need to focus on dynamic (changeable) risks. Explicit relations between the results in subcategories of structured risk assessment instruments and respective interventions are more often considered in childhood and youth, but need to be addressed in all areas of criminological risk assessment and risk-based interventions. This is not a unique problem of forensic sciences and criminology. In psychiatry and other fields differential treatment is also a challenge.

In practice, gaps between the information from structured instruments and detailed intervention planning are often filled by traditional low-structured expertise or clinical override of standardized criteria. This is also the case when structured instruments are used by experts in court trials. Such expert assessments may include characteristics of the index offence, qualitative information from staff or family members, data on expectable situations after release et cetera. These data are often less systematic and validated than the data in structured instruments. To reduce well-known problems of subjective clinical versus actuarial judgment (e.g., Grove & Meehl, 1996), practice institutions have developed guidelines for such parts of case-oriented risk assessment. Properly used, these more qualitative assessments provide "flesh to the bones" of the skeleton from data of systematic instruments. Thus, low-structured clinical and forensic expertise is still important beyond large-scale quantitative prediction studies on structured assessment instruments.

Protective factors and resilience

Traditional criminological risk assessment addresses single and accumulated risk factors for the respective undesirable outcome. However, in recent decades compensating protective factors are considered as well. For example, in risk

assessment for extremism, radicalization, and terrorism some instruments explicitly include protective factors (Lösel et al., 2025; Pressman & Flockton, 2014). On other topics risk assessors also address potential positive influences of protective factors. This widening of perspectives is supported by research on resilience in developmental psychopathology, desistance from crime, strength-based approaches in offender treatment, and general concepts of positive psychology. Although protective factors as counterparts of risk factors are intuitively plausible, the respective concepts and findings are more complicated than in mere risk research. Resilience refers to phenomena such as healthy development despite a high-risk status, maintaining competence under specific stressors, or recuperating from trauma (Lösel & Bender, 2003, 2006; Rutter 2012). The processes of successful adaptation to and coping with developmental risks require individual and social resources that have protective functions. These factors may explain why individuals with similar risk profiles show different behavioral outcomes (what is in accordance with the basic developmental principles of equifinality and multifinality). Knowledge about protective factors cannot only reduce the rate of false positives in prediction, but enable more successful prevention.

Protective factors are sometimes misunderstood as simply the other 'side of the coin' of a dichotomous risk factor or the opposite pole of a quantitative risk factor. This is the case when, for example, violence in the family, poverty, poor housing conditions etcetera are counted as risk factors, but the absence of such characteristics as being protective. Obviously, there is some tautology when the same factors are counted in different ways (and thus may accumulate explained variance either on the risk versus protective side of a profile). The analysis of protective factors and processes requires more differentiated research and assessment methods. One has to investigate curvilinear relations between quantitative variables of direct protective (promotive) factors and, in particular, assess buffering effects in interaction analyses and hierarchical regressions when risk factors are present (Loeber & Farrington, 2012; Lösel & Farrington, 2012). For example, this has been shown for low intelligence that is a risk factor in developmental risk instruments, but good intelligence is also a buffering protective factor in the presence of other risks (Ttofi et al., 2016).

Accordingly, risk and protective factors may not be different variables. The same variable may function as both a risk and protective factor, depending on the context of other factors, age period, contexts, and other conditions. For example, at younger age anxiousness seems to have a protective effect against antisocial development, but in already delinquent youngsters comorbid anxiety may increase further problems (Zara & Farrington, 2009).

Of course, practical risk assessment cannot consider numerous differentiated findings of developmental research. However, structured assessment instruments should put more attention on protective factors. If this is not yet the case, assessors in practice should have a closer look at potential resources and strengths and their relation to the risk profile of an individual. This should contribute to differentiated intervention programs. For example, most accredited offending behavior programs in England and Wales (https://www.gov.uk/guidance/offending-behaviour-programmes-and-interventions) have risk- or deficit-oriented as well as strength-based contents.

Personality characteristics and principles of symmetry

Whether at young ages or on reoffending of adult offenders, criminological risk assessment partially addresses personality characteristics. This is particularly the case for psychopathy or more specifically for impulsivity and other propensities. Several years ago, there was an intensive controversy about the validity and usefulness of general personality traits. Mischel (1973), Endler and Magnusson (1976), and other authors fundamentally questioned personality traits in psychology and emphasized person-situation-interactions. Unfortunately, this discussion partially contained misconceptions (Epstein, 1977, 1979; Lösel 1980). Operationalizations of traits should not be based on single acts, but require the assessment of multiple acts. A simple example: To assume a trait of "unpunctionality" is inappropriate when a student arrives only once or twice too lately in the classroom, but may be appropriate when there is a frequent pattern of this behavior. Accordingly, based on aggregation of data, trait concepts are alive and well (Epstein, 1977, 1979). Although, to my knowledge, the psychological controversy about trait concepts was not a topic in criminology it is still relevant for risk assessment. This is because a part of criminological risk assessment refers to general traits, but often has only single acts and narrow sources of information available.

For example, low self-control/impulsivity is rightly considered as a very important risk factor for criminality. It is also the core construct in the general crime theory of Gottfredson and Hirschi (1990). In contrast, the meta-analysis of Pratt and Cullen (2000) revealed that the mean effect sizes for the relation between self-control and criminality are not strong and larger in cross-sectional studies (r = .27) than in longitudinal designs (r = .19). Furthermore, many criminological studies of self-control are based on the 24-item self-report questionnaire of Grasmick et al. (1993). This scale contains an overlap with antisocial behaviors/items as outcomes. A meta-analysis on the Grasmick Scale and behavioral measures of self-control showed that both approaches had similar correlations with delinquency (Walters, 2016), but the relation between both types of assessment was not stronger than the relations of each with the delinquent outcomes. Walters offered four interpretations: (1) Gottfredson and Hirschi's theory contains a tautology; (2) both assessment approaches measure different constructs; (3) self-control is multidimensional; and (4) self-reports of low self-control are inadequate.

I have also carried out research on self-control and partially agree with Walters, but suggest a moderate view because impulsivity is still important for practical risk assessment. However, we need to consider different aspects/dimensions of impulsivity, more behavioral instead of questionnaire measurements, and not use it as a general explanation of crime (Lösel, 2017).

Beyond the example of impulsivity, it is necessary to consider multiple information sources and the issue of symmetry in assessments. A part of suboptimal predictions stems from the typical design of many predictors and only a single or very few outcomes. Based on Brunswik's concept of symmetry, Wittmann (1988, 2012) has shown that effect sizes are substantially larger when not only single acts are included on the outcome side of the equation. This relates to the above-mentioned multiple-act-criteria of personality traits. Assessment data should be based on multiple informants and multiple contexts. For child and youth behavior problems, Achenbach has shown that the typical intercorrelations of ratings of problem behavior are small (Achenbach, 2006; Achenbach et al., 1987) when they stem from different informants and different contexts. Lösel (2002) used data from standardized assessment instruments and found that the average cross-sectional correlations between different informants were substantially lower than the longitudinal correlations of data from the same informant. There seems to be an influence of stereotyping that may also reduce the chance of positive effects in prevention programs.

Again, these considerations should not be seen as a general problem of criminological risk assessment. However, they should alert us to use multiple data from different informants and contexts as far as possible. This would help to reduce gaps between the scientific complexity and the necessary reduction of complexity in practical decision making.

Sensitive outcome criteria

In various fields of criminological risk assessment, the base rates of outcome variables are low. For example, official sexual recidivism after prison sentences strongly declined over recent decades (from about 20% to currently 5-8%). This is rather similar for treated and untreated inmates and seems to derive from various processes on the societal level (Lösel et al., 2023). The decrease is good news for the society and potential victims. On the other hand, such a "floor effect" of very low prevalence makes valid risk predictions and the proof of effective interventions difficult. Even in rather large samples very few false negative cases can have a more or less random impact on significance. Accordingly, treatment evaluations often show significant effects on general or non-sexual violent reoffending, but not on sexual recidivism (e.g., Lösel et al., 2025).

Particularly in fields with extremely low (or high) base rates the typical dichotomous outcome criterion of "yes-no" recidivism is not sensitive. Therefore, researchers and practitioners need to include other measures. Some authors recommend non-criminal indicators of family or work relations, attitudes, and mental health. However, these are only loosely related to sexual offending. The general public and policy makers are mainly interested in "hard" reoffending criteria (that are also the legally justified aims of rehabilitation in criminal law). Some potentially more sensitive criteria are a reduced frequency of reoffending, less seriousness of reoffences, and more delayed recidivism (what would probably reduce the prevalence according to the age-crime-curve). Various studies showed that these criteria are more sensitive and suggest promising treatment effects when dichotomous recidivism revealed no significant changes. For example, in a comprehensive evaluation of sexual offender treatment in German prisons we found that an index that based on the severity of reoffending (according to the penal code) showed some desirable results (Link & Lösel, 2022). We also found that not only the mean risk level of the individuals (measured by the Static-99) was related to different recidivism rates but also the social and therapeutic climate in various institutions (Lösel et al., 2023). This suggests that in addition to personal characteristics, risk assessment should consider social framing conditions that are related to difficulties in rehabilitation processes (e.g., Carl & Lösel, 2021).

Sensitive outcome assessments are not only relevant for reoffending of individuals who carried out sexual offences. For example, there are also similar challenges in risk assessment of radicalized individuals or terrorists (Lösel et al., 2025). In addition to other specific assessment problems in this field, it is difficult to carry out long-term prospective studies on large groups as they are more available on general and violent offending. The problem of sensitive criteria is also relevant in developmental risk assessment of youngsters. Here, we often have studies that predict an antisocial outcome at one time only, although there is much developmental change over time (e.g., Jennings & Reingle, 2012; Tremblay, 2000). This problem is similar in the scarcity of longer-term follow ups in developmental prevention where most evaluation studies only gather data shortly after the program (Beelmann & Lösel, 2021; Weiss et al., 2022). Against this background, studies on risks should address a range of serious outcome problems in complex and long-term follow-ups. Some examples are represented this special issue. It is also important to investigate not only one measurement point in development but developmental trajectories over time. This approach typically reveals the most serious subgroup of consistently antisocial individuals over time, but also groups with decreasing or increasing problems in development (e.g., Farrington et al., 2023; Lösel et al., 2025).

As for other above-mentioned issues, multiple outcome measurements and time points are general challenges in criminological risk assessment. I faced them in my own research and practice. Problem solutions are not easy, not at least due to limited data access and financial restraints. I only suggest to draw attention to them in daily

practice and research. Even in the risk assessments of serious offenders in court trials practice often does not get information about long-term outcomes of expert recommendations and court decisions. This does not enable sound longitudinal feedback for assessors and judges. Risk assessors in court cases should also be aware (and according to my experience often are) that conclusions based on probability data from group studies cannot fully justify decisions on individual cases (Cooke & Michie, 2010). The false positive cases who may be kept in prison over many years are a silent population.

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