Injury recidivism among trauma patients may be related to an individual pattern of high risk behaviors. The extent to which an injury episode modifies this behavior pattern is unknown. A self report, voluntary, anonymous, cross sectional survey was administered to motorcycle and all-terrain vehicle (ATV) riders at a popular recreation site. Data included demographics, injury history, and current usage of helmet and protective gear. Two hundred eighty surveys were completed. History of ATV/motorcycle related minor and major injury were reported by 21% and 9%, respectively. Persons with a history of minor ATV/motorcycle injury only were less likely to use a helmet or protective equipment (78% v 74%, p = 0.58 and 49% v 41%, p = 0.29). Persons with a history of any major ATV/motorcycle injury were also less likely to use a helmet or protective equipment (77% v 56%, p = 0.03 and 48% v 40%, p = 0.53). These findings suggest a pattern of persistent high risk behavior among previously injured persons.

METHODS
A self report, anonymous survey was distributed over a four week period to ATV and motorcycle users at a popular recreation site. The survey gathered data regarding demographics, motorcycle and ATV usage, and injury history. The survey required approximately 10 minutes for completion, and surveys were sealed in an unmarked envelope by each subject. Participants were offered a candy bar or soda as an incentive. Children younger than age 15 were required to complete the form with parental assistance. Data entry and analysis were completed at a separate time and location. Questions included in the survey were adopted from the Behavioral Risk Factor Surveillance System, but the questionnaire itself was not independently validated.

Minor ATV/motorcycle related injuries were defined as any traumatic injury requiring evaluation by a health care provider in a professional setting but not requiring hospitalization. Major injuries included those requiring at least overnight hospitalization. Further injury details were not collected and injury reports were not verified. Usage of helmets and protective equipment was evaluated using a five point scale ranging from “never” to “always”. Protective equipment was defined as protective clothing and included pads, masks/goggles, gloves, and hearing protection. For analysis, persons reporting either “always” or “almost always” using helmets and/or protective equipment were recorded as “users” of these devices. Data were analyzed with standard statistical software using the χ² test (SPSS for Windows, version 11.5, 2002).

RESULTS
Two hundred eighty surveys were completed. One hundred eleven (40%) of respondents were ages 16–21, with 16% being 15 years of age or younger (age range 4–61). Seventy percent of the subjects were males, 52% were from rural areas or small towns, and 9% (of adults) had less than a high school education with 25% being college graduates (see table 1).

In a lifetime history of minor ATV/motorcycle injury only was reported by 21% of respondents and major injuries by 9%. The rate of injury was greatest in the 16–21 age group and among males and those from rural areas. Current helmet use was reported by 75% overall, and the use of protective equipment by 47%. Use of a helmet was lower for persons of a younger age, rural background, and with less education. These trends were similar for use of protective equipment (see table 2).

Persons with a history of a minor ATV/motorcycle injury only were less likely to use a helmet or to use protective equipment (78% v 74%, p = 0.58 and 49% v 41%, p = 0.29). Persons with a history of major injury were also less likely to use a helmet or protective equipment (77% v 56%, p = 0.03 and 48% v 40%, p = 0.53). Persons with a history of either minor or major injury were also less likely to use a helmet and protective equipment (78% v 68%, p = 0.09 and 49% v 47%, p = 0.23) (see table 3).

DISCUSSION
Persons with a history of both minor and major ATV/motorcycle related injury were less likely to report current use of either helmets or protective equipment compared to persons without a previous injury. Subjects with a history of major ATV/motorcycle injury have the greatest impetus for behavioral changes and would be expected to have the highest rate of protective equipment usage. Yet, subjects in this study with a history of major injury were the group least likely to report both current helmet and protective equipment usage.
These findings suggest the previously described theory in which risk taking is a constellation of behaviors. Injury recidivism likely results from a combination of continued high risk behaviors and a failure to adopt proactive, protective behaviors. This study demonstrates that previously injured persons engaging in a high risk activity do not utilize readily available protective equipment at the same rate as non-injured persons. Therefore, behavior modification interventions in the trauma population must focus not only on avoidance of negative behaviors but also on reinforcing the adoption of protective behaviors. As previously demonstrated, the target group for intervention should be adolescent and young adult males from rural areas or small towns. This study also supports the assertion that the greatest risk factor for traumatic injury is the history of a previous traumatic injury, as the injury episode does not appear to have a significant impact on modifying high risk behaviors. Future research of this type should focus on identifying the motivation for use and non-use of protective equipment. This
on-site, questionnaire-type study was effective in that there was a high rate of participation and it benefited from a large percentage of the participants having experienced previous traumatic injury.

ACKNOWLEDGEMENT
This paper was presented at the meetings of the Indiana Chapter of the American College of Surgeons, Indianapolis, 2002.

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REFERENCES

Table 3 Use of protective equipment stratified by history of ATV/motorcycle related injury; values are number [%]

<table>
<thead>
<tr>
<th>History of Injury</th>
<th>Always’ or “almost always” use helmet</th>
<th>p Value</th>
<th>“Always’ or “almost always” use protective clothing</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No history of minor injury (only)</td>
<td>157 (78)</td>
<td>0.58</td>
<td>99 (49)</td>
<td>0.29</td>
</tr>
<tr>
<td>History of minor injury (only)</td>
<td>40 (74)</td>
<td>0.03</td>
<td>121 (48)</td>
<td>0.53</td>
</tr>
<tr>
<td>No history of major injury</td>
<td>14 (56)</td>
<td>0.09</td>
<td>99 (49)</td>
<td>0.23</td>
</tr>
<tr>
<td>History of major injury</td>
<td>157 (78)</td>
<td>0.09</td>
<td>131 (47)</td>
<td>0.23</td>
</tr>
<tr>
<td>No history of any injury</td>
<td>54 (68)</td>
<td>0.09</td>
<td>131 (47)</td>
<td>0.23</td>
</tr>
</tbody>
</table>
Current helmet and protective equipment usage among previously injured ATV and motorcycle riders


*Inj Prev* 2004 10: 56-58
doi: 10.1136/ip.2003.002626