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

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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

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May 2012
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Title: An Empirical Comparison of Logistic Regression to Decision Tree Induction in the Prediction of Intimate Partner Violence Reassault

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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.