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Problem Driving Behavior and Psychosocial Maturation in Young Adulthood

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Abstract

This study examined the association between psychosocial maturation and problem driving behavior in young adulthood. Psychosocial maturation is the process of adopting adult roles, attitudes and behaviors and completing developmental tasks associated with becoming an adult. Past research has demonstrated that individuals' participation in health-risk behaviors decreases as psychosocial maturity increases. Not surprisingly, decreases in driving risk that occur over the first years of driving have often been assumed to result in large degree from general maturation; however, no research has tested this assumption. This study used data from a telephone survey of young adults to begin addressing this gap in the literature by testing three hypotheses: 1) indicators of higher psychosocial maturity are associated with lower problem driving behavior; 2) the association between the level of psychosocial maturity and problem driving behavior is cumulative; and, 3) these associations are moderated by sex. Problem driving behavior was evaluated by assessing three measures: high-risk driving, drink/driving, and drug/driving. Results supported all three hypotheses. Participants with greater psychosocial maturity had lower levels of problem driving behavior than participants who were less psychosocially mature. Second, problem driving behavior was lower with higher psychosocial maturity. Third, these associations between psychosocial maturity and problem driving behavior were moderated by sex. The primary contributions of this study are: 1) initial evidence that psychosocial maturation may play a role in improvements in the safety of young drivers; and 2) the generation of questions and hypotheses that provide direction for future research on the role of maturation in observed declines in risk among young drivers.

Late adolescence and early young adulthood mark an interval of high risk of physical injury, and a period of rapid developmental changes, both of which have implications for the

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remainder of life. During this interval individuals experience many concurrent changes in all aspects of their lives (Schulenberg, Sameroff, and Cicchetti, 2004). This period of development is characterized by high levels of personal exploration (Jessor, Donovan, and Costa, 1991), increased mobility and independence from parents, and the adoption of adult roles (Erikson, 1968). Also during this interval in development, individuals typically obtain a driver license, learn to drive, and experience the highest lifetime risk of a motor vehicle crash, resulting in teen and young adult drivers having the highest rates of crash-related morbidity and mortality of any age-group of drivers. After licensure, novice teen drivers' high crash rates decline quickly, but this fast rate of initial decline is followed by a slow decrease in crash risk that does not reach its lowest levels until ages 40–45 (Mayhew et al., 2000; McCartt et al., 2003; NHTSA, 2007). The rapid declines in driver risk during the early months of licensure are most likely largely a result of practice and the acquisition of skills and knowledge that increase driver safety. However, for individuals who are first licensed as teens or young adults, following rapid initial declines in crash rates the slope then flattens, and crash rates, which are still relatively high, decline slowly, not reaching their lowest point until the early- to mid-forties (NHTSA, 2007).

Changes in health risk trajectories from adolescence into young adulthood are associated with the adoption of adult roles, attitudes and behaviors, and the completion of developmental tasks related to psychosocial maturity (Schulenberg, Sameroff, Cicchetti, 2004). As individuals move from adolescence toward adulthood and they adopt more characteristics of an adult, their psychosocial maturity increases and for most individuals health risk behaviors such as sexual risk-taking, heavy alcohol consumption and experimentation with drugs, decline in number and frequency (Bachman et al., 2002; Donovan, Jessor, Costa, 1991; Johnston, O'Malley, Bachman, 2004; Maggs, Schulenberg, 2005; Merline et al., 2004; NHTSA, 2007; Schulenberg, Sameroff, and Cicchetti, 2004). Specifically, events such as marriage (Chilcoat, Breslau, 1996; Curran, Muthen, Hartford, 1998; Kearns, Leonard, 2004; Maggs, Schulenberg, 2004; O'Malley, 2004), becoming a parent (Bachman, et al., 1997), completing education, and entering the workforce (Gotham, Sher, Wood, 1997; Johnston, O'Malley, Bachman, 2000; Wechsler, Dowdall, Davenport, Castillo, 1995; Wilsnack, Wilsnack, 1992) have been shown to relate to lower health-risk behaviors.

In the traffic safety literature on teenage and young adult drivers, it is commonly assumed, and often stated, that the declines in crash risk that are observed between adolescence and young adulthood are a result of increased maturity and a reflected of the adoption of adult roles and the completion of developmental tasks associated with becoming an adult (Bates, Labouvie, 1997; Bennette, McCrady, Johnson, Pandina, 1999; Maggs, Schulenberg, 2004). However, research has not examined this assumption, and it is not known whether declines in crash risk during adolescence and young adulthood are even associated with psychosocial maturation. This study represents an initial attempt to address this gap in the literature on adolescent and young adult development and driver safety. It is one of the first examinations of the assumption that maturation is involved in the gradual decline in crash rates that begin at licensure and continue into young adulthood.

This research tested three hypotheses examining the association between psychosocial maturation in young adulthood and three problem driving behaviors: high-risk driving (e.g., behaviors that constitute ticketable offenses that could contribute to a crash); drink/driving; and drug/driving. The hypotheses were that: 1) indicators of psychosocial maturity are associated with less problem driving behavior; 2) the association between problem driving and the degree of psychosocial maturity is cumulative; and 3) these associations are moderated by sex.

METHOD

Sample

The study data were collected during surveys administered in 2003 as part of an on-going longitudinal study. The longitudinal study began when participants were in 5th and 6th grades as part of two intervention evaluation studies. Participants who had valid Michigan driver licenses were followed up with a telephone interview in 2003 when they averaged 29 years of age. The telephone interview measured demographic characteristics, driving behavior, safety belt use, crash and conviction experience, substance use, psychosocial variables, adult role acquisition, and status on developmental tasks related to psychosocial maturation, and perceptions and attitudes of the respondent, parents and friends regarding drinking and driving, alcohol use and misuse, and friends' and peers' use of alcohol.

Advance letters invited study participants to be part of the telephone survey, and offered \$30 for completing the interview. The interviews were conducted by trained personnel using computer assisted telephone interviewing procedures that allowed immediate data entry. The interview and study were described to the participants, and their participation constituted consent. The participants were harder to track and contact than anticipated, and in order to reduce attrition, paper-and-pencil surveys were sent through standard mail to participants who could not be reached by telephone. Subsequent analyses showed no effects of survey mode, and the data were combined for this study. Once contacted, only 10% of the potential participants refused the interview and a total of 2,342 (58.6% of the sample based on definition RR5, American Association for Public Opinion Research, 2000) completed either the telephone interview or the paper-and-pencil survey.

Data for 29-year-olds are appropriate for addressing the objectives of this paper for the following reasons. First, declines in crash risk that is often attributed to maturation continue into the early- to mid-forties before reaching their lowest lifetime levels, suggesting that maturation may still be strongly associated with the driving outcomes of people in their mid- to late-twenties. Second, the adoption of adult roles, attitudes and behaviors, and the completion of developmental tasks related to psychosocial maturity happen over a long range of ages in modern western civilization, suggesting that in order to capture a meaningful degree of variation in these characteristics, a young adult sample is more appropriate than a younger age group, which would have less broad representation of markers of psychosocial maturity.

To check for attrition bias, respondents and non-respondents from a subset of the sample were compared on measures from State of Michigan driver history records and surveys they completed in 10th and 12th grades in high school. There were a few significant differences between the two groups of participants that were associated with very small effects ranging from $d = -.009$ for alcohol availability in 12th grade to $d = .370$ for 10th grade marks in school. Only differences in age ($d = .267$; non-respondents older), 10th grade marks in school ($d = .370$, non-respondents had lower marks) and living with both biological parents at 12th grade ($d = -.203$; respondents were more likely to live with both biological parents) were large enough to be considered even small effects (see Cohen, 1992). Driving behavior, the central outcome for this paper, did not differ between respondents and non-respondents. The study sample included 2,342 (1131 men [43%], 1211 women) young adult survey respondents. Participants in this study were 88.0% white, 56.5% married, 83.0% employed, and 10.6% were students when they completed the surveys.

Measures

Adult Roles

Education Complete: The completion of formal education was measured by a single item that asked respondents “Have you finished your formal education?” Responses were 1=“yes” 0=“no”.

Employed: Employment status was measured by one item that asked “Are you working now, looking for work, a homemaker, or a student?” Responses were 1=“Working (including military, temporary lay-off, maternity leaves);” 2=“Looking for work;” 3=“Homemaker;” 4=“Student;” and 5=“Other.” This measure was recoded for this study into a dichotomous variable coded so that 1=employed (i.e., working) and 0=unemployed (i.e., all other categories).

Parent, and Childbearing Complete: Status as a parent and the completion of childbearing were measured by two variables. The first was a single item that asked “Do you have any children” (1=yes, 0=no), and was used to measure parenthood. The second variable asked parents (i.e., responded yes to previous item) “Would you like to have more children?” and asked non-parents “Would you like to have children?” (1=yes, 0=no). Childbearing was considered complete if the answer to either question was no, and was an indicator of progress through young adulthood.

Married: Marital status was measured by an item that asked “Are you currently married, separated, divorced, widowed, or have you never been married?” Responses to this item were used to create a dichotomous variable that indicated whether the respondent had ever been married (1=yes, 0=no).

Developmental Tasks

Financially Independent: Financial independence was measured by an item that asked, “Do you receive financial support from family, a friend, or other sources, not including loans to you from a bank or lending institution?” (1=yes, 0=no).

Self-Sufficient: Individual self-sufficiency was measured by 13 items. Example items are “I feel I am my own person;” “I feel capable of doing things for myself;” and “I am confident about my own judgment.” The responses were 1=“Strongly agree,” 2=“Agree,” 3=“Neither agree nor disagree,” 4=“Disagree,” and 5=“Strongly disagree.” The scale was reverse-coded so that a higher score indicated greater self-sufficiency ($\alpha=0.87$) (Chassin, Pitts, DeLucia, 1999).

Capable: Personal capability in adult roles and responsibilities was measured by five items (adapted from Chassin, Pitts, DeLucia, 1999) that asked participants “Compared to others your age, how capable do you feel in the following adult roles: romantic relationships/marriage; being a parent; working/being a student; managing your money; managing your time?” Responses were 1=“Much less capable;” 2=“Less capable;” 3=“Equally capable;” 4=“More capable;” and 5=“Much more capable.” Responses to these five items were averaged (versus being summed) so as to avoid penalizing individuals who were not parents or were not employed ($\alpha=0.74$).

Percent Adult: The degree to which the participant considered him/herself to be an adult was measured by a single item that asked “On a scale from 0% to 100%, how adult do you feel most of the time?” Responses were recorded on a continuous scale as the percentage reported by the respondent.

Problem Driving Outcomes—*High-risk driving, drink/driving, and drug/driving*, were assessed by 27 items covering the previous year. High-risk driving ($\alpha=.86$) was assessed by 20 items measuring the frequency of speeding, improper passing, following, lane usage, right of way, turning, and control signal observance. The frequency of drink/driving was measured by five items that assessed driving within an hour of having 1 or 2 drinks, driving within an hour of having 3 or more drinks, driving while high or lightheaded from drinking, driving when coordination was affected by alcohol, and drinking while driving a car ($\alpha=.89$). Two items assessing the frequency of driving after smoking marijuana and after using other drugs ($\alpha=.74$) measured drug/driving. The original 12-month frequency data for each item were recoded into the following 14 categories: never (0), once (1), twice (2), three times (3), four times (4), five times (5), 6 to 9 times (6), 10 to 14 times (7), 15 to 19 times (8), 20 to 24 times (9), 25 to 29 times (10), 30 to 49 times (11), 50 to 99 times (12), and 100 or more (13) in the prior year. The recoded item scores were then averaged to form scale measures of the three problem driving behaviors. These measures have demonstrated construct validity (Donovan, 1993; Shope, Bingham, 2002).

Control Variables—*Participants' ages* at the time the survey was completed were calculated using birth and survey administration dates. This variable was used to adjust all models because it is associated with the degree of psychosocial maturity and the level of problem driving behavior; therefore, variability in participants' ages could have confounded the results.

Alcohol quantity-frequency (QF) was measured by two items. One asked "How often do you have a drink containing alcohol?" Responses were coded 1=never, 2=once a month or less, 3=2–6 times a month, 4=2–3 times a week, and 5=4 or more times a week. The second item asked, "How many drinks do you have on a typical day when you are drinking?" Responses were 1=1 or 2, 2=3 or 4, 3=5 or 6, 4=7 to 9, and 5=10 or more. Non-drinkers were given the value of 0 for this measure. These two items were multiplied together and the product was used as a measure of combined quantity and frequency of drinking.

Drug use was measured by summing across items measuring the use of 12 drugs during the previous year. The items asked "In the past 12 months, have you used: marijuana, ecstasy, other club drugs, uppers, ephedrine/pseudoephedrine for non-medical purposes, downers, tranquilizers, psychedelic drugs, cocaine/crack, heroine, other opiates, other types of drugs for non-medical reasons? Responses were coded as 0=no, and 1=yes. Past research has shown that driving after using drugs or alcohol is associated with the level of drug and alcohol use (Bingham, Elliott, Shope, 2006). To adjust for confounding effects that might result from variation in the levels of alcohol use and drug use, these variables were included in all models with drink/driving and drug/driving, respectively, as outcomes.

Driving exposure was measured by a single item that asked "How many miles in total did you drive in the past 12 months? Responses ranged from 10 to 150,000 miles. This measure was included in all models to adjust for the contribution of driving exposure to the likelihood of problem driving behavior.

RESULTS

Descriptive statistics for all variables used in this study are shown in Table 1. The sample is evenly divided between men and women, and the participants averaged 29 years of age. In terms of measures of psychosocial maturity, a little over half the sample had completed their formal education, and 90% of men and 76% of women were employed. Over 55% of both men and women were married; more women (56%) than men (40%) reported that they were parents; and fewer men (27%) than women (36%) said they had completed childbearing. On

average, men and women scored high on self-sufficiency, rated themselves as having moderate levels of capability, and rated their personal maturity at about 80% (men=79%; women=84%). On average, both men and women had completed five of nine measures of psychosocial maturity. Not surprisingly, average frequencies of drink/and drug/driving were low, with men reporting each of five drink/driving behaviors an average of 1.5 times per year, which totals to 7.5 drink/driving events on average. Men reported each of two drug/driving behaviors an average of 0.6 times in the prior year, totaling 1.2 drink/driving events on average. Women reported each of five drink/driving behaviors 0.7 times, and each of two drug/driving behaviors an average of 0.4 times in the prior year, totaling to an average of 3.5 drink/driving events, and 0.8 drug/driving events, in the prior year. Rates of high-risk driving were higher than drink/and drug/driving, but still generally low, with men reporting participating in each of 20 different high-risk driving behaviors an average of 2.2 times, which equals a total average of 44.2 events of high-risk driving in the prior year. Women reported engaging in each of 20 high-risk driving behaviors an average of 1.6 times in the previous year, which totals to 32.0 high-risk driving events per person per year. Men reported driving 21779 miles in the previous 12 months, and women reported driving 14656 miles.

The results of univariate and multivariate (i.e., mutually adjusted for all predictors) regression models addressing the first hypothesis are shown in Tables 2 and 3. Poisson regression models were used to test models with high-risk and drink/driving as the outcome, and logistic regression was used to estimate models for drug/driving. Poisson regression models for high-risk driving and drink/driving showed good fit to a Poisson distribution, but there was a high degree of over-dispersion apparent for drug/driving. Because there was only a small proportion of individuals reporting drug driving (14% of men and 9% of women), the variables were collapsed so that 0 = no drug driving, and 1 = any drug driving in the prior year. All models were adjusted for the respondent's age and number of miles driven in the previous year.

For men, the univariate models showed that more high-risk driving (see Table 2) was predicted by being employed, not being a parent, not being married, and feeling like an adult less of the time. The same variables remained significant in the multivariate models. In addition, less financial independence became a significant predictor.

For women, completion of formal education, being employed, not being a parent, not having completed childbearing, not being married, and feeling like an adult less of the time predicted more high-risk driving. In the multivariate models being married and completing childbearing were not significant.

More drink/driving (see Table 2) among men was predicted in the univariate models by being employed, not being a parent, not having completed childbearing, not being married, less financial independence, being less capable in adult roles, and feeling like an adult a smaller percent of the time. In the multivariate models for men not being a parent and completion of childbearing were no longer significant, but all other effects that had been significant in the univariate models remained significant.

Univariate models for women showed that more drink/driving was predicted by being employed, not being a parent, not being married, being less financially independent, being less capable in adult roles and feeling like an adult a smaller percent of the time. All of these effects remained significant in the multivariate models, and completing childbearing became a significant predictor of drink/driving.

In the univariate logistic regression models predicting drug/driving (see Table 3) for men, not being employed, not being married, being less financially independent, less capability in

adult roles, and feeling like an adult less of the time predicted more drug/driving. In the multivariate models, not being employed and feeling like an adult less of the time became non-significant.

In the univariate models, women having never married and being less capable in adult roles predicted drug/driving. In the multivariate model, only having never been married remained significant.

Poisson regression models were also used to test the second hypothesis for high-risk driving and drink/driving, and logistic models were used for drug/driving. Models using the number of markers of psychosocial maturity to predict high-risk driving and drink/driving showed that participants who had completed more markers had lower rates of high-risk driving (men: $\beta = -0.04$, $p = .001$; women: $\beta = -0.12$, $p = .001$), drink/driving (men: $\beta = -0.12$, $p < .001$; women: $\beta = -0.04$, $p < .01$), and lower odds of drug/driving (men: odds ratio [o.r.] = 0.81, $p < .001$; women: o.r. = 0.86, $p < .05$) than those who had completed fewer markers. This finding suggests that the association between psychosocial maturity and problem driving behavior is cumulative.

Differences in the results for men and women were used to address the third hypothesis. It was clearly evident in the analyses reported in Tables 2 and 3 that, while some of the same predictors were significant for men and women, there were a number of differences in prediction, as well, suggesting that associations between psychosocial maturity and problem driving behavior are moderated by sex on an individual variable basis. Overall, however, the association between greater psychosocial maturity and less problem driving held for both sexes.

DISCUSSION

The results of this research provided general support for the hypothesis that greater psychosocial maturity, as measured by the adoption of adult roles, attitudes and behaviors and completion of developmental tasks associated with becoming an adult, is associated with problem driving. This is consistent with other research showing that psychosocial maturation is associated with decreased participation in health-risk behaviors. However, the measures of psychosocial maturity did not always predict less problem driving. Exceptions include the completion of formal education in models predicting high-risk driving among women, and for men being employed predicted high-risk driving and drink/driving. While these associations are contrary to what was expected, they are the only exceptions. One can reason that there might be an association between having completed formal education and being employed and more high-risk driving and more drink/driving. Several elements may contribute to these associations. For example, people with completed educations who have a job may spend more time in rush hour traffic as they travel to and from work, potentially experiencing greater frustration with other drivers and driving more aggressively. People with these characteristics are likely to have more expendable income for purchasing alcohol, and may experience a lifestyle that involves having a drink in conjunction with work or with friends, and then drive home. These hypotheses were not examined in this study, but should be investigated in future research.

Maturation is generally accepted as an important contributor to the improvement in driver safety that is observed from adolescent licensure through young adulthood, and on into middle adulthood when the lowest crash rates occur for men and women (NHTSA, 2005, 2006, 2007; Williams, Mayhew, 2004). While this decreasing trend in driving risk has been attributed in part to maturational processes, research has not specifically examined the association between individual maturation and driving outcomes. This study provides initial

evidence of that link, indicating that for men and women the frequency and degree of problem driving generally declines as psychosocial maturation increases. Individuals with greater psychosocial maturity generally exhibited lower rates of problem driving behavior.

While the association between psychosocial maturity and problem driving observed in this study is evidence supporting the assumption that maturation was related to decreased driving risk, the results from this study do not indicate that maturation is the driving force behind the association. The results also fail to verify that the association between increasing maturation and decreasing problem driving is not due to the influence of a third variable. The primary and most important contributions of this study are that: 1) it provides initial evidence that psychosocial maturation might play a role in improvement in the safety of young drivers; and 2) it raises many questions and generates hypotheses that provide direction for future research on the role of maturation in observed declines in risk among young drivers.

There are several hypotheses about the association between maturation and problem driving that future research should examine. One hypothesis is that the process of maturing provides the individual with perspectives and motivations that increase risk avoidance generally, and reduced problem driving specifically. This hypothesis focuses on the developmental course, both intrapersonal and social, and is likely multidimensional, consisting of many interacting factors and processes. For example, development of the ability to think abstractly could contribute by providing the ability to more accurately assess personal risk and increased motivation to limit risk exposure. Increases in moral reasoning ability may reduce problem driving by increasing the individual's sense of personal responsibility, and emphasizing the immoral nature of participating in behaviors that place innocent others at risk. Learning through direct experience or through the observation of others is another way that driving safety might be affected (Baranowski, Perry, and Parcel, 2002). As individuals gain driving experience, and as they gain exposure to the driving behaviors of others and the serious outcomes that they or others experience as a result of problem driving, their motivation to reduce crash risk might be increased.

Psychosocial maturation, which was specifically examined in this study, could contribute to greater efforts to minimize driving risk by strengthening ties between the individual and conventional society. As individuals adopt adult roles they naturally become increasingly integrated into conventional social institutions, such as school and education, family, and employment. According to Social Control Theory (Hirschi, 1969), as people become more integrated into conventional social institutions, their bond to the values and people representing those institutions increases, and their desire to alienate themselves from conventional society and the institutions and people representing it decreases. This understanding may provide some explanation of adults' increased avoidance of illegal and problem driving behaviors after the adoption of more adult roles and responsibilities. Greater integration into conventional society by being married or in another committed long-term relationship, and having children increases individuals' sense of personal responsibility for others. This responsibility may result in a belief that there is too much to lose by taking unnecessary risks while driving, and such risks are then avoided.

Some evidence supporting these processes is provided by research examining the association between cognitive social maturation and health risk behaviors. This research indicates that health risk behaviors decrease as cognitive social maturity increases (Ievers-Landis, Greenley, Burant, Borawski, 2006). As with the present study, this research provides an initial look at the association between maturation and risk-taking; however, a search failed to reveal any longitudinal analyses examining the association between maturity or maturation and involvement in health risk behaviors.

Another hypothesis to be tested is that maturation and reductions in driving risk are either both outcomes of overlapping sets of unmeasured variables, or are the result of completely different variables that are linked only by having their effect over the same period of time. For example, as individuals drive they may reduce their driving risk by gaining new driving skills and honing existing ones, and gaining a more realistic perception of the potential negative outcomes they face from driving in a risky manner. This change may increase the level of risk they perceive to be associated with driving and provide motivation for them to change their driving behaviors. Over the same period of time the person is growing older. Due to the age-graded nature of society, they are encountering changes in expectations regarding their behavior, and begin moving through the normative processes of completing their education, getting a job, marrying, having children, gaining greater independence from their families of origin, and so forth. If this scenario were true, all that maturation and reduction in driving risk would have in common is that the structure and expectations, laws and regulations of society result in both processes taking place during the same interval of development.

Future research should examine these and other hypotheses that might explain the association between maturation and changes in problem driving behavior. While providing an important initial examination of the association between maturation and driving risk, this study was limited by the small number of measures of maturation available in the dataset that was analyzed, and the fact that those that were available were restricted to psychosocial maturation. Having more measures of varied aspects of individual maturation, including cognitive and affective components of this process, might provide a different picture than that found in this study. Another limitation of this study is that it only examined the association between maturation and driving risk in cross-sectional data. The patterning and trajectories of maturation and problem driving should be explored using longitudinal data to address this issue. Future research using longitudinal data and examining other facets of maturation is needed to fill in the many gaps that currently exist in this area. Because of the huge toll taken on young drivers, such research would be a worthwhile endeavor that could lead to improved approaches to reduce deaths from motor vehicle crashes.

References

- The American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. AAPOR; Ann Arbor, Michigan: 2000.
- Bachman, JG.; Wadsworth, KN.; O'Malley, PM.; Johnston, LD.; Schulenberg, JE. Smoking, Drinking, and Drug Use in Young Adulthood: The Impacts of New Freedoms and New Responsibilities. Mahwah, NJ: Lawrence Erlbaum Associates; 1997.
- Bachman, JG.; O'Malley, PM.; Schulenberg, JE.; Johnston, LD.; Bryant, AL.; Merline, AC. The Decline of Substance Use in Young Adulthood: Changes in Social Activities, Roles, and Beliefs. Mahwah, NJ: Lawrence Erlbaum Associates; 2002.
- Baranowski, T.; Perry, CL.; Parcel, GS. How individuals, environments, and health behavior interact: Social cognitive theory. In: Glanz, K., et al., editors. Health behavior and health education theory, research, and practice. 3. San Francisco, CA: Jossey-Bass; 2002. p. 165-184.
- Bates ME, Labouvie EW. Adolescent risk factors and the prediction of persistent alcohol and drug use into adulthood. *Alcoholism: Clinical and Experimental Research*. 1997; 21(5):944-950.
- Bennette ME, McCrady BS, Johnson V, Pandina RJ. Problem drinking from young adulthood to adulthood: patterns, predictors, and outcomes. *Journal of Studies on Alcohol*. 1999; 60:605-614. [PubMed: 10487729]
- Chassin L, Pitts SC, DeLucia C. The relation of adolescent substance use to young adult autonomy, positive activity involvement, and perceived competence. *Development and Psychopathology*. 1999; 11(4):915-932. [PubMed: 10624732]

- Chilcoat HD, Breslau N. Alcohol disorders in young adulthood: effects of transitions into adult roles. *Journal of Health and Social Behavior*. 1996; 37:339–349. [PubMed: 8997889]
- Cohen J. A power primer. *Psychological Bulletin*. 1992; 112:155–159. [PubMed: 19565683]
- Curran PJ, Muthén BO, Hartford TC. The influence of changes in marital status on developmental trajectories of alcohol use in young adults. *Journal of Studies on Alcohol*. 1998; 59:647–658. [PubMed: 9811086]
- Donovan JE. Young adult drinking-driving: Behavioral and psychosocial correlates. *Journal of Studies on Alcohol*. 1993; 54(5):600–613. [PubMed: 8412150]
- Donovan JE, Jessor R, Costa FM. Adolescent health behavior and conventionality-unconventionality: An extension of problem-behavior theory. *Health Psychology*. 1991; 10(1):52–61. [PubMed: 2026131]
- Erikson, EH. Identity, youth, and crisis. New York: Norton; 1968.
- Gotham H, Sher KJ, Wood PK. Predicting stability and change in frequency of intoxication from the college years to beyond: The role of individual difference variables. *Journal of Abnormal Psychology*. 1997; 106:619–629. [PubMed: 9358692]
- Hirschi, T. Causes of Delinquency. Berkeley, CA: University of California Press; 1969.
- Jessor, R.; Donovan, JE.; Costa, FM. Beyond adolescence: Problem behavior and young adult development. New York, NY: Cambridge University Press; 1991.
- Johnston, LD.; O'Malley, PM.; Bachman, JG. Monitoring the Future National Survey Results on Drug Use, 1975–1999 Volume II: College Students and Adults Age 19–40. Rockville, MD: National Institute on Drug Abuse; 2000.
- Johnston, LD.; O'Malley, PM.; Bachman, JG. Monitoring the Future National Survey Results on Drug Use, 1975–2003 Volume II: College Students and Adults Age 19–40. Rockville, MD: National Institute on Drug Abuse; 2004.
- Kearns JN, Leonard KE. Social networks, structural interdependence, and marital quality over the transition to marriage: A prospective analysis. *Journal of Family Psychology*. 2004; 18(2):383–395. [PubMed: 15222845]
- Ievers-Landis CE, Greenley RN, Burant C, Borawski E. Cognitive social maturity, life change events, and health risk behaviors among adolescents: Development of a structural equation model. *Journal of Clinical Psychology in Medical Settings*. 2006; 13:107–116.
- Maggs JL, Schulenberg J. Trajectories of alcohol use during the transition to adulthood. *Alcohol Research and Health*. 2004/2005; 28:195–201. Available at: <http://pubs.niaaa.nih.gov/publications/arh284/195-201.htm>.
- Mayhew, DR.; Simpson, HM.; Pak, A. Changes in collision rates among novice drivers during the first months of driving. Insurance Institute for Highway Safety; Arlington, VA: 2000.
- McCartt AT, Shabanova VI, Leaf WA. Driving experience, crashes and traffic citations of teenage beginning drivers. *Accident Analysis and Prevention*. 2003; 35:311–320. [PubMed: 12643948]
- Merline AC, O'Malley PM, Schulenberg JE, Bachman JG, Johnston LD. Substance use among adults 35 years of age: prevalence, adulthood predictors, and impact of adolescent substance use. *American Journal of Public Health*. 2004; 94(1):96–102. [PubMed: 14713705]
- National Highway Traffic Safety Administration [NHTSA]. Traffic Safety Facts 2003, Report No. DOT HS 809 775. Washington, DC: Department of Transportation; 2005a. Available at: <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/TSFAnn/2003HTMLTSF/TSF2003.htm>
- National Highway Traffic Safety Administration [NHTSA]. Traffic Safety Facts 2004, Report No. DOT HS 809 919. Washington, DC: Department of Transportation; 2005b. Available at: <http://www-nrd.nhtsa.dot.gov/Pubs/TSF2004.PDF>
- National Highway Traffic Safety Administration [NHTSA]. Traffic Safety Facts 2005, Report No. DOT HS 810 631. Washington, DC: Department of Transportation; 2006. Available at: <http://www-nrd.nhtsa.dot.gov/Pubs/TSF2005.PDF>
- National Highway Traffic Safety Administration [NHTSA]. Traffic Safety Facts 2006, Report No. DOT HS 810 818. Washington, DC: Department of Transportation; 2007. Available at: <http://www-nrd.nhtsa.dot.gov/Pubs/TSF2006FE.PDF>
- O'Malley PM. Maturing out of problematic alcohol use. *Alcohol Research & Health*. 2004/2005; 28:202–204. Available at: <http://pubs.niaaa.nih.gov/publications/arh284/202-204.htm>.

- Schulenberg JE, Sameroff AJ, Cicchetti D. The transition to adulthood as a critical juncture in the course of psychopathology and mental health. *Development and Psychopathology*. 2000/4; 16:799–806. [PubMed: 15704815]
- Shope JT, Elliott MR, Raghunathan TE, Waller PF. Long-term follow-up of a high school misuse prevention program's effect on students' subsequent driving. *Alcoholism: Clinical and Experimental Research*. 2001; 25(3):403–410.
- Shope JT, Dielman TE, Butchart AT, Campanelli PC. An elementary school-based alcohol misuse prevention program: a follow-up evaluation. *Journal of Studies on Alcohol*. 1992; 53:106–120. [PubMed: 1560663]
- Shope JT, Copeland LA, Maharg R, Dielman TE. Effectiveness of a high school alcohol misuse prevention program. *Alcoholism: Clinical and Experimental Research*. 1996; 20(5):791–798.
- Shope JT, Copeland LA, Marcoux BC, Kamp ME. Effectiveness of a school-based substance abuse prevention program. *Journal of Drug Education*. 1996; 26(4):323–337. [PubMed: 9071055]
- Shope JT, Bingham CR. Drinking-driving as a component of problem driving and problem behavior in young adults. *Journal of Studies on Alcohol*. 2002; 63(1):24–33. [PubMed: 11925055]
- Wechsler H, Dowdall GW, Davenport A, Castillo S. Correlates of college student binge drinking. *American Journal of Public Health*. 1995; 85:921–926. [PubMed: 7604914]
- Williams, AF.; Mayhew, DR. Graduated licensing: A blueprint for North America. Web based Insurance Institute for Highway Safety; Arlington, VA: 2004. Available from: www.highwaysafety.org
- Wilsnack RW, Wilsnack SC. Women, work and alcohol: Failures of simple theories. *Alcoholism: Clinical and Experimental Research*. 1992; 16:172–179.

Table 1

Descriptive Statistics for men and women

	Men (n=1131)	women (n=1211)
Variables	(%)	(%)
Sex	50.0	50.0
Education Complete	57.4	55.2
Employed	90.3	76.2
Financially Independent	89.3	83.1
Married	55.6	57.1
Parent	40.0	55.5
Child Bearing Complete	26.6	36.4
	Mean (sd)	Mean (sd)
Age	29.43 ± 1.12	29.36 ± 1.06
Self-Sufficient	4.20 ± 0.44	4.25 ± 0.46
Capable	3.67 ± 0.67	3.58 ± 0.66
Percent Adult	78.89 ± 19.18	83.72 ± 15.61
Transition Markers Completed	5.11 ± 1.77	5.24 ± 1.67
Drink/Driving	1.56 ± 3.28	0.70 ± 4.01
Drug/Driving	0.61 ± 2.03	0.35 ± 1.39
High-Risk Driving	2.21 ± 1.71	1.58 ± 1.45
Miles Driven in Past Year	21779 ± 16814	14656 ± 11558

Table 2

Univariate and multivariate regression coefficients predicting high-risk driving and drink/driving for men and women

	High-Risk Driving		Drink/Driving	
Variable	Univariate	Multivariate	Univariate	Multivariate
Men				
Education Complete	0.01	0.02	0.06	0.06
Employed	0.16 [*]	0.24 ^{**}	0.26 ^{**}	0.46 ^{***}
Parent	-0.17 ^{***}	-0.14 ^{**}	-0.31 ^{***}	-0.03
Child Bearing Complete	-0.08	-0.03	-0.16 ^{**}	-0.08
Married	-0.09 [*]	0.01	-0.45 ^{***}	-0.36 ^{***}
Financially Independent	-0.12	-0.15 [*]	-0.40 ^{***}	-0.40 ^{***}
Self-Sufficient	0.02	0.06	0.03	0.10
Capable	-0.06	-0.04	-0.18 ^{***}	-0.11 [*]
Percent Adult	-0.01 ^{***}	-0.01 ^{***}	-0.01 ^{***}	-0.01 ^{***}
Women				
Education Complete	0.16 ^{***}	0.13 ^{**}	-0.06	-0.01
Employed	0.33 ^{***}	0.23 ^{***}	0.65 ^{***}	0.51 ^{***}
Parent	-0.35 ^{***}	-0.24 ^{***}	-0.62 ^{***}	-0.45 ^{***}
Child Bearing Complete	-0.20 ^{***}	-0.08	0.03	0.29 ^{**}
Married	-0.15 ^{**}	0.02	-0.66 ^{***}	-0.34 ^{***}
Financially Independent	0.04	-0.01	-0.26 [*]	-0.23 [*]
Self-Sufficient	-0.03	0.01	-0.12	0.07
Capable	-0.01	0.01	-0.38 ^{***}	-0.35 ^{***}
Percent Adult	-0.01 ^{***}	-0.01 ^{***}	-0.01 ^{***}	-0.01 ^{***}

*
p < .05

**
p .01

p .001

Table 3

Univariate and multivariate regression coefficients predicting drug/driving for men and women: odds ratios (95% Confidence Limits)

Variable	Men		Women	
	Univariate	Multivariate	Univariate	Multivariate
Education Complete	0.92 (0.65, 1.29)	1.00 (0.69, 1.44)	0.68 (0.45, 1.02)	0.78 (0.51, 1.19)
Employed	0.39 (0.24, 0.63)	0.59 (0.34, 1.01)	0.97 (0.61, 1.56)	0.93 (0.56, 1.56)
Parent	0.99 (0.69, 1.40)	1.50 (0.93, 2.42)	0.98 (0.66, 1.46)	1.22 (0.74, 2.03)
Child Bearing Complete	1.40 (0.97, 2.04)	1.37 (0.90, 2.07)	1.33 (0.88, 2.00)	1.16 (0.73, 1.84)
Married	0.47 (0.33, 0.66)	0.43 (0.28, 0.68)	0.51 (0.34, 0.76)	0.53 (0.33, 0.86)
Financially Independent	0.35 (0.22, 0.54)	0.49 (0.29, 0.81)	0.66 (0.41, 1.06)	0.84 (0.50, 1.42)
Self-Sufficient	0.77 (0.52, 1.14)	1.13 (0.73, 1.73)	0.83 (0.54, 1.28)	1.06 (0.65, 1.71)
Capable	0.59 (0.44, 0.77)	0.72 (0.53, 0.98)	0.71 (0.51, 0.98)	0.73 (0.51, 1.04)
Percent Adult	0.99 (0.98, 0.99)	0.99 (0.98, 1.00)	0.98 (0.97, 1.00)	0.99 (0.98, 1.00)