



Comparing theories' performance in predicting violence



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ABSTRACT

The stakes of choosing the best theory as a basis for violence prevention and offender rehabilitation are high. However, no single theory of violence has ever been universally accepted by a majority of established researchers. Psychiatry, psychology and sociology are each subdivided into different schools relying upon different premises. All theories can produce empirical evidence for their validity, some of them stating the opposite of each other. Calculating different models with multivariate logistic regression on a dataset of $N = 21,312$ observations and ninety-two influences allowed a direct comparison of the performance of operationalizations of some of the most important schools. The psychopathology model ranked as the best model in terms of predicting violence right after the comprehensive interdisciplinary model. Next came the rational choice and lifestyle model and third the differential association and learning theory model. Other models namely the control theory model, the childhood-trauma model and the social conflict and reaction model turned out to have low sensitivities for predicting violence. Nevertheless, all models produced acceptable results in predictions of a non-violent outcome.

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1. Scientific controversies about the roots of violence

In 2005 Kroner, Mills, and Reddon published a study comparing the predictive accuracy of four well-known criminal risk assessment scales (PCL-R, LSI-R, VRAG, GSIR) to four randomly generated scales (so-called coffee-can scales), each one consisting of 13 items taken blindly from the pool of all items of the original scales. Their results showed that the original instruments did not perform better than the coffee-can scales, thus demonstrating a deficiency of conceptual bases of those risk assessments scales. The authors proposed that more specific prediction scales should be created, theory driven and outcome specific as well, so that treatments can be directed at reducing specific risks and their effects measured.

With the present study we intend to pursue the inverse approach, testing the predictive qualities of different theories about violence by logistic modeling and comparing those theory-driven models with the comprehensive theory-unspecific violence prediction model derived from the entire pool of ninety-two variables related to risk and protective factors.

Almost every school in psychiatry, psychology and sociology has developed its own theory about the origins of violence. But which ones among them allow causal inferences? Which influences are mediators, which variables are influenced by unidentified backdoor-paths

and which ones are only confounding covariates? All empirical findings suggest that there is no uniform behavior pattern or simple cause of the phenomenon of violence. This study addresses the issue and suggests a method to assess different theories on violence in an epidemiological perspective.

One branch of sociology claims that macro-social influences precede individual traits and the influence of the primary care group (i.e. the family). Psychology and psychiatry assert the opposite. Control theory, arguing that delinquency is the product of a failure of personal and social controls, constructs a bridge between the two. To examine their performance we compared the following theories to a comprehensive interdisciplinary model:

- social conflict and reaction theories
- differential association and learning theories
- rational choice and lifestyle theories
- control theory
- childhood trauma theories
- psychopathology

To avoid blurring all boundaries between different theories we chose to operationalize them with factors related to their core-hypothesis only.

2. Defining violence

The initial characterization of a phenomenon will closely influence all empirical results that might be found thereafter. The hazier the

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criterion, the more confusing and rambling all explications concerning a social phenomenon must become. For the present purpose, violence was defined as “the physical attack against another person, as well as the threat to perpetrate such an attack” (Swiss National Science Foundation, 1995, p. 5). We made sure to grasp many kinds of physical attacks or threats of a physical attack with the questionnaire (Haas, 1997; Killias, 1997). Keeping in mind the goal of explaining only one specific phenomenon (i.e. intentional physical violence) we did not include sexual abuse in this definition, nor reckless driving, nor verbal abuse.

3. Data and variables of the 1997 Swiss youth and army recruits survey *ch-x*

3.1. Data collection and the validity of the data

Swiss Army recruits are interviewed regularly on a topic of social, health or policy relevance. This study, based on a sample of 21,312 valid interviews with 20-year-old Swiss males, was collected in 1997 and represents over 70% of the national cohort. Questionnaires lacking credibility have been excluded from the database. After approximately four weeks of basic training, the soldiers were asked to complete a 44-page questionnaire containing about 900 items. The questionnaire was conceived in an interdisciplinary approach by a sociologist (Killias, 1997) and a psychologist (Haas, 1997). The topic chosen in 1997 was acts of physical violence committed by the recruits before their training in the army.

The data collection took place in the first weeks of the recruits' training. Between 35 and 60 soldiers sat in a classroom, with space between them (exam-like), under the remote supervision of civilian staff. They were to put their completed anonymous questionnaires into a box with a slit. This procedure established confidentiality comparable to an electoral ballot and very few soldiers refused to co-operate. All recruits were obliged to attend the whole session, but the questionnaire explicitly allowed to leave any questions unanswered. Men of the same age group who did not serve in the army in 1997 were invited to answer a short version of the questionnaire by mail. This sample of 1160 non-recruits showed a bimodal distribution, with a disproportionate number of university students. Illegal drug use and sexual harassment were admitted somewhat more often by those not enrolled in the army, whereas physical violence and forced sexual intercourse were admitted more by army recruits. However, the difference was not large (Haas, 2001).

3.2. The items of the questionnaire

At the beginning of the questionnaire a wide range of questions concerned the biographic and social circumstances of their childhood, adolescence and young adulthood (Haas, 1997; Killias, 1997). Next came lists of questions about offenses that the recruits could have committed in the twelve months before training. Finally there was a set of questions concerning their social life as young adults as well as descriptions of themselves and opinions on law and on violence.

3.3. The criterion variable, operationalization of violence

Covering the twelve months before the recruits' training, the questionnaire contained a list of 13 different types of violence to be scored on a frequency range from 0 to 20 times (and more). It was followed by a series of questions about the severity of the acts, the identity of the victims and the potential disclosure of the offenses, according to the suggestions made by Hindelang, Hirschi, and Weis (1981). The criterion variable violent behavior (over the past twelve months before training) thus includes a variety of acts of physical violence ranging from beating, kicking, threatening with weapons, using blunt objects as weapons, poisoning, throwing stones, to shooting with a firearm at

somebody. Among all 21,312 recruits, $n = 528$ had not answered any question related to acts of violence, $n = 15,622$ had not committed any acts of violence, whereas $n = 5162$ (24.22% of those who had answered) had committed acts of physical violence. Compared to previous publications (with $N = 21,314$ observations) we chose a new and better interpretation of the raw data set, excluding two more records).

The factors to be tested were chosen among ninety-two entering variables, known as criminogenic or protective factors, almost all of which had a significant bivariate effect on violence. Some factors on the list are composite variables or scales with several levels (see Haas, 2001).

Some variables serve to test several related theories as they fit equally well the constructs of all these theories. The data were analyzed with *proc freq*, *proc corr*, *proc means*, *proc logistic*, *proc mi*, and *proc mianalyze* from the SAS® software.

4. Testing theories' performance

Many studies support their hypotheses with the simple existence of a statistical link between a risk factor (typically unemployment and childhood trauma) and the outcome violence. Often brought up as evidence, many such links are only confounding covariates. Closer to the goal of causal inference, one can build multivariate models, taking into account the influence of several different variables, each assuming a distinct role in the genesis of the phenomenon. In the last decades, the multivariate logistic regression has become the method of choice for doing so. We used it to test the prediction power of the model containing only the relevant influences for the respective theory.

As many violent offenders act rather impulsively in any context lacking close supervision, this symptom manifested itself also in the way they filled out their questionnaires. Unfortunately the regression algorithm excludes all observations with missing values in the entering variables. So when a large number of influences are tested, more than fifty percent of a sample will be excluded. Imputing missing values was here the best solution to avoid sampling bias (Lessler & Kalsbeek, 1992). The following models were constructed with imputed values for missing values in the entering variables by the statistical means corresponding to the respective level of violence and then compared to the models without imputation and to ten models created by random-multi-imputation of the missings.

To test a model for a given theory, we must first determine the performance of the null hypothesis, stating that violence cannot be predicted—and thus not prevented—at all. This hypothesis is true in majority of cases (the three out of four non-violent individuals among all males), but it fails totally when it should predict violent cases. These are the parameters of the null hypothesis (Table 1):

Any theory claiming to take the credit for a valid explanation for the phenomenon of violence must perform above the prediction parameters of the null hypothesis.

5. The model for social conflict and reaction theories

Since the 19th century, sociologists and economists have observed the overrepresentation of the underprivileged in criminal statistics. Marx (1867) argued that the capitalist system's emphasis on

Table 1
The null hypothesis (no factors entered).

Classification parameters	Proportion of cases
Correct predictions	75.78%
True hits (sensitivity)	0.00%
True rejections (specificity)	100.00%
False alarms (false positives)	0.00%
False rejections (false negatives)	24.22%

Note: Prediction based on the assumption that no factors influence the outcome.

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