Typological structure of adolescent drinking-drivers

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Drinking and driving among adolescents is a prominent public health issue. In Ontario, 50% of drivers aged 16-18 fatally injured in traffic crashes in 1992 were found to have been drinking (Bierness et al., 1992). A 1995 provincial survey found that 24% of Ontario high school students had driven within one hour of drinking two or more drinks of alcohol within the previous 12 months, a rate significantly higher than 20% reported in 1991 (Stoduto and Adlaf, 1996).

Jessor and colleagues (e.g., Donovan and Jessor, 1985; Jessor, 1987) have proposed Problem-Behaviour Theory, which posits that problem behaviours occur together as a result of a constellation of underlying psychosocial factors. Research on self-reported drinking and driving among adolescents reveals associations with such characteristics as male gender, age, non-intact family structure, delinquency, frequency of heavy drinking, number of alcohol-related problems, marijuana use, driving more mileage, traffic crashes, traffic violations, speeding, having friends who drink and drive, less time spent on homework, poorer academic performance, working part-time, and participating in school activities (Williams et al., 1986; Barnes and Welte, 1988; Sheehan and Nucifora, 1989; Hayes and Swisher, 1991; Klepp et al., 1991; Little and Clontz, 1994; Augustyn and Simons-Morton, 1995; Stoduto et al., 1995). However, researchers have not examined fully the underlying assumption that adolescent drinking-drivers are a homogeneous group. Based on a population survey sample of adolescent drivers, we examine the typological characteristics of adolescent drinking-drivers and develop profiles of associated characteristics.

METHOD

We use data from the 1993 Ontario Student Drug Use Survey of students in grades 7, 9, 11, and 13 (Adlaf et al., 1993), administered by the Institute for Social Research, York University, which employs a stratified (grade by region) single stage cluster sample of classes (77% participation). The sample size for analysis is based on 403 students who reported driving within one hour of drinking two or more drinks of alcohol within the previous 12 months. The data were gathered through self-administered, anonymous questionnaires completed in class.

Four categories of data are used in the cluster analysis: delinquency, alcohol use measures,
driving-related measures, and demographic. The three delinquency measures were derived from factor analysed items. Property-related delinquency measures the number of times they took things that did not belong to them, banged up or damaged (on purpose) something that did not belong to them, and broke into a locked building (4 items, a=.84). Drug-selling delinquency includes number of times sold marijuana or hashish and other drugs (2 items, a =.86). Violent delinquency includes the number of times engaged in gang fights and beat up anyone or hurt anyone on purpose (2 items, a=.65). Alcohol use measures include weekly consumption, heavy drinking and alcohol-related problems. Weekly consumption is estimated by multiplying the frequency of alcohol consumption in the last 12 months (at special events, once a month or less, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 or 5 times a week, almost everyday, coded as weekly frequency: 0.125, 0.25, 0.625, 1, 2.5, 4.5, 7) by the typical amount of beer (none, 1-3, 4-6, 7 or more bottles, coded 0, 2, 5, 7), wine (none, 1-3, 4-5, 6 or more glasses, coded 0, 2, 4.5, 6) and hard liquor (none, 1-2, 3-4, 5 or more drinks, coded 0, 1.5, 3.5, 5) usually consumed at one time. Frequency of heavy drinking is measured by the number of times five or more drinks of alcohol were consumed in the previous four weeks (none to 5 or more times, coded 0 to 5). The alcohol problem scale consists of five items measuring whether respondents: were ever warned by police because of their use of alcohol; ever saw a doctor or been in hospital because they had been drinking; ever spoke with a school counsellor, school nurse or teacher because they had a problem as a result of using alcohol; wished they could drink less than they do now; and parents think they drink too much (a=.42). Driving-related variables include: length of time licenced to drive (coded: no licence, beginner's or temporary licence=0, 1 year or less=1, 2 years=2, 3 or more years=3), total number of miles driven (coded: less than 1,000=1; 1,001-5,000=3; 5,001-10,000=7.5; 10,001-20,000=15; 20,001-30,000=25; 30,001-40,000=5; 40,001-50,000=45; over 50,000=50), number of accidents in the last 12 months (none to 2 or more, coded 0 to 2), drinking-driving accident (no=0, yes=1), ever convicted of a drinking-driving offense (no=0, yes=1) and the number of times driven within one hour of drinking two or more drinks of alcohol in the last 12 months (one to 8 or more times, coded 1 to 8). Lastly, we include gender in our analysis (female=0, male=1).

The procedure for classification involved implementing agglomerative, hierarchical cluster analysis (Aldenderfer and Blashfield, 1984), using squared Euclidean distance as the similarity measure and Ward's method between groups as the merging criterion. In hierarchical agglomerative clustering, clusters are formed by grouping cases into larger and larger clusters until all cases are members of a single cluster. Ward's method is designed to optimize the minimum variance within clusters (Ward, 1963); at each step groups or cases that result in the minimum increase in the error sum of squares are joined. This method has been shown to outperform others if complete coverage of a classification is required and the data have relatively few outliers, and when cluster overlap is not desired (Aldenderfer and Blashfield, 1984). All variables were standardized prior to cluster analysis. The analytical sample size due to listwise
deletion of cases is 377.

By performing significance tests on 20 variables not employed in the cluster solution we validate the existence of unique and meaningful cluster differences. These external variables include: age, region, family structure (i.e., living with both natural parents or not), amount of money free to spend each week, family’s financial situation, marks usually get in school, perceived likelihood of staying in school until graduation, truancy (number of days of school missed) and number of classes skipped in the last 4 weeks, number of nights a week spent staying at home, reading or watching T.V., going to a friend’s house, going out with a friend, participating in a school activity and non-school activity, just hanging around and working at a part-time job, self-esteem scale (5 items, a=.82), frequency of cannabis use in the last 12 months, proportion of close friends who used cannabis in the last 12 months and proportion of best friends who use illegal drugs.

For comparison purposes, we also contrast drinking-driver sub-types to those drivers who drank alcohol within the last 12 months but did not drive after drinking (n=1209).

RESULTS

Selection of the three cluster solution was based on examination of the fusion coefficients to discover a significant increase, implying that two relatively dissimilar clusters have been merged, and on examination of the conceptual clarity of the solution. The solution revealed three clusters we label: «marginals» (n=234), «heavy drinkers» (n=120), and «delinquents» (n=23). Raw scores on cluster analysis measures for drinking-driver sub-types and non-drinking-drivers are presented in Table 1. In comparison to other drinking-driver sub-types, «marginals» consist of the lowest proportion of males, lowest delinquency and alcohol use, moderate driving exposure, lowest accident involvement, drinking-driving consequence experience and drinking-driving frequency. «Heavy drinkers» consist of the greatest proportion of males, moderate delinquency, the greatest number of heavy drinking occasions, greatest driving exposure, moderate accident involvement, no drinking-driving accident and few drinking-driving convictions, although drinking-driving frequency is highest. «Delinquents» consist of about three quarters males, highest delinquency, somewhat lower heavy drinking than «heavy drinkers», least driving exposure, highest accident involvement, drinking-driving accident and conviction, and somewhat lower drinking-driving frequency than «heavy drinkers». Post hoc F-tests revealed significant (p < .01) differences between sub-types on all cluster variables. «Marginals», although somewhat more extreme, have similar characteristics to non-drinking-drivers.
External validation of the 3-cluster solution reveals that 11 of 20 variables significantly differentiate clusters (p < .01): age, financial status, marks received in school, perceived likelihood of graduating, truancy, number of classes skipped, number of nights spent at home, number of nights spent at friend’s home, frequency of cannabis use, proportion of friends who used cannabis and proportion of best friends who use illegal drugs. «Delinquents» represent the youngest, the lowest financial status, marks in school and likelihood of graduating, the highest truancy and skipping classes, and the greatest proportion of friends who used cannabis and best friends who use illegal drugs. The «heavy drinkers» are the oldest and their family’s financial status is highest. Lastly, the «marginals» are most likely to graduate, spend the most number of nights at home and the least number of nights at a friend’s home per week, have the lowest frequency of cannabis use, proportion of friends who used cannabis and best friends who use illegal drugs. «Delinquents» are most unlike, and «marginals» most like, non-drinking-drivers on external measures.

CONCLUSIONS

The cluster analysis of adolescent drinking-drivers provides a classification involving three groups. «Marginals» engage in the least amount of delinquent behaviours, alcohol use, drinking-driving, and characteristically, are most similar to non-drinking-drivers. «Heavy drinkers» are the heaviest drinkers, most frequent drinking-drivers, and have the greatest driving exposure. «Delinquents» exhibit the most delinquency, have the least driving exposure, the greatest experience of accidents and drinking-driving consequences.

The validity of the typology was suggested by significant cluster differences in: age, financial status, scholastic achievement, leisure time, cannabis use and friends use of illicit drugs. These clusters reflect a profile of drinking-driver sub-types which may have differing degrees of risk for future involvement in crashes, DUI convictions and fatalities. Further research into adolescent drinking-driver typology and associated driving and drinking-driving attitudes, behaviours and contexts is needed.

No single prevention effort is likely to be equally effective for all types of adolescent drinking-drivers. Population-based prevention efforts may influence «marginals», since they are marginally involved in drinking-driving and other problem behaviours. However, influencing «heavy drinkers» and «delinquents», who represent a large portion of drinking-driving adolescents, who frequently drink and drive and are likely at higher risk of harmful consequences, may require programs aimed at reducing heavy alcohol use, delinquency and risky driving behaviour and attitudes.
REFERENCES


Table 1: Characteristics of drinking-driver sub-types and non-drinking-drivers on cluster analysis measures

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Marginals (n=234)</th>
<th>Heavy Drinkers (n=120)</th>
<th>Delinquent (n=23)</th>
<th>non-drinking-drivers (n=1209)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (% males)</td>
<td>58.1%</td>
<td>87.5%</td>
<td>73.9%</td>
<td>50.7%</td>
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<tr>
<td>property-related delinquency</td>
<td>3.38</td>
<td>10.79</td>
<td>19.57</td>
<td>2.83</td>
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<td>drug-selling delinquency</td>
<td>0.75</td>
<td>11.27</td>
<td>8.09</td>
<td>0.90</td>
</tr>
<tr>
<td>violent delinquency</td>
<td>0.97</td>
<td>3.59</td>
<td>11.00</td>
<td>1.12</td>
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<tr>
<td>alcohol per week</td>
<td>5.88</td>
<td>24.94</td>
<td>20.66</td>
<td>4.51</td>
</tr>
<tr>
<td>heavy drinking occ.</td>
<td>1.35</td>
<td>3.76</td>
<td>2.91</td>
<td>0.80</td>
</tr>
<tr>
<td>alcohol problems</td>
<td>0.26</td>
<td>0.90</td>
<td>0.91</td>
<td>0.21</td>
</tr>
<tr>
<td>length of licence</td>
<td>1.59</td>
<td>1.98</td>
<td>1.17</td>
<td>1.03</td>
</tr>
<tr>
<td>total miles driven</td>
<td>14,100</td>
<td>24,979</td>
<td>13,130</td>
<td>7,821</td>
</tr>
<tr>
<td>accidents (% &gt;1)</td>
<td>3.4%</td>
<td>8.3%</td>
<td>39.1%</td>
<td>3.6%</td>
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<td>drink-drive accident</td>
<td>0%</td>
<td>0%</td>
<td>65.2%</td>
<td>0.8%</td>
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<tr>
<td>drink-drive conviction</td>
<td>0%</td>
<td>0.8%</td>
<td>56.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>drink-drive frequency</td>
<td>1.72</td>
<td>4.29</td>
<td>3.44</td>
<td>-</td>
</tr>
</tbody>
</table>

\(^1\) means, unless otherwise stated