

Predicting Developmental Change in Risky Driving: The Transition to Young Adulthood

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Data from a 3-wave, statewide mail survey of young adult drivers (1,025 men, 634 women) in Colorado were used to examine correlates and antecedents of risky driving, controlling for both drink driving and drug-related driving. The strongest predictor of risky driving, cross-sectionally, was behavioral conventionality, followed by psychosocial conventionality and social role status. Developmental decline in risky driving, from age 18 to 25, was related to entry into conventional adult social roles and to increases in psychosocial and behavioral conventionality. The strongest predictor of change in risky driving over time was change in behavioral conventionality. Risky driving by young adults appears to be part of a larger syndrome of problem behavior involvement.

Motor vehicle crashes, a major public health problem in the United States, are the most common cause of death for people under 34 years of age (National Committee for Injury Prevention and Control, 1989). Among 16- to 19-year-olds, the crash rate is four times as great as the rate for all other ages combined, and motor vehicle injuries account for more than 40% of all deaths in this age group (Williams, 1993, 1996).

Although alcohol use is associated with a large proportion of these crashes, "young drivers are least likely to have been drinking yet are at higher risk of crash involvement than older drivers at all blood alcohol concentrations" (Simpson & Beirness, 1993, p. 77). The relative contributions of alcohol use, age-related alcohol effects, driving skills and experience, risky driving practices, and "more stable, enduring aspects of personality or lifestyle" to risk for motor vehicle accidents remain obscure (Simpson & Beirness, 1993, p. 77). This study has as its focus factors that may account for one of these intermediary

influences on the motor vehicle crashes of young drivers: risky driving practices.

A number of researchers have emphasized the need to separate alcohol- and nonalcohol-related factors that may be linked to high-risk driving practices, such as speeding and control signal violations, that increase the likelihood of involvement in motor vehicle crashes (Donovan, Marlatt, & Salzberg, 1983; Hedlund, 1994; Yu & Williford, 1993). Studies of drinking, driving, and traffic accidents suggest that drink driving is only one manifestation of a larger pattern of high-risk driving practices (Donovan et al., 1983; Donovan, 1993; Hedlund, 1994). Because drinking drivers are similar to high-risk drivers and crash-involved drivers on numerous demographic characteristics (e.g., younger men) and personality characteristics (e.g., impulsiveness, aggressiveness), it is likely that some proportion of motor vehicle crashes would still occur if high-risk drivers did not drink but still drove (Hedlund, 1994).

Elsewhere, we have encouraged broadening the nearly exclusive focus in the road safety field on one type of behavior (drink driving) to include a wider range of behaviors (risky driving) that can compromise safe driving (Jessor, 1989). Risky driving refers to those patterns of driving behavior that place drivers at risk for morbidity and mortality and that involve legal violations, but do not involve alcohol or drug use. Risky driving practices include speeding, passing violations, tailgating or following other vehicles too closely, lane-usage violations, right-of-way violations, illegal turns, and control signal violations, among others.

In earlier work, it was established that risky driving is indeed one component of a larger class of problem driving behaviors, which also includes drink driving and drug driving (Donovan, 1993). The correlations of

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risky driving with drink driving and drug driving in that study were .46 and .24, respectively, indicating that risky driving is related to alcohol-impaired and drug-impaired driving. Nevertheless, the magnitude of those correlations is low enough to suggest that the role of risky driving as an independent factor in motor vehicle crashes merits direct investigation.

Risky driving has been found to be more prevalent among younger drivers than among older drivers. Cross-sectional data from observational studies (Evans & Wasielewski, 1983; Wasielewski, 1984), official driving records (Peck, 1985), and survey research (Jonah, 1990; Jonah & Dawson, 1987; Yu & Williford, 1993) indicate that speeding, following too closely, passing violations, and control signal violations are more common among younger drivers. There is reason to expect, then, that as drivers progress from youth through young adulthood, many should discontinue or "mature out" of risky driving behavior.

Risk behavior while driving is positively linked to involvement in other norm-violating or "problem" behaviors in adolescence, including delinquent behavior, problem drinking, and marijuana use (Beirness & Simpson, 1988; Jessor, 1987), and to personality and perceived social environmental characteristics that reflect greater psychosocial unconventionality: greater tolerance of deviance, less traditional values (i.e., lower value on academic achievement, less compatibility with parental values, and lower religiosity), and greater susceptibility to peer influence (Beirness & Simpson, 1988). These findings are consistent with findings from other problem-behavior research, which has established a negative association between psychosocial conventionality and such problem behaviors as marijuana use, problem drinking, and delinquent or deviant behavior in adolescence and young adulthood (Bachman, Johnston, & O'Malley, 1981; Jessor, Donovan, & Costa, 1991; Jessor & Jessor, 1977; Kandel, 1984; McLaughlin, Baer, Burnside, & Pokorny, 1985; Newcomb & Bentler, 1988). This same body of research has also shown that involvement in other problem behaviors plays a significant role in accounting for involvement in any specific problem behavior (see, for example, Jessor et al., 1991; Jessor & Jessor, 1977). Furthermore, as adolescents enter young adulthood, they become both more conventional and less involved in problem behaviors (Jessor et al., 1991). These cross-sectional and developmental findings suggest that risky driving should vary with variation in psychosocial conventionality and with involvement in other problem behaviors.

The assumption of marital, parental, and employment roles has also been associated with the diminution or discontinuation of involvement in problem behaviors, including criminal activity (Sampson & Laub, 1993) and the use of alcohol, marijuana, and other illicit drugs (Bachman, O'Malley, & Johnston, 1984; Temple

et al., 1991; Yamaguchi & Kandel, 1985). The inhibiting effect of adult social-role occupancy on involvement in deviant or problem behavior may reflect new role demands, new social ties to individuals and institutions (family, community, workplace), and, therefore, changes in self- and social expectations and increases in informal social controls.

Role socialization processes are expected to decrease involvement in problem behavior because it is incompatible with or interferes with conventional role performance (Chassin, Presson, Sherman, & Edwards, 1992; Yamaguchi & Kandel, 1985). Assumption of conventional adult roles may also involve "a heightened degree of self identification as an 'adult' expected to behave in the culturally prescribed manner" and a lower likelihood of associating with people who are either involved in or encourage participation in problem behaviors such as substance use (Bachman et al., 1984, p. 630). Declines in various nonnormative or problem behaviors from adolescence to young adulthood may also be attributed partly to the social controls that the conventionalizing roles of marriage, work, and parenthood entail (Jessor et al., 1991). Involvement in deviant and conforming behavior is "mediated by social bonds to key institutions of social control" (Sampson & Laub, 1993, p. 18), and variation in behavioral development from adolescence into adulthood is expected to be at least partially attributable to the "social ties embedded in adult transitions" (p. 249).

In this study we examine whether variation in risky driving can be accounted for by variation in social role status and psychosocial and behavioral conventionality. The occupancy of conventional adult roles (e.g., spouse, parent, and employee) and greater psychosocial and behavioral conventionality should be related to less involvement in risky driving. Furthermore, the assumption of conventional adult roles and a developmental increase in psychosocial and behavioral conventionality should eventuate in a decline in risky driving behavior over time. Developmental analyses presented in this article examine factors associated with change in risky driving and change in a subset of the riskiest drivers in the sample as well.

Method

Procedure

This article is based on data from a three-wave (1990–1992), annual mail survey of drink driving and risky driving among young adults in the State of Colorado. A stratified random sample of 18- to 25-year-old licensed drivers was selected by the Colorado Division of Motor Vehicles (DMV) from their driver history database, which is public information. A total of 5,545 drivers with Class C (passenger car) licenses was se-

lected, stratified by sex, age (18–20 vs. 21–25), area of the state (metro Denver, northeast, southeast, west), and violation status. The four violation-status strata were as follows: no moving violations in the previous year (zero to two points), three or more points in the previous year for traffic violations not involving alcohol or other drugs, a Driving While Ability Impaired (DWAI) conviction in the previous year ($.05 < \text{BAC} < .10$), and a Driving Under the Influence (DUI) conviction ($\text{BAC} \geq .10$) in the past 3 months. (A 3-month period was selected to ensure that the convicted driver's year-long driving suspension would not have been in effect for much of the previous year.)

Twice as many men as women were selected for the study to reflect the sex differences in involvement in drinking and driving. Because only a small number of women in this age range had been convicted of DUI, no DUI stratum could be constituted for them. Within sex strata, the stratum sizes for age and for area of the state were proportional to the numbers in the state driving population. Drivers with no traffic violations were undersampled (33% of the sample vs. 86% of the population). Drivers with nonalcohol-related traffic violations were oversampled (42% of the sample vs. 14% of the population). Nearly all drivers in this age range who had alcohol-related violations were invited to participate in the study (25% of the sample vs. 0.4% of the population).

Letters requesting participation in the study were mailed to all 5,545 selected drivers. Nineteen percent (1,069) were returned as undeliverable, with no forwarding address. Signed consent forms were returned by 2,943 drivers (66% of those initially contacted [not undeliverable]; 53% of the total potential sample).

In 1990, the Young Adult Driving Questionnaire (YADQ) was mailed to the 2,943 drivers who gave consent. Completed questionnaires were returned by 2,720 young adult drivers (92% of those providing consent; 61% of those initially contacted; 49% of the total sample). Each participant was mailed a check for \$15. Approximately a year later, in 1991, a follow-up questionnaire was sent. A check for \$25 was sent to each respondent who returned the second questionnaire. The third questionnaire was mailed about a year after the second questionnaire was returned. In this third wave, completed questionnaires were returned by 1,879 participants (69% of the Wave 1 participants; 42% of those initially contacted at Wave 1; 34% of the total sample drawn). A \$25 check was mailed to each Wave 3 respondent.

The Wave 1 participants were compared with the total sample drawn to assess selection bias. Geographic areas were represented in the same proportions as in the total sample, plus or minus 1%. Whereas 60% of the total sample were 21 to 25 years old, 57% of the participants were in that age bracket. Sixty-four percent of the participants were men, versus the intended oversampling of 67%. Percentages of participants in each

violation category versus the intended percentages in the total sample are as follows: no moving violation, 36% versus 33%; traffic violation(s), 44% versus 42%; DWAI, 14% versus 15%; and DUI, 6% versus 10%. Thus, men, and particularly men with DUI, were oversampled with respect to the state population, but not quite as much as we had intended.

Description of the Sample

Data from participants who completed both Waves 1 and 3 of the study were analyzed for this article. These participants had the following characteristics at Wave 1: 62% were men, 38% were women; 37% were 18 to 20 years old, 29% were 21 to 22 years old, 34% were 23 to 25 years old; 15% were married, and 3% had been divorced; 51% were from metropolitan Denver, 17% were from western Colorado, 16% were from northeastern Colorado, and 17% were from southeastern Colorado. Ethnic composition of the sample, available only from the Wave 3 questionnaire, is 84% White, 11% Hispanic, and 2% each Black, Native American, and Asian. At Wave 1, 38% had zero to two points for traffic violations; 44% had three or more points for nonalcohol and nondrug-related traffic violations, 13% had a DWAI conviction, and 5% had a DUI conviction. With respect to employment, 57% were working full time, 22% were working part time, 2% were homemakers not working outside the home, 11% were unemployed full-time students, and 9% were unemployed. Forty-seven percent were enrolled in an educational program, from General Education Development (GED) to postgraduate.

To test for the possibility of bias due to attrition from the Wave 1 sample, we compared participants who completed Wave 3 with those who did not, using their data from Wave 1. Small but significant ($p < .05$) mean differences were found between the two groups on only 3 out of 10 representative measures from the questionnaire. Those who completed Wave 3, on average, were less aggressive, had fewer friends as models for problem behavior, and attended church more often. No difference was found in intolerance of deviance, impulsiveness, perceived agreement between parents and friends, influence from parents relative to friends, risky driving, percentage married, or percentage with full-time jobs.

Despite these mean differences on three measures between participants lost to attrition and those who completed Wave 3, intercorrelations among the various measures were essentially the same within the two groups. A comparison of covariance structures in the two groups tested the goodness of fit between observed data from the 10 representative measures from the Wave 1 questionnaire and a model that equated each covariance between the two groups (Jöreskog & Sör-

bom, 1989). The goodness of fit index was .999, indicating an excellent fit to that model, and the chi-square statistic for lack of fit ($df=45$) was 31.9, *ns*. The absence of evidence of bias in relations among the measures makes it unlikely that the results of regression analyses will be biased due to attrition from the initial, participating sample.

These analyses are based on data from 1,659 young adult drivers (1,025 men and 634 women) who had no missing data in Waves 1 and 3 for the risky driving criterion scores and for the social role and conventionality scores to be used as predictors (37% of those who were initially contacted, 61% of the Wave 1 participants, 88% of the Wave 3 participants).

Description of the Questionnaire

The 20-page YADQ includes a number of personality, perceived social environment, and self-reported behavior measures originally developed to test problem-behavior theory among high school and college students (Jessor & Jessor, 1977) and later modified for use with young adults in their middle to late twenties (Jessor et al., 1991). It also includes a variety of scales developed specifically for this study, as well as adapted versions of several measures developed by others (e.g., measures of competitive speed, driving aggression, and tension reduction from D. M. Donovan, Queisser, Salzberg, & Umlauf, 1985).

Measurement of driving behaviors. Risky driving, drink driving, and marijuana driving were assessed by 28 items that asked how many times in the past year the respondent had engaged in each behavior. The open-ended responses were recoded into the following 14 categories: never, 1 time, 2 times, 3 times, 4 times, 5 times, 6 to 9 times, 10 to 14 times, 15 to 19 times, 20 to 24 times, 25 to 29 times, 30 to 49 times, 50 to 99 times, and 100 or more times in the past year.

Risky driving was measured by a 20-item summative scale ($\alpha = .95$) whose item content is as follows: speeding (3 items), unsafe passing (3 items), following too closely (2 items), unsafe lane changes (4 items), failure to yield right of way (2 items), illegal turns (3 items), and running a stop sign or stop light (3 items). Drink driving was assessed by five items ($\alpha = .93$), which asked about frequency in the past year of the following behaviors: driving within an hour of having one or two drinks, driving within an hour of having three or more drinks, driving when high or light-headed from drinking, driving when coordination was already affected, and drinking while driving. Marijuana driving was assessed by three items ($\alpha = .88$), which asked about frequency in the past year of driving while a little high on marijuana, driving while very high on mari-

juana, and smoking marijuana while driving. Differential exposure to opportunity for risky driving was measured by a single item asking for the total number of miles driven during the past year.

Measurement of social role statuses. Social role status measures included three items that asked whether the respondent is married, has children, and is working full time (≥ 30 hours a week).

Measurement of conventionality. Psychosocial conventionality was represented by two personality measures and three perceived environment measures. The personality measures include attitudinal intolerance of deviance, a 10-item scale (range = 10–40, $\alpha = .79$) involving ratings of the “wrongness” of a variety of normative violations, including theft, lying, aggression, and property damage; and religiosity, a 5-item scale (range = 52–20, $\alpha = .90$) assessing the personal importance placed on religious beliefs, religious counsel, and religious activities. The perceived environment measures include parent–friends compatibility, a 3-item scale (range = 3–12, $\alpha = .80$) of perceived agreement between parents and friends regarding what is important in life, the kind of person one should become, and what one should be doing with one’s life; parent–friends influence, a 3-item scale (range = 3–9, $\alpha = .70$) assessing the relative influence of parents and friends on the participant in making important decisions and in general outlook on life (higher score means more influence from friends); and friends as models for problem behavior, a 2-item scale (range = 2–10, $\alpha = .58$) reflecting exposure to friends who model involvement in drinking and in marijuana use. Behavioral conventionality was represented by two measures. Delinquent-type behavior was measured by a 10-item scale (range = 10–50, $\alpha = .68$), including reported frequency in the past 6 months of shoplifting, taking things that do not belong to you, giving fake excuses for missing meetings, lying to cover up something you did, starting fights and arguments, and intentionally damaging property that belongs to others. Church attendance was measured by a single multiple-choice item (range = 1–7) asking how many times in the past year the respondent attended religious services.

Correlations among the conventionality measures and among the social role measures had absolute magnitudes ranging from .05 to .70 ($p < .05$ for all), with an average of .22 and a median of .18. Correlations between conventionality measures and social role measures were smaller in magnitude, with a range of .00 to .15 (one third of them nonsignificant), average .07, and a median of .08. Thus, there appears to be more homogeneity within the two constructs than between them, and they may be considered relatively independent of each other.

Establishing the Risky Driving Criterion Measure

The 20-item risky driving scale is the principal criterion measure used in this study. It has an alpha reliability of .95, indicating very high internal consistency. Correlations between annual data waves indicate high stability of the risky driving measure from one year to the next. Correlations between Waves 1 and 2 were .67 and .72 for men and women, respectively; .75 and .75 between Waves 2 and 3; and .62 and .64 between Waves 1 and 3.

The official driving records of the participants provide some support for the validity of their self-reported driving behaviors. The mean risky driving score was significantly higher for those participants with recorded traffic convictions (59.8) than for those with no convictions (53.1), $t(1,439) = 2.9$, $p < .01$. Furthermore, in a previous article on drink driving based on this same dataset, J. E. Donovan (1993) reported a significant correlation between the self-reports of drink driving and the number of alcohol-related traffic offenses in the DMV records ($r = .21$, $p < .001$).

Construct validity of the risky driving measure is supported by the pattern of its relations with other measures, a pattern that is consistent with expectations derived from theory and from previous empirical work. Women reported fewer instances of risky driving ($M = 48.6$) than did men ($M = 64.5$), $t(1590) = 8.0$, $p < .001$. This sex difference is consistent with the relative risks of collision among young adult drivers shown by national crash involvement data (Williams, 1996).

Risky driving scores showed strong negative correlations with three measures that refer to safe driving practices, one behavioral and two attitudinal. (All correlations reported in this paragraph are significant at $p < .001$.) Risky driving had a correlation of $-.59$ with a 7-item scale of safe driving habits ($\alpha = .74$), such as obeying speed limits and stop signs, and driving defensively to leave a margin of safety. Risky driving correlated $-.52$ with a 5-item scale of attitudinal intolerance of risky driving ($\alpha = .77$), which asked how "wrong" it is to speed, run stop signs, follow too closely, and take risks for fun while driving. In addition, risky driving correlated $.50$ with a 5-item scale of competitive driving attitude ($\alpha = .89$), a measure of the extent to which the respondent enjoys outmaneuvering other drivers.

Results

Results are organized into three sections. First, we examine the cross-sectional relations of social role status and conventionality with risky driving at Wave 1. Second, we describe developmental change in risky driving in this young adult sample over the 2-year interval from Wave 1 to Wave 3. Third, we predict change in risky driving between Wave 1 and Wave 3

based on change in social role status and in conventionality. In the multivariate analyses, the effects of age, ethnicity, miles driven in the past year, drink driving, and marijuana driving were partialled out. All analyses were done separately for men and for women.

Correlates of Risky Driving: Cross-Sectional Analyses

Bivariate analyses. Before examining multivariate relations with risky driving, we examined how each of the control measures and the measures of theoretical interest is related to risky driving (see Table 1). Nearly all the correlations between the control measures and risky driving are significant, highlighting the importance of controlling for these variables in the multivariate analyses. Most of the theoretical measures are significantly correlated with risky driving. These correlations indicate that occupancy of conventional young adult social roles and greater conventionality are associated with lower levels of risky driving for both men and women. The relations of marital status and parenthood with risky driving, however, are quite small, especially for men. The weakness of the relation between full-time employment and risky driving (not significant for women) may be due to the added exposure to driving that is involved in going to work every day.

With respect to psychosocial conventionality, greater attitudinal intolerance of deviance, greater religiosity (men only), more compatibility between parents and friends (men only), more influence from parents relative to friends, and fewer friends who model problem behavior were linked to less risky driving. With respect to behavioral conventionality, greater involvement in delinquent-type behavior was significantly correlated with risky driving, but church attendance was not.

Interestingly, the delinquent-type behavior scale, which has no driving-related content, was more strongly correlated with the risky driving scale (.45 for men, .50 for women) than were the control measures of driving after drinking (.39 and .42), $t(1,022) = 2.0$ and $t(631) = 2.2$, respectively, $p < .05$, or driving after using marijuana (.19 and .25), $t(1,022) = 7.72$ and $t(631) = 6.02$, respectively, $p < .001$. This suggests that the risky driving score reflects a tendency to violate norms and rules, more than a substance-related impairment of driving.

In general, measures of conventionality are more strongly associated with risky driving than are social role measures, especially for men. The strongest relations with risky driving are for scales that refer to problem behaviors—intolerance of deviance, friends models for problem behavior, and delinquent-type behavior.

Multivariate analyses. The multivariate relations of all of the social role and conventionality measures with risky driving were assessed by hierarchical multiple regression analysis. The effects of age, ethnic-

ity, miles driven in the past year, drink driving, and marijuana driving were partialled out by entering those control measures at Step 1 of the regression. Because there were so few non-White participants, the ethnicity

measure was merely dummy coded as 0 for White and 1 for non-White. Measures of social role statuses, psychosocial conventionality, and behavioral conventionality were then entered at Steps 2, 3, and 4, respectively. The analyses yield an account of the improvement in prediction (increase in amount of variance accounted for) at each step, as each predictor set is entered.

As shown in Table 2, the measures of social role statuses and of psychosocial and behavioral conventionality accounted for a significant proportion of the variance in the risky driving measure, 12% for men and 15% for women, over and above that accounted for by the control measures. With the entry of the social role measures at Step 2, there is a small, significant increment in the amount of variance explained (1% for men, 2% for women). A larger increment (an additional 4% for each sex) was added by the measures of psychosocial conventionality entered at Step 3, and a still larger increment (an additional 8% for men, 9% for women) was provided by the measures of behavioral conventionality entered at Step 4. With all of the predictor measures entered in the analysis, significant regression weights (betas) were obtained for delinquent-type behavior and church attendance for the men, and for parenthood, intolerance of deviance, delinquent-type behavior, and church attendance for the women. (Because church attendance was unrelated to risky driving at the bivariate level, it can be interpreted as a suppressor variable.)

The increase in the squared multiple correlation at the final step in the hierarchical regression analysis reflects

Table 1. *Correlations of Control, Social Role, and Conventionality Predictor Measures With the Risky Driving Measure*

Measure	Men	Women
Control		
Age	-.08**	-.09*
Ethnicity (Non-White) ^a	-.15***	-.05
Miles Driven, Past Year	.19***	.18***
Drink Driving	.39***	.42***
Marijuana Driving	.19***	.25***
Social Role		
Married	-.06*	-.14***
Parent	-.07**	-.19***
Full-Time Job	-.05*	-.04
Psychosocial Conventionality		
Intolerance of Deviance	-.31***	-.28***
Religiosity	-.07**	.00
Parent-Friends Compatibility	-.06*	.05
Parent-Friends Influence	.13***	.10**
Friends Models, Problem Behavior	.15***	.16***
Behavioral Conventionality		
Delinquent-Type Behavior	.45***	.50***
Church Attendance	.00	.05

Note: Data are from Wave 1 (1990); men, $n = 1,025$; women, $n = 634$.

^a0 = White, 1 = non-White.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Table 2. *Cross-Sectional Hierarchical Regression Analysis Predicting Wave 1 Risky Driving Measure from Wave 1 Social Roles and Conventionality, Controlling for Age, Ethnicity, Miles Driven, Drink Driving, and Marijuana Driving*

Step	Measures Entered	Men ^a			Women ^b		
		β at Final Step ^c	R^2	R^2 Change	β at Final Step ^c	R^2	R^2 Change
1	Control measures		.21***			.21***	
	Age						
	Ethnicity (non-White)	-.09**					
	Miles driven	.17***			.12***		
	Drink driving	.27***			.23***		
	Marijuana driving				.09*		
2	Add social role measures		.22***	.006		.23***	.020**
	Married						
	Parent				-.11**		
	Full-time job						
3	Add psychosocial conventionality measures		.25***	.036***		.27***	.038***
	Intolerance of deviance				-.08*		
	Religiosity						
	Parent-friends compatibility						
	Parent-friends influence						
	Friends models, problem behavior						
4	Add behavioral conventionality measures		.33***	.077***		.36***	.093***
	Delinquent-type behavior	.33***			.36***		
	Church attendance	.11**			.13**		

Note: Sample sizes are slightly reduced due to missing data on control measures.

^a $n = 949$. ^b $n = 585$. ^cNonsignificant beta coefficients are omitted.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

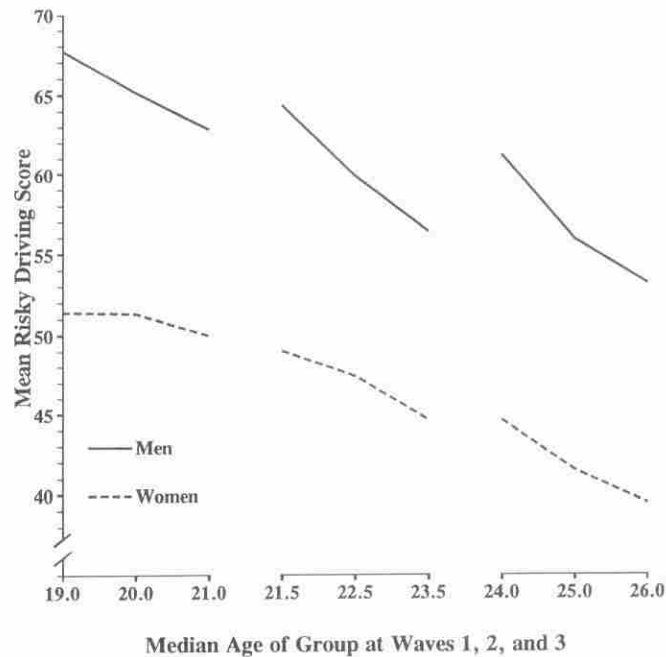


Figure 1. Change in mean risky driving score, Wave 1 to Wave 2 to Wave 3, by sex and three age groups.

variance accounted for uniquely by the behavioral conventionality measures, over and above the variance accounted for by all other predictors combined. To determine whether social role statuses or psychosocial conventionality can account for variance in risky driving that is not accounted for by other predictors, we reordered the steps of the analysis to enter either the social role measures or the psychosocial conventionality measures at the final step (not tabled). Each set of measures, when entered at the final step, accounted uniquely for 1% of the variance, a significant increment ($p < .05$), but substantially less than the variance uniquely accounted for by behavioral conventionality.

The Wave 1 analyses were replicated using the parallel data from Waves 2 and 3. The same pattern of results was found (not tabled) with similar proportions of variance accounted for. Again, after controlling for age, ethnicity, exposure, and driving after substance use, social roles accounted for a small proportion of variance in risky driving; psychosocial conventionality contributed a larger increment; and behavioral conventionality accounted for the most variance, even after all other predictors had been entered.

Developmental Change in Risky Driving: Descriptive Findings

Our second major aim in this article is to describe the developmental course of risky driving over time. In the 2-year interval between Wave 1 and Wave 3, the average level of risky driving in this sample declined. The men's mean risky driving scores in Waves 1, 2, and 3, respectively, were 64.5, 60.4, and 57.6, $F(2,972) =$

17.7, $p < .001$. The women's mean scores were 48.6, 47.1, and 45.0, $F(2,616) = 4.9$, $p < .01$. Furthermore, male and female drivers at each age level showed this pattern of declining scores. The developmental decline in risky driving is illustrated in Figure 1, by sex, for three groups defined according to their ages at Wave 1: ages 18 to 20 (median age = 19), ages 21 and 22 (median age = 21.5), and ages 23 to 25 (median age = 24).

The figure illustrates, for each sex, a decline in average scores across data waves within each of the three age groups. This decline is statistically significant ($p < .05$) for all but the youngest female group. The figure also illustrates the cross-sectional differences noted above between sexes and among age groups at Wave 1 (the left hand point in each curve), at Wave 2 (the middle point), and at Wave 3 (the right-hand point).

The Wave 3 mean of any group can be compared to the Wave 1 mean of the next older, same-sex group, which represents drivers at approximately the same age level two years earlier. There is no significant difference between the two groups in any of these comparisons. In other words, those drivers who were age 20 to 22 at Wave 3 (1992) reported about the same average frequency of risky driving as those who had been age 21 and 22 at Wave 1 (1990), and the 23- and 24-year-old drivers at Wave 3 reported about the same amount of risky driving as those who had been age 23 to 25 at Wave 1. Thus, the cross-sectional age differences in risky driving, as well as the longitudinal declines in risky driving, can be seen as developmental changes rather than cohort differences reflecting historical change.

Because social role statuses and conventionality are associated cross-sectionally with risky driving, the ob-

served decrease in risky driving with age suggests corresponding changes in social roles and conventionality with age (Jessor et al., 1991). The data provide some support for those expectations. From Wave 1 to Wave 3, participants reported average increases in occupancy of the three young adult social role statuses and increases in conventionality as measured by parent–friends compatibility and by delinquent-type behavior ($p < .05$ for all). There was no significant mean change in religiosity, parent–friends influence, or friends as models for problem behavior. One measure of conventionality, church attendance, showed an average decrease in both sexes, as did intolerance of deviance among the men. In sum, half of the predictor measures showed significant mean changes that were theoretically consonant with the observed decline in risky driving over time.

Developmental Change in Risky Driving: Longitudinal Prediction

Although involvement in risky driving declined, on average, from Wave 1 to Wave 3, many respondents reported no change, and some even reported an increase in risky driving. Our third major aim in this study, therefore, is to try to account for these individual differences in change in risky driving over time—that is, to predict variation in developmental change in risky driving. Our main hypothesis is that the observed changes in risky driving can be accounted for by change in young adult social roles and change in conventionality.

One method for predicting change with a regression approach is to enter the Time 1 score as a control measure and use the Time 2 score as the criterion measure (Dalecki & Willits, 1991). Change in risky driving from Wave 1 to Wave 3 was operationalized by entering the Wave 1 risky driving score at Step 1 of a hierarchical multiple regression predicting risky driving at Wave 3. Similarly, change in social role statuses and change in conventionality were established by entering the Wave 1 measures of those variables as controls at Step 3, after the other control measures had been partialled out at Step 2. Regression weights for the Wave 3 measures of social roles and psychosocial and behavioral conventionality, entered at Steps 4, 5, and 6, respectively, then represent the effect of Wave 1–Wave 3 change in those predictors on Wave 1–Wave 3 change in the risky driving criterion measure. The analyses presented in Table 3 show that change in social role statuses and change in psychosocial and behavioral conventionality do, indeed, provide a significant account of change in risky driving.

The substantial stability of risky driving scores across the three data waves was noted earlier. As can be seen in Table 3, Wave 1 risky driving, entered at Step 1, accounts for 38% and 42% of the variance in Wave 3

risky driving for men and women, respectively. At Step 2, the other five control measures account for an additional 11% of the variance for men and 6% for women. These percentages are based on the total variance in Wave 3 risky driving. Our interest in these analyses is in the variance in change in risky driving—that is, in the residual variance after the Wave 1 risky driving score has been entered. Subtracting the variance accounted for at Step 1 from the total variance, the residual can be considered the variance in change in risky driving left to be explained (Cohen & Cohen, 1975). The 11% and 6% accounted for at Step 2, expressed now as a percentage of the residual variance, yield 18% and 10%, respectively, of the variance in change in risky driving accounted for by the five controls.

At Step 3, the entire set of Wave 1 measures of social roles and conventionality was entered to partial out the variance related to their initial levels (about 1%), thereby allowing us to assess the effects of change in those measures in subsequent steps. When the Wave 3 social role measures were entered at Step 4, there was no improvement in prediction for men, but there was a significant increment in R^2 for the women of 1% of the variance in risky driving, which converts to 2% of the variance in change in risky driving. Change in social roles is minimally predictive of change in risky driving, but the lone significant regression weight among the Wave 3 social role measures does indicate that, for women, getting married between Wave 1 and Wave 3 is linked to a decrease in risky driving. This significant effect of getting married, for women, can be illustrated by the differential change in average risky driving scores for women who married after Wave 1 versus women who did not marry: For the former, the average risky driving score decreased (from 48.1 at Wave 1 to 35.8 at Wave 3); for women who did not marry, the average score showed essentially no decrease (from 48.7 at Wave 1 to 47.5 at Wave 3).

When the Wave 3 psychosocial conventionality measures were entered at Step 5, they accounted for an additional 1% of variance in risky driving for both men and women, or 2% of the variance in change in risky driving. Change in psychosocial conventionality, like change in social role status measures, accounts for only a small, although significant, amount of variation in change in risky driving. It is change in the behavioral conventionality measures, entered at Step 6, that accounts for a more substantial increment of 5% of variance in risky driving for men and 3% for women; those convert to 9% and 4%, respectively, of the variance in change in risky driving. Change in behavioral conventionality, therefore, has a larger impact on change in risky driving than either change in social role statuses or change in psychosocial conventionality. The importance of behavioral conventionality was seen earlier in the cross-sectional analyses as well. Overall, then, the data in Table 3 indicate that change in social role

Table 3. Longitudinal Hierarchical Regression Analysis Predicting Change in Risky Driving, Wave 1 to Wave 3, From Change in Social Roles and Change in Psychosocial and Behavioral Conventionality

Step	Measures Entered	Men			Women		
		β at Final Step ^c	R^2	R^2 Change	β at Final Step ^c	R^2	R^2 Change
1	Wave 1 risky driving measure	.45***	.38***		.54***	.42***	
2	Wave 3 control measures		.49***	.110***		.48***	.057***
	Age	-.05*					
	Ethnicity (non-White)						
	Miles driven	.15***			.09**		
	Drink driving	.26***			.16***		
	Marijuana driving				-.06*		
3	Wave 1 predictors as controls		.50***	.012*		.49***	.012
	Social role measures						
	Married						
	Parent						
	Full-time job	-.06*					
	Psychosocial conventionality measures						
	Intolerance of deviance						
	Religiosity						
	Parent-friends compatibility						
	Parent-friends influence						
	Friends models, problem behavior	-.05*			-.10**		
	Behavioral conventionality measures						
	Delinquent-type behavior						
	Church attendance						
4	Wave 3 social role measures		.50***	.001		.50***	.013**
	Married				-.08*		
	Parent						
	Full-time job						
5	Wave 3 psychosocial conventionality measures		.51***	.012***		.51***	.010*
	Intolerance of deviance	-.06**					
	Religiosity						
	Parent-friends compatibility						
	Parent-friends influence						
	Friends models, problem behavior						
6	Wave 3 behavioral conventionality measures		.57***	.053***		.54***	.025***
	Delinquent-type behavior	.28***			.21***		
	Church attendance						

Note. Sample sizes are slightly reduced due to missing data on control measures

^a $n = 965$. ^b $n = 595$. ^cNonsignificant beta coefficients are omitted.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

statuses, psychosocial conventionality, and behavioral conventionality together account for a significant amount of the variance in change in risky driving—11% for the men and 8% for the women.

These same analyses of change were replicated over the Wave 1 to Wave 2 interval with very similar findings (not tabled). Change in behavioral conventionality was again the strongest predictor for each sex.

It is plausible that the Wave 3 measures of social roles and psychosocial conventionality are weak or are not significant in these longitudinal predictions due to multicollinearity, which would inflate the standard errors of coefficients for those measures. One rule of thumb is that variance inflation factors greater than 10 may cause poorly estimated coefficients (Myers, 1990). When we examined the variance inflation factors associated with all predictors

in the model, most of them were less than 2, with the largest being 3.4. We therefore conclude that small or nonsignificant coefficients in the present analyses are not due to multicollinearity.

Predicting change in risky driving among risky drivers. The analyses thus far have been concerned with predicting change in risky driving for the entire sample of drivers. But a key concern remains: What happens developmentally to the risky drivers making the transition to young adulthood? Can their change also be predicted? To examine developmental change in that subgroup, we defined a group of risky drivers based on their Wave 1 risky driving scores being at or above the 66th percentile of the distribution for each sex (score of 79 for men, 58 for women). That cutoff

score was chosen because it seemed sufficiently extreme to represent hazardous driving behavior, but was low enough to give adequate group sizes for analysis ($n = 319$ men, 199 women). The analyses sought to predict, among the Wave 1 risky drivers, which ones would still be risky drivers by Wave 3—that is, have a score at or above 79 for men or 58 for women—and which would no longer be in the risky driver group—that is, have risky driving scores below these levels.

Again, changes in social roles and in conventionality were used as predictors. The criterion measure was whether a person was in the group that continued as risky drivers (chronic risky drivers) or not (matured out of risky driving). (It may be argued that a logistic regression is more appropriate for this dichotomous criterion measure, but results from logistic regressions showed the same significance levels for the unique contributions of the various predictor types. Results

from the ordinary hierarchical regressions are presented to allow the increments in variance accounted for to be compared with the preceding analyses.) The results of these analyses (see Table 4) indicate that the theoretical measures are indeed relevant for accounting for maturing out of risky driving.

After all the control measures were entered in Steps 1, 2, and 3, the effects of changes in the theoretical predictors were assessed in Steps 4, 5, and 6. For the women, changes in social role statuses predicted maturing out of risky driving. For the men, change in behavioral conventionality predicted maturing out of risky driving. Total variance in risky driver status accounted for by change in social roles, change in psychosocial conventionality, and change in behavioral conventionality, over and above the control measures, was 10% for the men and 11% for the women. Change in social role statuses, at Step 4, accounted for a significant 7% of

Table 4. Longitudinal Hierarchical Regression Analysis Predicting Change of the Riskiest Driver Group, Wave 1 to Wave 3, from Change in Social Roles and Change in Psychosocial and Behavioral Conventionality

Step	Measures Entered	Men ^a			Women ^b		
		β at Final Step ^c	R^2	R^2 Change	β at Final Step ^c	R^2	R^2 Change
1	Wave 1 risky driving measure	.22***	.09***		.06***		
2	Wave 3 control measures		.19***	.094***	.12***	.061*	
	Age						
	Ethnicity (non-White)						
	Miles driven						
	Drink driving	.29***			.17***		
	Marijuana driving						
3	Wave 1 predictors as controls		.23***	.043	.14*	.019	
	Social role measures						
	Married						
	Parent						
	Full-time job						
	Psychosocial conventionality measures						
	Intolerance of deviance						
	Religiosity						
	Parent-friends compatibility						
	Parent-friends influence						
	Friends models, problem behavior						
	Behavioral conventionality measures						
	Delinquent-type behavior						
	Church attendance						
4	Wave 3 social role measures		.23***	.001	-.27**	.21***	.071***
	Married						
	Parent						
	Full-time job				-.16*		
5	Wave 3 psychosocial conventionality measures		.25***	.018	.24***	.032	
	Intolerance of deviance	-.11*					
	Religiosity	-.19*					
	Parent-friends compatibility						
	Parent-friends influence						
	Friends models, problem behavior						
6	Wave 3 behavioral conventionality measures		.33***	.076***	.25**	.004	
	Delinquent-type behavior	.25***					
	Church attendance	.29***					

^a $n = 319$, ^b $n = 199$. ^cNonsignificant beta coefficients are omitted.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

variance for the women, but no significant variance for the men. Change in psychosocial conventionality, at Step 5, did not significantly improve prediction for either sex. Change in behavioral conventionality at Step 6, however, significantly improved prediction for the men (an additional 8% of variance accounted for). There was no improvement for the women. These findings indicate an important sex difference in those factors that facilitate development out of risky driving among initially risky drivers during the transition to young adulthood. Significant predictors of maturing out of risky driving for the men were change in intolerance of deviance, change in religiosity, and change in delinquent-type behavior. (Change in church attendance also had a large coefficient, but as a suppressor variable). For the women, the significant predictors of maturing out of risky driving were different—getting married and getting a full-time job.

We replicated these analyses over a briefer interval; maturing out of risky driving by Wave 2 was regressed on changes in the predictors between Waves 1 and 2 (not tabled). In predicting change in risky driver status over this 1-year period, change in social roles did not account for significant variance for either sex; change in psychosocial conventionality accounted for a significant increment of 3% of variance in risky driver status for the men and a nonsignificant 3% for the women. As was found in the 2-year change analysis, change in behavioral conventionality was the strongest predictor for the men, but was not significant for the women.

In the change analyses presented in Tables 3 and 4, Wave 1 measures of social roles and psychosocial and behavioral conventionality were entered at Step 3 to control for their initial levels. That step also serves to show how poorly Wave 1 social role statuses and conventionality predict change in risky driving. The increment in variance accounted for at that step was small and, with one exception, nonsignificant. In the next three steps, changes in those predictors from Wave 1 to Wave 3 provided significant prediction of changes in risky driving over the same time period. Thus, measures of developmental change in social roles and in conventionality predicted change in risky driving, whereas the initial levels of those predictors did not.

Discussion

In this study we established a linkage between participation in conventional social roles and psychosocial and behavioral conventionality, on the one hand, and involvement in risky driving, on the other. The nature of that linkage is consonant with linkages that have been established for other adolescent and young adult problem behaviors: the greater the participation in conventional social roles and the greater the psychosocial and behavioral conventionality, the less the involvement in

problem behaviors (Jessor et al., 1991; Jessor & Jessor, 1977; Sampson & Laub, 1993). That those same variables now also account for risky driving suggests that it may be part of a larger syndrome of problem behavior in adolescence and young adulthood. To ensure that the relations of the theoretical variables with risky driving are not merely due to their associations with driving after drinking or drug use, measures of those variables were partialled out of the risky driving criterion measure.

The developmental pattern of risky driving in youth and young adulthood—a linear decline in average levels of risky driving as age increased from 18 to 25 in this study—is consistent with findings from other studies (Evans & Wasielewski, 1983; Jonah, 1990; Jonah & Dawson, 1987; Peck, 1985; Wasielewski, 1984; Yu & Williford, 1993). Changes in young adult social role statuses and in some of the measures of psychosocial and behavioral conventionality that were theoretically consonant with that decline also were observed. Thus, young adults in this sample exhibited the “return to conventionality” that was noted in an earlier study of the transition to young adulthood (Jessor et al., 1991), and that is one explanation of the “maturing out” process observed with respect to several other adolescent problem behaviors.

Also important, we have shown that it is *changes* in social roles and in psychosocial and behavioral conventionality, rather than initial levels, that are predictive of changes in risky driving. Changes in the same variables that accounted cross-sectionally for variation in risky driving accounted for variation in change in risky driving, demonstrating consistency in the cross-sectional and longitudinal relations. The changes in social roles and in conventionality appear to reflect a developmental process that involves the adoption of more conventional attitudes, values, beliefs, and behaviors with the approach to and entry into young adulthood. The direction of change toward more conventionality has implications not only for maturing out of risky driving, but for a lifestyle characterized by less involvement in problem behaviors in general.

The observed developmental decline in risky driving is consistent with crash data that show that rates of crashes are very high for 16-year-olds and then decline sharply across the next 9 years (Williams, 1993, 1996). The changes in psychosocial factors that are associated with decreases in risky driving behavior would have implications, albeit indirect, for those decreases in crashes and would help to explain why older drivers experience fewer traffic crashes than do teenagers and young adults.

Clear differences emerged in the relative importance of the different sets of theoretical predictors for explaining risky driving. Behavioral conventionality is the strongest predictor of risky driving cross-sectionally, followed by psychosocial conventionality and then so-

cial roles. There was also an important sex difference: The social role statuses that we assessed are more strongly correlated with risky driving for women than for men. Among the riskiest drivers, entry into conventional young adult social roles is the strongest predictor of change in risky driving for women, whereas it is change in behavioral conventionality that is the strongest predictor for men.

Perhaps of most practical or applied interest from a traffic-safety perspective is the finding that changes in social roles and in conventionality can predict change or maturing out of risky driving for those initially in the group of riskiest drivers. It suggests that established patterns of risky driving, even among the riskiest, can be deflected, and that those drivers need not remain chronic threats to traffic safety.

These data cannot establish causal direction, despite being longitudinal. It may be that changes in conventionality lead to changes in both social roles and risky driving, or that changes in social roles prompt changes in psychosocial conventionality and in a wide range of behaviors. There also may be reciprocal causation. Sadava & Pak (1993) showed a negative association between involvement in a committed relationship and alcohol consumption, but "both directions of causality are shown to be operative" (p. 39). Yamaguchi and Kandel (1985) found that marijuana use is associated with postponement of marital and parental roles and that marriage and parenthood are associated with subsequent reduction in marijuana use. They also argued that causality may operate in both directions through the processes of role selection and role socialization. Because these kinds of processes are obviously not amenable to control or experimentation, achieving more precise measurement of the timing of onset of change in each predictor might be helpful in clarifying causal directions in change in risky driving.

These results need to be evaluated in the context of several limitations. First, the analyses are based on self-reports, including driving behavior and involvement in other problem behaviors. Although assurance of confidentiality was given to participants in an effort to minimize inaccurate reporting, it is possible that participants understated their actual involvement in these behaviors. However, the consistency between self-reports and official driving records does support the validity of the self-reports.

Second, the theoretical measures accounted for a relatively modest proportion of variance in risky driving. Including the control measures, the predictors used in the cross-sectional analyses accounted for about one third of the variance in risky driving. In the longitudinal analyses, 29% of the variance in change in risky driving for the men and 21% for the women was accounted for. Part of the unexplained variance is most likely due to other, unmeasured influences, such as driving experi-

ence, proportion of driving done at night, proportion of driving for recreation versus for work, vehicle characteristics, and driving-related attitudes. Another part of the unexplained variance may be due to inadequacies in the measures used. For psychosocial and behavioral conventionality, we did borrow well-established measures from our own previous work, but our measures of social role statuses lack the known reliability and validity of well-developed measures. For example, the social role measures only assessed role occupancy, whereas there are many complex dimensions to social roles and to the contexts associated with roles (Bachman et al., 1984). The qualities of role occupancy, rather than simple role occupancy itself, may better explain the relations between social roles and nonnormative behavior (Chassin et al., 1992). More than the mere occurrence of role transitions, it may be the quality or strength of the social ties provided (for example, marital attachment or job stability) that can be expected to increase informal social control and thereby reduce problem behavior (Sampson & Laub, 1993). Despite these limitations in the measurement of social roles, however, the measures did show the expected mean differences between sexes and across age groups, as well as the expected relations with problem behavior.

A third limitation of the study is the relatively homogeneous nature of the sample. Although possible effects of race and ethnicity were controlled, the small number of non-White participants precluded more detailed analysis, and the present results speak essentially to the White population. An important direction for future research, therefore, would be to examine these relations among racial and ethnic minority populations.

The lower than desired initial participation rate and the attrition from the Wave 1 sample are additional limitations of this study. Nevertheless, the participants were quite representative of the original sample strata, and we were not able to detect any meaningful bias in the data due to the attrition.

Overall, the results of this study support a theoretical account of variation in risky driving and in change in risky driving. Risky driving in young adulthood, like other problem behaviors, seems to be embedded in a larger, more unconventional lifestyle. Because it is very likely that risky driving is a significant cause of crashes, changes in lifestyle—in social roles and in psychosocial and behavioral conventionality—may be important targets for interventions to reduce the morbidity and mortality associated with youthful driving. Efforts to educate young drivers about safe driving practices are likely to be ineffective without attention to these other psychosocial and behavioral aspects of their lives (see Williams, 1993). Continued social policy attention to drink driving alone would continue to elide what seems to be another important influence on driving-related crashes.

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