

Adolescent health brief

# Adolescent and Young Adult Crash Risk: Sensation Seeking, Substance Use Propensity and Substance Use Behaviors

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### Abstract

In a national youth sample, the propensity to use substances was more strongly related to motor vehicle crashes than use of any specific substance studied (cigarette, alcohol, marijuana). Substance use propensity was associated with sensation seeking, suggesting that increased crash risk for these youth is likely a result of general risk-taking tendencies. © 2010 Society for Adolescent Medicine. All rights reserved.

### Keywords:

Motor vehicle accidents; Sensation seeking; Substance use; Risk behavior

Motor vehicle crashes are the leading cause of death for young people in the United States [1]. It is well documented that individual differences in risky driving behaviors (e.g., speeding) are related to crash risk [2]. Furthermore, risky driving behaviors often co-occur in youth who engage in substance use behaviors (e.g., smoking cigarettes, drinking alcohol, or using drugs) [3], with some studies relating these behaviors to crash risk as well [4]. What remains unclear, however, is the causal role of substance use and whether specific substance use behaviors are direct predictors of crashes, or whether they merely reflect a personality trait associated with risky driving.

One personality trait consistently linked to risky driving is sensation seeking [5]. Sensation seekers tend to engage in a range of exciting behaviors, including the use of substances [6]. It is possible therefore that sensation seeking is an underlying trait that predisposes toward both substance use and risky driving. In this study, we use structural equation modeling (SEM) to investigate the model depicted in Figure 1 whereby sensation seeking is associated with general propensity to use substances and this propensity is related to crashes. We also test the possibility that the use of specific substances (as represented by paths a, b, and c in

Figure 1) is responsible for crashes rather than general substance use propensity.

### Methods

The National Annenberg Survey of Youth (NASY) is a nationally representative telephone survey conducted annually by the Annenberg Public Policy Center at the University of Pennsylvania, approved by that Institutional Review Board [4]. Using data from the 2007 survey, the outcome of interest in this study was involvement in a motor vehicle crash as a driver. The sample for analysis included 436 youth with a provisional or full license (mean age 19 years, SD = 1.80; 52% female).

Sensation seeking was modeled as a latent variable using four items from the Brief Sensation Seeking Scale [7]. Substance use propensity was modeled as a latent variable with three indicators measuring frequency of use of cigarettes, marijuana and alcohol (0 = never engaged in the behavior, 1 = not in the past month, 2–5 = increasing levels of the behavior in last 30 days). Involvement in a crash was measured by the question “How many crashes, if any, have you had as a driver?” (0 = none, 1 = one, and 2 = two or more).

We used the computer program EQS [8] using maximum likelihood procedures robust for non-normal to test the primary and three alternate models depicted in Figure 1. Gender, length of licensure, and weekly driving hours were

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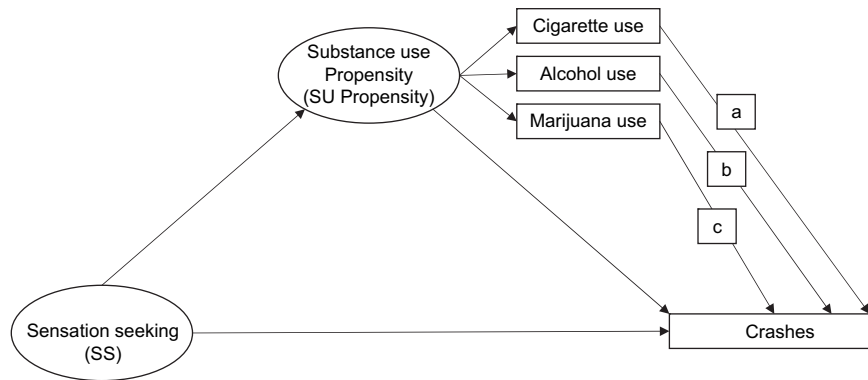


Figure 1. Proposed model predicting crashes from sensation seeking, substance use propensity, and specific substance use behaviors. The effects of gender, length of licensure, and weekly driving hours are also controlled for in the model. Circles indicate latent factors; rectangles indicate observed factors. Pathways a, b, and c are included in alternate models testing for the direct effects of individual substance uses on crashes apart from the primary model, which has only substance use propensity predicting crashes.

entered as control variables. We tested each model in the full sample, and in subsamples of teens (16–18 years) and young adults (19–22 years).

**Results**

Of these youth, 42% reported involvement in one or more crashes. The primary SEM provided reasonable fit (Table 1). As hypothesized, sensation seeking was positively associated with substance use propensity. Substance use propensity was positively related to crashes in the full sample and across both age groups, with youth with a greater substance use

propensity reporting more crashes. There was no direct relationship observed between sensation seeking and crashes.

Tests of the alternate models indicated that the direct paths from each substance to crashes were not significant. However, in the teen sample, the path for alcohol was marginally significant, whereas the path for substance use propensity was reduced. To probe this effect, we tested the model with the pathway from substance use propensity to crashes constrained to zero and the pathway from alcohol use free to vary. This model provided a fit comparable to the primary model and the direct pathway from alcohol use to crashes was significant ( $\beta = .21, p < .001$ ).

Table 1  
Primary and alternate structural equation models predicting crashes in the full sample and in the teen and young adult subsamples

	Primary model			Alternative models for specific substance use paths								
	Full sample (N = 436)	Teens (n = 101)	Young adults (n = 335)	(a) Cigarettes			(b) Marijuana			(c) Alcohol		
	Full sample	Teens	Young adults	Full sample	Teens	Young adults	Full sample	Teens	Young adults	Full sample	Teens	Young adults
<b>SEM pathways</b>												
SS → SU propensity	.45*	.46*	.52*	.45*	.46*	.52*	.45*	.46*	.52*	.45*	.46*	.52*
SS → crashes	-.04	.01	-.09	-.04	.01	-.08	-.04	-.02	-.08	-.05	.05	-.10
SU propensity → crashes	.27*	.28*	.28*	.24*	.29*	.25*	.27*	.41*	.25*	.29*	.06	.34*
Specific substance use → crashes	–	–	–	.02	-.02	.03	-.01	-.14	.02	-.02	.18 <sup>†</sup>	-.05
<b>Measures of fit</b>												
$\chi^2$	64.81	49.82	40.80	64.23	49.78	39.84	64.15	48.56	38.99	60.30	48.60	36.66
df	33	33	33	32	32	32	32	32	32	32	32	32
CFI	.93	.90	.96	.93	.90	.96	.93	.90	.96	.94	.89	.96
RMSEA	.05	.05	.03	.05	.06	.03	.05	.05	.03	.05	.05	.03
RMSEA 90% CI	.03, .06	.02, .08	.01, .06	.03, .07	.02, .09	.01, .06	.03, .07	.02, .08	.01, .06	.03, .06	.02, .08	.01, .06

All estimates are standardized.

SS = Sensation seeking; SU propensity = substance use propensity; arrows (→) denote pathways between variables; Specific substance use → crashes is the direct path from specific substance use behaviors (a, b, c) to crashes in the alternate models;  $\chi^2$  = Satorra-Bentler Chi-square; df = degrees of freedom; CFI = comparative fit index (values >.90 indicate good fit); RMSEA = root mean square error of approximation (values <.06 are considered acceptable); CI = confidence interval; covariances and pathways involving the control variables (licensure length, gender, and weekly driving hours) are not shown but are included in each model.

<sup>†</sup>  $p < .10, * p < .05$ .

## Discussion

In this youth sample, we found that an individual's propensity for substance use was more closely related to their involvement in motor vehicle crashes than either cigarette or marijuana use on their own. For young adults, substance use propensity was also more closely related to crashes than was alcohol use. These results suggest that an individual's tendency toward using multiple substances is a better indicator of crash risk than specific substance use behaviors.

For teens, further testing of the model provided some evidence that alcohol use was directly associated with crash risk. This result may be interpreted in several ways. First, it is possible that teens engaging in frequent alcohol use are more likely to drive while under the influence of alcohol, putting themselves at increased risk for accidents [2,9]. However, in a supplemental question in our survey, no teens reported driving while under the influence of alcohol, suggesting that alcohol use itself is an unlikely explanation for crash risk in this sample. Another possible explanation is that alcohol use is an early marker for what we identify as substance use propensity. In this case, alcohol use would not be more critical for predicting crashes than other substances. Consistent with this explanation, alcohol use was the behavior with the highest level of use in our sample of teens (alcohol: mean = .80, SD = .78; cigarettes: mean = .53, SD = .99; marijuana: mean = .20, SD = .47). Nevertheless, disentangling these alternative explanations is important for future research.

Consistent with previous research [6], we found sensation seeking related to substance use propensity. This finding suggests that increased crash rates for frequent substance users might be partly caused by higher levels of sensation seeking in these individuals. In this model, however, sensation seeking was not directly associated with crashes, indicating that not all sensation seekers have increased crash risk. It is primarily those youth drawn to using multiple

substances that appear vulnerable, possibly because of a number of factors that should be further investigated.

Limitations of the current research include the use of cross-sectional data, self-reported measurement of crashes, and failure to distinguish among incidental and more serious accidents. Despite these limitations, this study helps to clarify the relationship between youth substance use and crash risk.

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