Driving and autonomy during adolescence: An examination of driving, grades, and time use

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Running head: DRIVING, GRADES, AND TIME USE

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Abstract

Previous research on driving during adolescence has tended to focus on risky driving behaviors. However, as a normative experience during adolescence, driving may also reflect autonomy development. This study examines whether driving behaviors, including whether or not an adolescent has a license and how much freedom an adolescent has in his/her driving, are associated with grades and time use among an ethnically diverse sample of adolescents. Ethnic differences in rates of driving were found, consistent with other reports of ethnic differences in autonomy. Also consistent with autonomy research, adolescents with a license but restrictions on their driving received the highest grades in school and spent moderate amounts of time with their friends, compared to those without a license or more freedom in their driving. Consistent with the perspective that driving makes it easier to be away from home, increasing driving freedoms were associated with less time with family. Differences in time use according to driving tended to be more pronounced on weekends than on weekdays.

Driving and autonomy during adolescence: An examination of driving, grades, and time use

For many adolescents, getting a driver's license represents a right of passage, and it is a normative experience in much of the United States. A recent national survey determined that 52% of all 16-19 year olds drive (Trowbridge & McDonald, 2008), with even higher rates in parts of the country such as the one in this study, in which driving is part of the culture and people tend not to rely on public transportation. Even with restrictions on new drivers that many states have recently implemented (e.g., CA DMV, 2010), driving offers adolescents new opportunities for autonomy as they move towards adulthood (Hartos, Eitel, Haynie, & Simons-Morton, 2000). However, no study has examined driving in the context of autonomy to investigate individual differences in driving, or correlates of driving behaviors. The limited driving literature that does exist has tended to focus on risky driving behaviors (e.g., Beck, Hartos, & Simons-Morton, 2005), such as driving under the influence of alcohol. As a result, we know little about variation among adolescents in their driving experiences, or in the associations between driving and other aspects of adolescents' lives. The goals of this study are to 1) examine ethnic and gender differences in patterns of driving behavior, and 2) examine relations between adolescent driving and both GPA and time use in the family, school, and social domains. Average time use, as well as relative weekend and weekday time use will be examined. Overall, we focus not just on whether or not an adolescent drives, but also on how much freedom or autonomy an adolescent has in his/her driving to explore how driving, as an indicator of autonomy, manifests itself in other domains of adolescents' lives.

Driving and Autonomy

Becoming more autonomous is one of the key developmental tasks of adolescence (Erikson, 1968). However, numerous studies have shown that early autonomy, characterized by

a lack of parental input and control during adolescence, is associated with maladjustment (e.g., Dornbusch, Ritter, Mont-Reynaud, & Chen, 1990; Feldman & Wood, 1994; Haase, Romasik, & Silbereisen, 2008; Smetana, Campione-Barr, & Daddis, 2004). This suggests that autonomy best develops in the context of support from one's parents, in which one experiences a gradual change from parental decision making, to joint decision making, to adolescent decision making. This is consistent with research demonstrating the benefits of authoritative parenting during adolescence (e.g., Lamborn, Mounts, Steinberg, & Dornbusch, 1991). Authoritative parents allow their adolescents to explore age-appropriate autonomy, within structured limits and guidelines and with appropriate levels of monitoring.

Previous research has often measured an adolescent's degree of autonomy through an examination of his/her decision making in relation to that of his/her parents (e.g., Dornbush et al., 1990). In this study, we propose that the extent to which an adolescent drives is also likely to reflect his/her degree of autonomy. Unlike many other cultures, in the United States there are not clear markers that separate children or adolescents from adults. To a large degree, it is thus up to each individual family to determine the timing and course of an adolescent's autonomy development (Feldman & Quatman, 1988). Both adolescents and their parents likely play a role in determining when an adolescent gets a driver's license and how much freedom he/she has in his/her driving. Some adolescents may demonstrate themselves as being more responsible than others, by getting good grades or staying out of trouble, making it more likely that their parents will grant them greater autonomy in driving (Hartos, Beck, & Simons-Morton, 2004). Due to their parenting styles, some parents may generally be more permissive than others, granting more freedom in their adolescents' driving, while others are more likely to monitor and restrict some aspects of driving. In particular, having a drivers' license, but having some parental restrictions

on driving may reflect authoritative parenting and optimal provisions of autonomy because the license reflects an age-appropriate milestone, while the restrictions reflect continued monitoring. In contrast, fewer restrictions may reflect permissive parenting.

Many studies have documented ethnic, socioeconomic, and gender differences in provisions of autonomy. Compared to European-American adolescents, Asian adolescents and their parents tend to have later timetables for autonomy (Dornbusch et al., 1990; Feldman & Quatman, 1988; Feldman & Rosenthal, 1991; Stewart, Bond, Deeds, & Chung, 1999), potentially stemming from cultural differences in norms relating to parental control (Fuligni, Hughes, & Way, 2009). Ethnic differences have also been demonstrated in rates of authoritative parenting, with authoritativeness being more prevalent in European-American than ethnic minority households, and Asian parents being the least likely to be authoritative (see Steinberg, Dornbusch, & Brown, 1992). As a reflection of autonomy, it is therefore likely that Latino and Asian adolescents will have more driving restrictions than European-American adolescents. Driving may also vary according to SES, as some adolescents may not drive because there is no family car for them to use in learning to drive, or their parents can not pay for their insurance or other driving related expenses. Parent education may also be related to adolescent driving as highly educated parents have been found to be more likely to grant adolescents' autonomy in their decision making than those with less education (Wray-Lake, Crouter, & McHale, 2010).

Previous findings of gender differences in behavioral autonomy are mixed (see Wray-Lake et al., 2010). While boys tend to be monitored less closely than girls (Dishion & McMahon, 1998; Jacobson & Crockett, 2000) and be granted more autonomy and freedom than girls (Bumpus, Crouter & McHale, 2001), girls are more likely to exhibit behaviors that demonstrate them as more mature than boys (Bumpus et al., 2001). Consistent with this latter

perspective, Sherman, Lapidus, Gelven, and Banco (2004) reported that parents of female teens rated their daughters as more ready for the responsibility of driving and were more likely to expect to give their daughters unlimited vehicle access, compared to parents of male teens.

Driving and Grades

Previous research has shown strong associations between autonomy and adolescents' grades in school. Parent and adolescent joint decision making, rather than parent or adolescent alone decision making, is associated with the highest grades and levels of reported effort in school (Dornbusch et al., 1990). Autonomy coupled with firm control, the features of authoritative parenting, has also been shown to be associated with increases in achievement over time (Steinberg, Elmen, & Mounts, 1989). Finally, higher levels of monitoring have been found to be associated with GPA (Jacobson & Crockett, 2000). Dornbusch and colleagues (1990) reported that the association between autonomy and grades and effort was consistent across ethnic, gender, and socioeconomic groups. However, other research has been less consistent across ethnic groups, particularly when parenting rather than autonomy has been examined. While authoritative parenting has been linked with academic achievement (e.g., Lamborn et al., 1991), the relation is much stronger for European-American adolescents than for members of ethnic minority groups (Steinberg et al., 1992). Given this research, it is hypothesized that the highest grades will be found among those who drive, but have limitations on their driving. It is expected that this relationship will exist for members of all three ethnic groups, but that it will be strongest among European-American adolescents.

Driving and Time Use

In addition to grades, time use is also important in understanding the transformation of adolescents' experiences as they grow older (Larson, Richards, Moneta, Holmbeck, & Duckett,

1996). For example, adolescents tend to spend less time with their parents than do those in late childhood (Larson et al., 1996). As they get older, adolescents are also more likely to work at a job (e.g., Mortimer, Finch, Ryu, & Shanahan, 1996) and spend more time alone (e.g., Larson & Richards, 1991). However, it is possible that these changes over time are related not just to age, but to changing life experiences such as getting a license as well. Larson and colleagues (1996) found support for this idea in that a variable they created representing opportunities to be away from home, including whether or not one has a license, was negatively associated with family time. Because driving is potentially associated with the expansion of the life space (Shlechter & Gump, 1983), we examine time use in domains both inside and outside the home, represented by time with friends and family respectively, and time in productive activity, represented by time spent studying (Wight, Price, Bianchi, & Hunt, 2009).

Two different predictions can be made about the associations between driving and time use in these three domains. First, driving may make it easier for adolescents to be away from the home. This would suggest that those with a license, and particularly those who always have access to a car, are likely to spend more time with friends and less time with family. Associations with studying are less clear according to this explanation as it could be done either at home or away from home. On the other hand, it is possible that associations between driving and time use will be related to the autonomy provisions. Associations between developmentally appropriate levels of autonomy and adjustment (e.g., Dornbusch, et al., 1990) would suggest that those with a license, but restrictions, will spend more time with parents and studying than other adolescents, and moderate amounts of time with friends.

Given the amount of time that adolescents spend in school during the week, there are tremendous differences in the potential for discretionary time between weekends and weekdays

and researchers have found differences in adolescents' time use according to day of the week. For example, Larson and colleagues (1996) found that the largest decline in family time over the course of adolescence was on Friday and Saturday nights, when adolescents are less likely to have school demands on their time. Similarly, Wight and colleagues (2009) reported that adolescents spent more time studying on school days than on non-school days. Witkow (2009) found that differences between weekends and weekdays varied according to adolescent characteristics, such that higher achieving adolescents varied more in their time with friends and studying between weekends and weekdays than lower achieving adolescents. Because of more opportunities to demonstrate autonomy, or to simply be away from the home, it is important to examine differences according to day of the week.

The Current Study

The current study aims to explore driving behaviors during adolescence as reflecting autonomy development. In line with this, the first goal of the study is to examine patterns of driving behavior, both in terms of having a license and in how much freedom those with a license have in their driving. It is hypothesized that there will be ethnic differences in rates of driving, with European-American adolescents more likely to drive and to have more freedom in their driving than Latino and Asian adolescents. Because of the mixed findings documented by others regarding autonomy differences in gender, no specific hypotheses are proposed.

The second goal of the study is to examine associations between driving and GPA and time use. We first examine whether there are concurrent associations between driving and grades and time use in 12^{th} grade. It is hypothesized that those with a license but with restrictions will have the highest grades. Associations between driving and time use are potentially less straightforward, with driving either manifesting itself in time away from home or

reflecting autonomy-supported adjustment, as with grades. As a second step, we examine these concurrent associations controlling for reports of the outcome variable in tenth grade, to examine whether driving is associated with changes in grades and time use over this two-year period.

Gender and ethnic differences in the associations between driving and GPA and time use will be explored throughout. While ethnic differences are hypothesized in rates of driving, ethnic and gender differences in the associations with driving are exploratory, aimed to determine the extent to which the findings are generalizeable across groups.

Method

Sample

Twelfth grade students from a longitudinal study of adolescents' daily lives participated in this study. Beginning in ninth grade and continuing through each year of high school, students from three public high schools in the Los Angeles area were recruited. The schools were chosen to reflect the communities from which their students are drawn and vary in terms of ethnic composition, socioeconomic status, and overall level of achievement. The first school was predominantly populated by Latino and Asian-American students who came from families with lower-middle to middle-class educational and occupations backgrounds. This school tended to be in the lower-middle to middle range of the achievement distribution of schools within the state of California. The second school consisted of students from mainly Latino and European American families from lower-middle to middle-class backgrounds and tended to have average achievement levels. Finally, the third school consisted of students from mainly Asian and European American students with families that tended to be middle to upper-middle class. This school tended to have above average achievement levels. No single ethnic group dominated any

of these schools; rather, the two largest ethnic groups each comprised 30-50% of the total population in each school (California Department of Education, 2006).

In two of the schools, the entire twelfth grade was invited to participate, regardless of whether they had participated in earlier grades. In the third school, approximately half of the ninth graders were invited to participate during the first year of the study because the large size of the school did not make it feasible to recruit all of the students. At this school, students were recruited on the basis of their enrollment during the spring semester in a class that all ninth grade students were required to take during either the fall or spring semester. These students were followed in subsequent years. Further, in twelfth grade a random half of students at this school who had not participated in previous waves were invited to participate.

The sample used in this study is the 534 participants from Latino, Asian, and European-American backgrounds who participated during the Spring semester of their twelfth grade school year. This sample was relatively evenly split by sex (47.6% male and 52.4% female) and had an average age of 17.80 years (*SD* = .37). The sample was ethnically diverse, with 186 participants (34.8%) from Latino backgrounds, 239 (44.8%) from Asian backgrounds, and 109 (20.4%) from European-American backgrounds. Of the Latino participants, 84% had Mexican backgrounds, and of the Asian participants, 70% had Chinese backgrounds.

Of the 534 participants described above, 441 participants had also participated in the study in 10th grade. There was no difference between those who did and did not participate in 10th grade in likelihood of having a license in 12th grade, GPA in 12th grade, or any of the time use variables in 12th grade. This subsample was used only in the longitudinal analyses.

Procedure

In both tenth and twelfth grade, students completed a questionnaire during class time in a group setting. Consent forms and study materials were available to students and their parents in English, Chinese, and Spanish, and all participants chose to complete the survey in English. Upon completion of the questionnaire, participants were given a 14-day supply of three-page daily diary checklists and told to complete one each night before going to sleep, beginning the evening they filled out the initial questionnaire. Daily assessments of time use, as well as other daily experiences not relevant to the current study, were collected via these checklists. Participants folded each day's completed diary in half and sealed it shut with a seal that was provided to them. They then stamped the time and date across the seal with a hand-held electronic time stamper provided to them for use during the study period. The stamper was programmed such that the participants could not alter the date and time. Students were also called at their homes during the two-week period to remind them to complete their diaries and answer questions. All 14 diaries were collected at school at the end of the two-week study periods. Adolescents received $30 for their participation and were told that they would receive two movie passes if inspection of the data indicated that they had completed the diaries correctly and on-time (e.g., diaries completed on consecutive days with correct date stamped on seal).

The diary procedure resulted in a very high rate of compliance. While 42 participants did not return completed daily reports in twelfth grade and are not included in the time use analyses, those who did return reports completed approximately 97% of all diaries, and 94% of the sample completed all 14 diaries. Of the completed diaries, 72% could be verified as having been completed on time, on either the correct night or before noon the following day, based on the time and date provided by the time stamper. Compliance rates were similar in tenth grade. While 8 participants did not return any daily reports and are not included in the time use

analyses, among those who did return diaries, approximately 98% of diaries were completed and 85% could be verified as having been completed on time. Results of analyses including only diaries that could be verified as having been completed on time were similar to those using the full sample. All analyses reported here were therefore conducted with all completed diaries.

Students' course grades for the academic year were obtained from their official school records after the completion of the school year.

Measures

Driving. In twelfth grade, participants were asked whether or not they have a driver's license. If yes, they were then asked whether or not they have access to a car and, if so, how frequently they have access (1 = almost never, 5 = always). Among those with a license, if participants responded "no" to the initial question or 1-4 on the follow-up question regarding amount of access they were classified as *does not always have access* and were given a score of 0 on the access variable. If participants responded "yes" to the initial question and 5 on the follow-up question they were classified as *always has access* and were given a score of 1 on the access variable. Finally, participants were given a list of 5 locations ("to school," "to see friends," "to extracurricular activities", "to go shopping or run errands" and "to work") and asked to check the locations to which they typically drive. Given that not all of the locations were relevant for all participants (e.g., not all participants work at a job; some participants live close enough to walk to school), we collapsed number of locations driven to into a two-level variable. Among those with a license, participants were classified as to whether they drive to most (4 or 5) of the locations on the list (0 = does not drive to most locations, 1 = drives to most locations).

GPA. Course grades were collected from school records at the end of each academic

year. GPAs were computed based on participants' average grades for the year on a 5-point scale (0="Fail" to 4 = "A").

Time use. In both tenth and twelfth grade, participants completed forms each night for two weeks in which they indicated the amount of time they spent in a variety of activities that day. To measure *study time*, participants indicated whether they "studied or did homework while not in school" and "(if yes) for how long?" To measure *time with friends*, participants indicated whether they "spent time with [their] friends outside of school" and "(if yes) for how long?" To measure *time with family*, participants indicated whether they engaged in each of 11 different activities with family members (e.g., "helped your brothers or sisters with their schoolwork;" "ate a meal with your family"). They were then asked to estimate the total time they spent doing these things. Each time estimate was coded in hours.

California Driving Laws

In California, current law allows adolescents to get a provisional license at age 16 (CA Department of Motor Vehicles, 2010). For the first 12 months, or until age 18, those with a provisional license have all of the privileges of a non-provisional license with two exceptions: 1) They are not able to drive from 11pm until 5am, and 2) they are not allowed to drive with passengers under the age of 20 unless accompanied by an adult.

Results

Patterns of Driving During Adolescence

The first goal of this study was to examine the extent to which adolescents vary in terms of their driving behaviors. In 12th grade, 298 participants (55.8%) reported having a driver's license. Having a license did not vary according to gender or age. However, Latino adolescents were less likely to have a license (29.6%) than were European-American (73.4%) and Asian

(68.2%) adolescents, χ^2 (2) = 80.47, $p < .001$. To examine whether this ethnic difference was accounted for by SES, logistic regression was used to predict likelihood of having a license based on ethnicity, gender, age, and SES. Latino was treated as the baseline group given that Latino adolescents differed from the other two groups in their rates of having a license in the original analysis. In this analysis, both Asian, $\beta = 1.51$, $p < .001$, and European-American, $\beta = 1.76$, $p < .001$, adolescents continued to be more likely to have a license than Latino adolescents. None of the other variables significantly predicted likelihood of having a license.

Having a driver's license does not necessarily mean that an adolescent has total access to a car and is free to drive where he/she wants. Only 54.2% of those with a license in twelfth grade indicated that they always had access to a car. Always having access to a car did not vary according to gender or age. However, as shown in Figure 1, Asian adolescents with a license (47.2%) were less likely than European-American (63.8%) and Latino adolescents (61.1%) with a license to always have access to a car, $\chi^2(2) = 7.16$, $p < .05$. As above, logistic regression was used to examine whether the ethnic difference was accounted for by SES. In this analysis, Asian was treated as the baseline group. While SES was not a significant predictor itself, with SES included in the model, the differences between Asian and Latino ($\beta = .55$, $p = .095$) and European-American ($\beta = .60$, $p = .053$) adolescents were both marginal.

Adolescents also varied in terms of the types of locations to which they drive, driving to an average of 3.61 ($SD = 1.34$) of 5 possible locations. While number of locations did not vary by gender or age, Asian adolescent drivers ($M = 3.33$, $SD = 1.47$) drove to fewer locations than European-American ($M = 3.80$, $SD = 1.13$) and Latino ($M = 4.13$, $SD = 1.02$) adolescents, $F(2, 295) = 8.67$, $p < .001$. In particular, as shown in Figure 1, Asian adolescents who drove were less likely than Latino and European-American adolescents to report driving to see friends, $\chi^2(2)$

= 19.10, $p < .001$, to extracurricular activities, $\chi^2(2) = 7.47$, $p < .05$, and to go shopping or run errands, $\chi^2(2) = 9.26$, $p < .01$. Both Asian and European-American adolescents were less likely than Latino adolescents to drive to school, $\chi^2(2) = 5.96$, $p < .05$, and to a job, $\chi^2(2) = 8.56$, $p < .05$. There was only one gender difference in the locations to which adolescents drove. Among those with a license, girls (75.9%) were more likely to drive to extracurricular activities than boys (64.9%; $\chi^2(1) = 4.25$, $p < .05$). Logistic regression examined likelihood of driving to each location by gender, ethnicity, and SES simultaneously. The only difference that was found from that reported above was that in predicting likelihood of driving to extracurricular activities, neither gender nor ethnicity was significant with the other demographic variables in the model.

Concurrent Associations with Driving

The second goal of the study was to examine concurrent associations between driving and GPA and time use in twelfth grade. For each dependent variable, driving was examined in three different ways. We first compared those who do and do not have a license. Among those with a license, we next compared those who do and do not always have access to a car. Finally, among those with a license, we compared those who do and do not drive to most locations.

For the association between each of these driving variables and GPA, we tested a regression model in which we controlled for ethnicity, gender, and SES. As a second step, we added interactions between ethnicity and gender and the relevant driving variable. We used Hierarchical Linear Modeling (HLM; Bryk & Raudenbusch, 1992) to examine time use given that participants reported on their time use on 14 separate days. Rather than averaging these 14 reports, HLM allows us to take advantage of the variability across participants' days. A separate model for time use in each domain was estimated using the following equations:

$$Time_{ij} = b_{0j} + e_{ij} \quad [1]$$

$$b_{0j} = c_{00} + c_{01}\,(\text{Gender}) + c_{02}\,(\text{Ethnicity}) + c_{03}\,(\text{SES}) + c_{04}\,(\text{Drive}) + u_{0j} \quad [2]$$

This model allowed for the estimation of the average of each person's daily time use in each of the three domains, measured in hours, as a function of characteristics of the individual. In particular, time use was predicted by gender, ethnicity, SES and driving experience. Gender was coded such that males = 0 and females = 1 and was uncentered, ethnicity was indicated with two codes, one for Latino and one for Asian. This left European-American as the baseline group. SES was centered at the mean of the sample. Each of the driving variables was uncentered. As with GPA, as a second step we added interactions between ethnicity and gender and the relevant driving variable.

After examining average time use, we next examined whether time use varied between weekends and weekdays by adding an additional predictor indicating day of week to equation 1. This variable was coded such that weekdays = 0 and weekends = 1 and was uncentered. Adolescents often consider time after school on Fridays as part of the weekend and other researchers have included Friday afternoons with weekends for analysis (Larson & Richards, 1991; Smith, 1992). We therefore categorized Mondays through Thursdays as weekdays and Fridays through Sundays as weekends. As with the other analyses, as a second step we added interactions between ethnicity and gender and the relevant driving variable.

Whether or not one drives. We first examined whether GPA and time use varied according to whether or not a participant drove (0 = does not have a license, 1 = has a license). Adolescents with a license received higher grades in twelfth grade than those who did not drive, $\beta = .11$, $p < .05$. There was no association between driving and time in any of the three domains or in relative time use between weekends and weekdays in the first set of time use analyses. However, there were a number of significant interactions between driving and gender and

ethnicity in predicting time use. First, the association between driving and average time spent with friends varied according to gender. As shown in Figure 2, girls with a license spent more time with friends than girls without a license, $b = .40$, $p < .05$, while boys with a license spent marginally less time with friends than boys without a license, $b = -.29$, $p = .08$. As shown in Table 1, the day of week analyses revealed that this was due to differences on weekends, rather than weekdays. In particular, there was no association between driving and time with friends during the week. However, while boys with a license spent less time with friends on weekends than those without a license, this was reduced for girls. Also shown in Table 1, the associations between driving and relative time spent studying and with family on weekends and weekdays varied according to ethnicity. For European-American adolescents, but not Asian or Latino adolescents, having a license was associated with less study time during the week but less of a reduction in study time on weekends. For Latino adolescents, but not European-American or Asian adolescents, driving was associated with a reduction in time with family on the weekends.

Access to a car. Among those with a license, we next examined whether there were differences in GPA or time use between those who did and did not report always having access to a car (0 = do not always have access, 1 = always has access). Adolescents who always had access to a car received lower grades than those who had did not always have access to a car, $\beta = -.12$, $p < .05$. Adolescents who always had access to a car also spent more time with friends than those who did not always have access, $b = .46$, $p < .01$. However, as shown in Figure 3, further analysis revealed a significant ethnicity interaction such that average time with friends did not vary according to access to a car for Latino adolescents, $b = -.09$, n.s., while both Asian, $b = .41$, $p < .05$, and European-American adolescents, $b = .98$, $p < .01$, who always had access to a car spent more time with friends than those who did not always have access. As shown in Table 2,

the day of week analyses revealed that the ethnic difference described above was driven by differences on weekends, rather than weekdays. Compared to European-American adolescents, Latino adolescents with a license spent relatively less time with friends on weekends than weekdays (b = -1.43, $p < .05$).

There was no difference in average time studying or with family according to access to a car. Relative study time on weekends and weekdays also did not differ according to access to a car. However, as shown in Table 2, adolescents who always had access to a car spent relatively less time with their family on weekends than weekdays (b = -.32, $p < .05$). There were no significant interactions between access and either gender or ethnicity in predicting study time or time with family, on average or in adolescents' relative time use on weekends and weekdays.

Number of locations. Finally, among those with a license, we examined whether there were differences in GPA or time use between those who did and did not report driving to most of the locations. Adolescents who drove to most of the locations received lower grades than those who drove to few of the locations, β = -.12, $p < .05$, and adolescents who drove to most of the locations spent marginally more time with friends than those who drove to fewer locations, b = .33 p = .07. Day of week analyses revealed that adolescents who drove to most of the locations spent more time with friends during the week than those who drove to fewer locations (b = .43, $p < .05$). There was no difference in time studying or with family according to number of locations, and there were no significant gender or ethnicity interactions in any of the average time use or day of week analyses.

Longitudinal Associations with Driving

The final goal of this study was to examine the associations between driving in 12th grade and GPA and time use, controlling for one's level of the outcome variable in 10th grade. For

GPA, the same models described above were tested, with 10th grade GPA included as an additional predictor. For the time use analyses, daily reports of time use from both 10th and 12th grade were included and a variable representing year was including in equation 1. This variable was coded 0 for twelfth grade and 1 for tenth grade. As this variable was meant to control for time use in tenth grade, level 2 predictors examining associations between year and time use were not tested. These analyses include only the participants from the original sample who had also participated in the study in 10th grade.

Whether or not one drives. Controlling for GPA in 10th grade, there was no longer an association between having a license in 12th grade and GPA in 12th grade. Similarly, in the models without interactions, there were no significant associations between driving and time use in any of the three domains, controlling for time in that domain in 10th grade. In the follow-up analyses including interactions, the gender interaction in predicting time with friends found without the tenth grade control was still significant, $b = .37$, $p < .05$.

Access to a car. Among those with a license in 12th grade and controlling for GPA in 10th grade, there was a marginal negative association between always having access to a car and GPA, $\beta = -.08$, $p = .08$. There was also an association between always having access to a car and time with friends, $b = .25$, $p < .01$, controlling for tenth grade time with friends. This difference did not vary between weekends and weekdays. There was no association between always having access to a car and time with family or time spent studying, controlling for 10th grade time use. However, controlling for tenth grade time with family, there was a significant interaction between gender and access in predicting relative twelfth grade time with family on weekends, compared to weekdays ($\beta = -.81$, $p < .01$). Controlling for their tenth grade time use, girls who

always had access to a car spent less time with family on weekends than weekdays, while there was no difference according to access to a car for boys.

Number of locations. Among those with a license in 12th grade and controlling for GPA in 10th grade, there was no longer an association between driving to many locations and GPA in 12th grade. Similarly, there were no associations between driving and time use in any of the three domains, controlling for time in that domain in 10th grade. However, as with the analysis examining access to a car, there was a significant interaction between gender and locations in predicting relative twelfth grade time with family on weekends, compared to weekdays ($\beta = -.78$, $p < .05$). Controlling for tenth grade time use, girls who drove to most locations spent less time with family on weekends than weekdays, while there was no difference for boys according to number of locations.

Discussion

The goal of this study was to examine adolescent driving as a manifestation of autonomy. To this end, we examined ethnic and gender differences in rates of driving, as well as associations between driving and grades and time use in twelfth grade. Consistent with other literature on ethnic differences in autonomy (see Fuligni et al., 2009), European-American adolescents had the most autonomy in their driving. Latino adolescents were less likely than European-American and Asian adolescents to have a license and licensed Asian adolescents were less likely than licensed European-American and Latino adolescents to report always having access to a car. Licensed Asian adolescents also drove to fewer locations. When one considers that adolescents' friends tend to share their same ethnic background (e.g., Tolson & Urberg, 1993; Way & Chen, 2000), ethnic differences in driving may contribute to or strengthen differences in the ways in which adolescents structure their social activities. For example, other

work has demonstrated that Latino adolescents are more likely than members of other ethnic groups to know their friends' families (e.g., Way, Gingold, Rotenberg, & Kuriakose, 2005). When there is more inter-connection between family and friends, adolescents may be less motivated to be away from the home when with friends, reducing their need to have a license in order to be able to participate in social activities. It is important to note that these ethnic differences were found controlling for SES and thus these ethnic differences are not just due to monetary costs associated with driving. In contrast to the ethnic differences in driving, there were few gender differences, consistent with the mixed findings of others regarding gender differences in autonomy development.

The second goal of the study was to examine associations between driving and grades and time use. As hypothesized, partial autonomy, defined in this study as having a license with restrictions, was associated with the highest levels of academic success (see also Dornbusch et al., 1990). In particular, adolescents with a license received higher grades than those without a license and, among those with a license, those who always had access to a car and those who drove to most locations received lower grades than those with partial access and those who drove to fewer locations. While previous research has suggested a causal pathway from autonomy granting and parenting to effort and achievement in school (e.g., Dornbusch et al., 1990; Lamborn et al., 1991), and we conceptualized the relations between driving and grades in this way, the reverse may be true as well in that parenting can be influenced by the behavior of one's children (see Hutchinson, Baldwin, & Caldwell, 2003; Scarr & McCartney, 1983). That is, academically successful adolescents may be more likely to be granted autonomy in the form of privileges such as driving. The possible reciprocal relationship between driving and grades may

be one reason that the concurrent associations at twelfth grade were reduced when controlling for grades in tenth grade.

The hypotheses for the associations between driving and time use were less straightforward than for grades. On the way hand, driving may have been associated with more opportunities to be away from home, suggesting that adolescents who drive, and particularly those who always have access to a car and drive to most of the locations, would spend more time with friend and less time with family. On the other hand, time use may reflect autonomy provisions, with optimal levels of autonomy (i.e., driving with limitations) associated with the highest amounts of time studying and with family, and moderate amounts of time with friends. The results suggested that these processes may be operating differently across the three domains of time use investigated, varying also according to day of the week and gender and ethnic background. In general, differences in time use according to driving were more pronounced on weekends than weekdays, when adolescents are likely to have more discretionary time.

The association between driving and time with friends was consistent with both hypotheses. Particularly for girls and for Asian and European-American adolescents, and more strongly on weekends than weekdays, there was a linear association between driving and time spent with friends, such that those who always had access to a car spent the most time with friends, while those without a license spent the least amount of time with friends. While spending time with friends isn't inherently bad, and in fact is a normative part of adolescence (e.g., Hartup & Stevens, 1997), spending too much time with friends may take time away from other productive activities, as is also seen among those with an extreme peer orientation (Fuligni & Eccles, 1993). In contrast, adolescents without a license may be somewhat cut off from the important peer domain. This suggests that adolescents with a license who do not always have

access to a car may spend the most optimal amounts of time with friends, enough to satisfy the developmental needs for social interactions, but not too much such that the peer group is the only source of influence.

The lack of an association between having a license and time with friends for Latino adolescents may be related to the finding that Latino adolescents were simply less likely to have a license. As suggested above, Latino adolescents may therefore rely less on driving to meet their social needs. Beyond the concurrent associations between driving and time with friends, there were also changes in time use between tenth and twelfth grade as a function of driving. Compared to those with partial access to a car, adolescents who always had access to a car increased their time with friends. This suggests that our concurrent findings are not solely caused by adolescents who are already active in the social domain being more likely to always have access to a car.

In contrast, the association between driving and time with family was more supportive of the autonomy perspective than the ability to be away from home perspective in that licensed adolescents with partial access to a car spent the most time with their family, particularly on weekends. While the differences in time with family between those who did and did not have a license was not found for Latino adolescents, the reduction in family time among those who always have access to a car was seen among members of all three ethnic groups. This suggests that adolescents who always have access to a car may be trading off time with family for time with friends. For girls who always had access to a car or drove to most locations, a reduction in time with family was seen on weekends, controlling for tenth grade time use, suggesting that differences in time with family, at least for girls, are not just due to pre-existing differences

Finally, the concurrent analyses between driving and time spent studying did not provide

support for either hypothesis. For European-American adolescents only, having a license was associated with less differentiation between weekends and weekdays in time spent studying, but not in terms of overall amount of time spent studying. There were no differences for any group of adolescents based on access to a car or number of locations driven to. The lack of consistent associations between driving and study time may reflect individual differences in terms of how much time adolescents need to spend on their studies, with some adolescents spending less time studying but accomplishing more because they are studying efficiently and without distraction (Trautwein, Ludtke, Schnyder, & Niggli, 2006).

Limitations and Future Directions

Given the very limited literature on adolescent driving other than that focused on risky driving (e.g., Beck et al., 2005), this study was important in documenting that driving during adolescence may reflect autonomy. One important limitation, however, is that we don't know the extent to which adolescents and their parents negotiate driving in a manner similar to other autonomy provisions, such as an adolescent's curfew or dating. Future research should focus on understanding how adolescents and their parents decide whether an adolescent is able to seek a license and how much freedom he/she is allowed in his/her driving. There are likely to be important differences between adolescents who themselves choose to delay licensure from those whose parents decide for them. It will also be important to more clearly identify behavioral changes that are due to driving from those that predict driving behaviors. More frequent data collections around the time of licensure will be necessary to understand the causal direction between driving and other variables such as grades and time use. This would also allow for investigation of changing autonomy provisions in driving over time (see also Smetana, et al., 2004). It is likely that limitations in driving (or lack thereof) are not stable, but instead change as

adolescents demonstrate themselves as more or less responsible. For example, an adolescent who gets into an accident shortly after receiving his/her license may gain restrictions while an adolescent who demonstrates responsibility in his/her driving may be more likely to gain driving freedoms over time. These changes may be associated with adjustment.

An additional limitation is that this study was conducted in just one community. While more than half of adolescents over driving age in the United States have a license (Trowbridge & McDonald, 2008), the meaning of driving and thus how it is negotiated between parents and adolescents is likely to vary according to the driving culture within a given community. Driving may be less of a milestone for adolescents in cities in which public transportation is readily available and safe, or where adolescents can easily walk to see friends, than those who live in areas where they are relatively cut off from friends and recreational activities (e.g., restaurants, malls, etc) without a car. Related to this, it will be interesting for future work to examine the role of the peer group in driving. It may be that once one adolescent within a friendship group has a license, there is less motivation for the other members to drive. Alternatively, adolescents whose friends drive may feel more pressure to drive to maintain status within the group.

Conclusions

Previous research on adolescent autonomy has tended to focus on the extent to which adolescents or their parents make decisions independently, or whether decisions are made jointly (e.g., Dornbusch et al., 1990), or in terms of how autonomy can develop from authoritative parenting during adolescence (e.g., Lamborn et al., 1991). This study contributes to this literature by focusing on driving as a potential indicator of autonomy during adolescence. An advantage to studying driving as an indicator of autonomy is that it can be continually negotiated. Once an adolescent has a license, a parent can easily increase or decrease privileges

in line with demonstrations of responsibly or immaturity in other domains of life. This study also contributes to the driving literature more generally, which has been very limited to this point. As a normative transition during adolescence, the study of driving can provide important information about adolescent development in other domains, which we hope future research will continue to investigate.

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Table 1

Hierarchical Linear Models predicting relative time use on weekends compared to weekdays according to whether or not one drives.

	Time spent studying	Time spent with friends	Time spent with family
	b (SE)	*b (SE)*	*b (SE)*
Intercept	1.74 (.28)***	.99 (.27)***	1.43 (.26)***
Latino	-.86 (.32)*	-.11 (.25)	.30 (.33)
Asian	-.38 (.31)	-.20 (.31)	-.04 (.31)
Female	.26 (.16)	-.03 (.18)	.61 (.24)**
SES	.13 (.04)**	.03 (.03)	-.01 (.06)
Drive	-.73 (.32)*	.04 (.33)	-.29 (.31)
Drive X Latino	.64 (.35)	-.14 (.38)	.55 (.55)
Drive X Asian	.80 (.35)*	-.19 (.37)	.01 (.35)
Drive X Female	.15 (.21)	.38 (.22)	-.11 (.31)
Weekend	-.87 (.20)***	3.18 (.62)***	-.03 (.26)
Latino	.46 (.22)*	-2.20 (.62)***	.96 (.34)**
Asian	.31 (.23)	-2.16 (.64)***	.42 (.30)
Female	-.15 (.11)	-.53 (.27)*	.54 (.25)*
SES	-.01 (.03)	.07 (.05)	.06 (.05)
Drive	.56 (.25)*	-1.44 (.69)*	.30 (.31)
Drive X Latino	-.55 (.27)*	.71 (.71)	-1.05 (.46)*

Drive X Asian	-.70 (.27)**	1.23 (.73)	-.04 (.34)
Drive X Female	-.09 (.16)	.68 (.33)*	-.45 (.30)

Note. Drive was coded such that 0 = does not have a license and 1 = has a license.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2

Among adolescents with a license, Hierarchical Linear Models predicting relative time use on weekends compared to weekdays according to whether or not one always has access to a car.

	Time spent studying	Time spent with friends	Time spent with family
	b (SE)	*b (SE)*	*b (SE)*
Intercept	1.13 (.20)***	.71 (.19)***	1.02 (.27)***
Latino	-.23 (.23)	-.02 (.27)	.96 (.55)
Asian	.39 (.19)*	-.16 (.19)	.04 (.22)
Female	.43 (.14)**	.06 (.15)	.49 (.20)*
SES	.12 (.06)*	-.05 (.04)	.02 (.08)
Access	-.16 (.14)	.64 (.33)	.14 (.17)
Access X Latino		-.57 (.45)	
Access X Asian		-.50 (.41)	
Access X Female		.37 (.28)	
Weekend	-.34 (.17)*	1.31 (.30)***	.55 (.22)*
Latino	-.05 (.19)	-.59 (.39)	-.20 (.38)
Asian	-.3 (.16)*	-.50 (.31)	.24 (.21)
Female	-.25 (.12)*	.14 (.22)	.12 (.16)
SES	.00 (.05)	.10 (.06)	.01 (.06)
Access	.03 (.11)	.69 (.55)	-.32 (.15)*
Access X Latino		-1.43 (.64)*	
Access X Asian		-.62 (.64)	

Access X Female	.03 (.41)

Note. Access was coded such that 0 = does not always have access to a car and 1 = always has access to a car.

* $p < .05$, ** $p < .01$, *** $p < .001$.

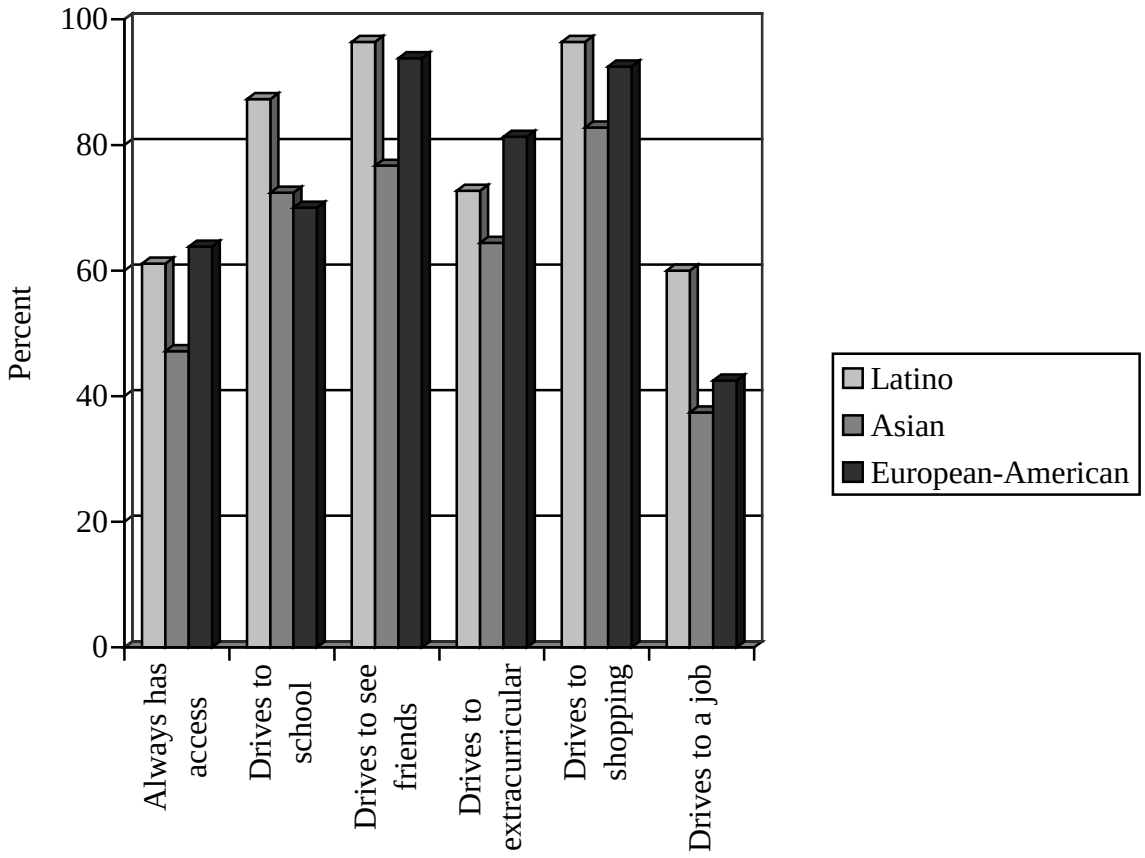

Figure 1. Among adolescents who drive, ethnic differences in driving behavior.

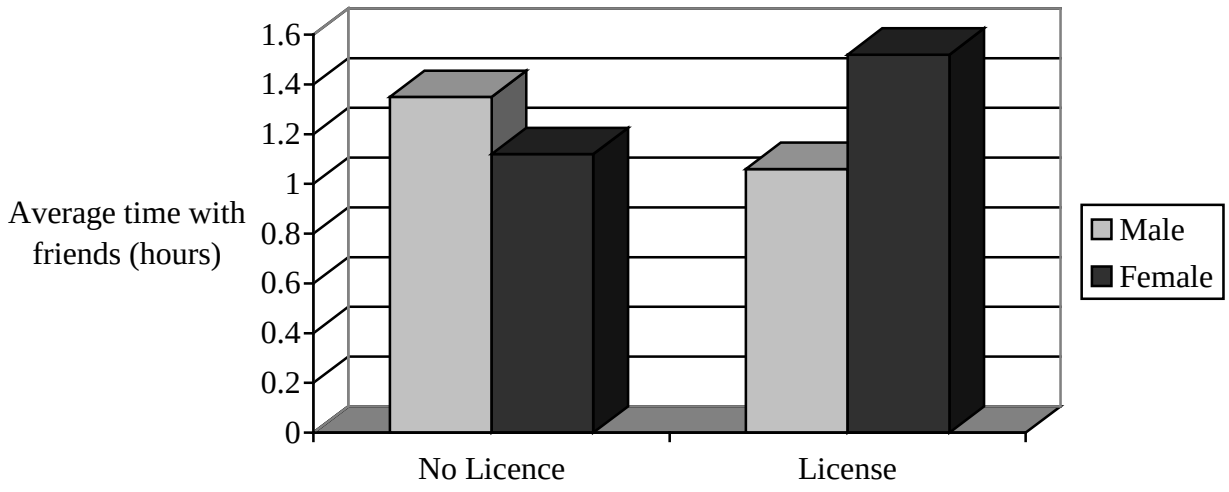

Figure 2. Gender differences in average time with friends according to whether or not one has a license.

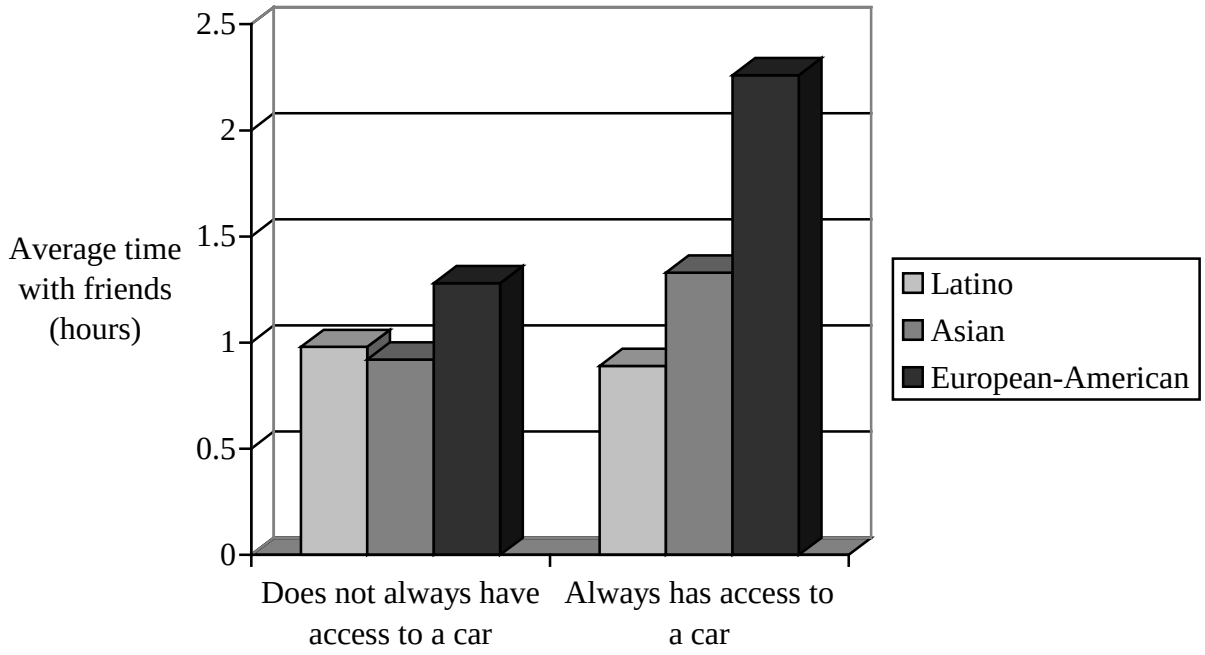

Figure 3. Among those with a license, ethnic differences in average time with friends according to whether or not one always has access to a car.