Theses and Dissertations (All)

6-8-2012

An Empirical Comparison of Logistic Regression to Decision Tree Induction in the Prediction of Intimate Partner Violence Reassault

Steven L. Brewer Jr.
Indiana University of Pennsylvania

Follow this and additional works at: http://knowledge.library.iup.edu/etd

AN EMPIRICAL COMPARISON OF LOGISTIC REGRESSION TO DECISION

TREE INDUCTION IN THE PREDICTION OF INTIMATE PARTNER VIOLENCE

REASSAULT

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

Steven L. Brewer Jr.

Indiana University of Pennsylvania

May 2012

Indiana University of Pennsylvania
School of Graduate Studies and Research
Department of Criminology

We hereby approve the dissertation of

Steven L. Brewer Jr.

Candidate for the degree of Doctor of Philosophy

_____   _____
                                        Erika Frenzel, Ph.D.
                                        Associate Professor of Criminology, Chair

_____   _____
                                        Jennifer J. Roberts, Ph.D.
                                        Professor of Criminology

_____   _____
                                        Jennifer L. Gossett, Ph.D.
                                        Associate Professor of Criminology

_____   _____
                                         Bitna Kim, Ph.D.
                                        Assistant Professor of Criminology

ACCEPTED

_____   _____
Timothy P. Mack, Ph.D.
Dean

Title: An Empirical Comparison of Logistic Regression to Decision Tree Induction in the

Prediction of Intimate Partner Violence Reassault

Author: Steven L. Brewer Jr.

Dissertation Chair: Dr. Erika Frenzel

Dissertation Committee Members: Dr. Jennifer J. Roberts
                                         Dr. Jennifer Gossett
                                         Dr. Bitna Kim

Abstract:

The purpose of this research was to determine if the decision tree analytical technique

offered improvement in predicting intimate partner violence outcomes. Two dependent

variables were used to examine the research question. The first variable represents a

dichotomy; reassault versus no reassault. The second variable included five categories; no

reassault, controlling behaviors only/ threatening reassault, one-time reassault, and repeat

reassault. Logistic regression and decision trees were used to assess the outcome and

were compared to one another for predictive accuracy. For logistic regression, there were

two models; dichotomous logistic regression and multinomial logistic regression. For the

decision tree models there were four algorithm-based models; CHAID, Exhaustive

CHAID, CART, and QUEST. The models were ranked on AUC, overall classification,

sensitivity for the target category, and selection of the splitting variable. The results

suggested that decision trees offer an improvement over logistic regression in the

prediction of intimate partner violence reassault and repeat reassault. The CART

algorithm was found to be most effective in predicting the outcomes associated with

intimate partner violence. The decision tree models selected "controlling behaviors" as

the most influential variable in predicting intimate partner violence.