Center for Advanced Studies in Child Welfare

MINN-LINK
Minnesota-Linking Information for Kids

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RESEARCH BRIEF

Exploration of a screening tool for predicting increased risk of young people in Minneapolis becoming victims of violent crime

Purpose of the study

The purpose of this study was to identify a set of indicators available from existing administrative databases that could be used to identify adolescents at elevated risk for being a victim of violent crime in order to direct early intervention resources to the young people who would most benefit from services..

Background & Purpose

In November 2006, the Minneapolis City Council declared youth violence a public health problem. Guided by input from the community, systems partners, and subject matter experts, City staff created the *Blueprint for Action to Prevent Youth Violence*, a comprehensive, city-wide plan to address the issue of youth violence (City of Minneapolis, 2013). The Blueprint is a collaborative, community-driven strategic framework for the City's response. In 2012, Minneapolis was invited to join the federal National Forum on Youth Violence Prevention, and in 2013, revised the Blueprint. Both versions included the goal of intervening with youth and families at the first sign of risk. In response to community and partner feedback, City leadership recognized the need for even more services for youth at risk of involvement with violence — either as perpetrator or as victim. As a result, the City broadened its efforts to identify at-risk youth and increased its investment in intervention programming.

The study sought to identify the characteristics and background experiences that best distinguished victims and nonvictims of violent crime, and calculate various estimates of how well individual indicators or sets of indicators accurately identified victims.

In the interest of determining how to better identify youth at risk of violent crime victimization, the Minneapolis Health Department contracted with Minn-LInK to use existing administrative data sets to compare characteristics and backgrounds of adolescents with or without such a history. The study was influenced by previous work conducted in Chicago. The purpose was to identify a set of indicators that could identify adolescents at elevated risk for violent crime victimization so that these youth could be referred to services that would reduce their risk

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Methods

Preexisting data collected by police and the public school system were examined to determine whether the number or type of intersections with these systems was associated with identification as a violent crime victim. Other individual characteristics or experiences, alone or in combination with school and police data, were also tested for usefulness as screening items to predict violent victimization.

Through Minn-LInK, data from the Minneapolis Police Department (Computer Assisted Police Records System), Minnesota Department of Education (Minnesota Automated Reporting Student System, Minnesota Comprehensive Assessment), Minnesota Department of Human Services, and Minneapolis Public Schools (Disciplinary Incident Reporting System) were linked to create records for a total of 33,770 individual students aged 14 to 17 who attended a Minneapolis public school anytime between 2011 and 2013 (see Table 1). For this study, a violent crime was defined as a crime captured in the police records classified by the Uniform Crime Report System as Level 05 or lower; these include 2nd degree domestic assault, assault, criminal sexual conduct, domestic assault, murder, robbery, 3rd degree domestic assault, and child abuse.

Table 1: Description of sample created for analysis (n=33,770)

Total number of student records analyzed	**33,770**
Total number of students matched to MPD records	**14,136**
Subset of matched records who were victims of violent crime in MPD records	**1,541**
Subset of MPD victims of violent crime who were identified in an additional MPD role	**1,299**
Subset of MPD victims of violent crime with no other MPD role identified	**242**

Using the full sample of students, characteristics and experiences of victims and nonvictims of violent crime were compared with respect to sociodemographic factors including free or reduced price school lunch as a proxy for poverty; school disciplinary records; out-of-home placement; or involvement with child protective services.

Finally, each characteristic was tested as a potential screening item to correctly identify an individual who was known to be a victim of violent crime. If the items could successfully identify these individuals, a screening tool would be developed to assist in screening youth for future violent victimization.

Calculations were made for the following measures of the effectiveness of individual screening items: sensitivity, specificity, positive predictive value, and negative predictive value.

Sensitivity: the percentage of victims of violent crime who were correctly classified as such by the screening item or scales (the number of True Positives divided by the sum of True Positives plus False Negatives X 100).

Specificity: the percentage of nonvictims of violent crime who were correctly classified as such by the screening items or scales (the number of True Negatives divided by the sum of True Negatives plus False Positives X 100)

Positive Predictive Value (PPV): the percentage of individuals who test "positive" by the screening items or scales that actually were victims of violent crime (True Positives divided by the sum of True Positives plus False Positives X 100)

Negative Predictive Value (NPV): the proportion of individuals who test "negative" by the screening items or scales that actually were nonvictims of violent crime (True Negatives divided by the sum of True Negatives plus False Negatives X 100).

For this project, an effective screening threshold was defined *a priori* as having sensitivity and specificity values of at least of 80%, a positive predictive value of at least 35%, and a negative predictive value of at least 90% (Altman & Bland, 1994a, 1994b, 1994c; Metz, 1978).

Findings

Data from existing datasets did not successfully screen for violent crime victimization among this student population. School disciplinary incidents and experiences as a witness to a crime or a victim of nonviolent crime generally had low sensitivity and high specificity, which is not useful for the purpose of screening. Examination of a combination of risk factors across systems followed the same trend.

Using recorded roles in interactions with the Minneapolis Police Department as screening items

Of 33,770 individual student records from the Minneapolis Public Schools, 14,136 had a match in the Minneapolis Police Department files. Comparing Minneapolis Public School records and the Minneapolis Police Department dataset, 32,256 individuals were not identified as a victim of a violent crime and 1,541 (4.6%) were identified as a victims of a violent crime. Among the group of identified as violent crime victims, the great majority (84.2%) were also identified in another role in that incident or another incident that could be used a predictor (see Table 2).

Table 2: Analysis of roles in the MPD dataset and detection of victims of violent crime (n=33,700)

Predictive role	Victims of violence, yes to predictive role	Specificity	Specificity	Positive predictive value	Negative predictive value
Nonviolent crime victims	1,052	69%	88%	21%	98%
Violent crime arrestee	55	4%	99%	16%	96%
Nonviolent crime arrestee	317	21%	83%	5%	96%
Other role	381	25%	80%	6%	96%

For the 1,299 students who were identified with multiple roles in the MPD database including that of a violent crime victim, no indicator met the sensitivity and specificity threshold assigned (see Supplemental Table A). "Victims in non-violent crimes" was the closest at 69% and 88%; however, only 21% of the individuals who were identified as victims of violent crime by the screening item could be expected to be actual victims of violent crime.

Identification as an arrestee in a violent crime, an arrestee in a non-violent crime, or in an "other" role did not improve the ability of the screening to identify an association with violent victimization. Neither did examining the number of roles a young person was identified in within the data. Two indicators had a weak ability to detect an association with a victim of violence: identification as a victim in a non-violent crime and having only one other role in the Minneapolis Police Department data; however, these were not strong associations. Using "only one other role" as a screening indicator, only 8% of the individuals who were identified by the screening item could be expected to actually be victims of violent crime.

Using Minneapolis Public Schools disciplinary data as screening items

School disciplinary incident data were classified into nine categories (disruptive/disorderly behavior; alcohol or drugs; assault; other potentially violent (e.g. arson); bullying; fighting; other infraction; threatening; and verbal harassment). Other variables were created to represent number of disciplinary incidents alone or in combination with specific types of infractions.

No single infraction or combination of infractions or number of infractions came close to meeting the sensitivity and specificity levels (see Supplement Table B). Overall, across all potential screening items, specificity was high and sensitivity was low, which is generally consistent with a statistically rare event. No single infraction or combination of infractions or number of infractions, when used as a screening item, could be expected to correctly identify a violent victim more than 13% of the time. This means that most of the individuals identified by infraction as having an increased risk of becoming a victim of a violent crime would be false positives.

Using data from a combination of sources as screening items

Because the police and school disciplinary data elements proved ineffective as screening items, analyses were also conducted looking at other available data and combinations of items or scales. Additional risk factors examined included: ever receiving free or reduced price lunch; any school disciplinary citation; out of home placement; child protection services substantiated child abuse; low achievement in math or reading; any special education services; limited English proficiency; having dropped out of school; homelessness; low attendance at school; transferring schools ever; transferring schools two or more times; and pre-adolescent appearance in the Minneapolis Police Department dataset.

No individual risk factor in this set of analyses met the threshold of 80% sensitivity and 80% specificity (see Supplement Table C). After examining the individual risk factors, the risk factors in combination were tested. Even when young people had up to twelve of the risk factors present, this compilation did not function as an effective screening basis for identification as a violent victim because of how few students experienced this combination of risk factors.

Conclusion

This study examined the feasibility of using administrative data to create a screening tool to predict a higher likelihood of violent crime victimization.

Intervention programming designed to reduce risk factors and promote protective factors to prevent young people from becoming victims of violence remains an essential focus for the City. Presently, the City relies largely on the expertise of professionals who encounter young people. While the City and its partners have seen significant successes with that approach, it is prudent to continue examining ways to refine processes using empirical measures and data.

The purpose of a screening tool is to rapidly sort a population with similar risk factors and determine who probably will have the outcome and who probably will not. Design of a screening tool balances the danger of missing a case against the impact and practical implications of a high number of false positives. There is no way to create a test where there are neither false positives nor false negatives in all testing situations. A high positive predictive value means that the tester can be fairly confident in the results and a low positive predictive value means that further assessment will be needed for anyone who receives a positive test. The administrative datasets used in this study were not able to successfully predict associations with violent crime victimization.

Limitations

This study had several significant limitations. Many students who are residents of Minneapolis do not attend Minneapolis Public Schools, so disciplinary data were unavailable for them. Disciplinary data for students who previously may have attended school elsewhere were also unavailable. Crime data were available only for crimes committed within Minneapolis city limits and recorded in the Police Department database. Minneapolis Public School students who were victims of violent crime that occurred elsewhere were classified as nonvictims in this study unless they had also been violent crime victims in incidents that occurred in Minneapolis. Similarly, students may have been witnesses to crime or victims of nonviolent crime elsewhere but not so classified within this study.

As an example, if a student was identified as a potential victim of violence based on appearing in all four categories of roles in the police records, this would represent such an infrequent combination of characteristics that the population impact would be very small. Using the current data, students who appear in all four roles represent 0.2% of the cohort population, or 74 out of 33,770 over three years. If those 74 students were successfully located, this screening predicts that about one in three (about 24 students) are actually at increased risk for violent victimization, around 8 students a year. If this screening item correctly identifies a "true positive," this student would represent less than 1% of the total population of those who will eventually be victims of violence.

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The Center for Advanced Studies in Child Welfare (CASCW) is a resource for child welfare professionals, students, faculty, policy-makers, and other key stakeholders concerned about child welfare in Minnesota. **Minn-LInK** is a unique collaborative, university-based research environment with the express purpose of studying child and family well being in Minnesota using state administrative data from multiple agencies.

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