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Emerging Adults without a Driver's License Engage in More Transportation-Related Physical Activity to School/Work in Certain Environmental Contexts

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Abstract

The aim was to examine the moderation effect of driving licensure status on the association between different environmental contexts and transportation-related physical activity to and from school and/or work (TPA-SW) among emerging adults. The data were from Wave 4 (n = 2,026, year 2013) of the NEXT Generation Health Study, an annual assessment of a nationally representative cohort across the nine U.S. Census Divisions. The outcome variable, TPA-SW, was derived from walking or cycling as modes of travel to and from school and/or work.

Environmental context variables included residence, college attendance, and work status. Driving licensure status indicated whether or not participants had an independent driver's license. Poisson regression models, adjusted for potential confounders, were used to test interactions between environmental context and driving licensure. There were significant interactions between environmental context and licensure. Interaction contrasts indicated that participants who did not have a driver's license engaged in more TPA-SW than their licensed counterparts if they were living at home ($\beta = 1.10$, $p < 0.001$), not attending school ($\beta = 0.73$, $p < 0.001$), attending a technical school/community college ($\beta = 1.13$, $p < 0.001$), working 1–30 hours/week ($\beta = 0.69$, $p < 0.001$), or working 30+ hours/week ($\beta = 1.12$, $p < 0.001$). Among nonworkers, those without a license engaged in less TPA-SW than participants with a license ($\beta = -0.22$, $p = 0.05$). Among emerging adults in certain environmental contexts, delayed driver licensing may result in more physical activity with the possible tradeoff of less transportation mobility.

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Conflict of interest statement

The authors declare that there are no conflicts of interest.

Keywords

emerging adults; transportation-related physical activity; physical activity; active transportation; driver's license; driving licensure; environmental context

Introduction

Emerging adulthood is a period of human development between late adolescence and young adulthood, usually considered the ages of 18–25 (Arnett, 2000; Arnett 2007). This period of time is often accompanied by declining levels of physical activity (Caspersen et al., 2000; Gordon-Larsen et al., 2004; Nelson et al., 2008; Van Dyck et al., 2015). However, using physically active modes of transportation could contribute to higher levels of moderate-to-vigorous physical activity (Sisson and Tudor-Locke, 2008; WHO, 2015). Findings from Sisson and Tudor-Locke (2008) suggested that college students who commuted by bicycle spent as much as 70% more time engaged in moderate-to-vigorous physical activity than those who commuted by motor vehicle. Similarly, Chaix et al. (2014) indicated that older adults who traveled by walking or cycling spent more time engaged in moderate-to-vigorous physical activity than those who used a motor vehicle.

In general, physical activity has several possible health benefits including weight moderation and lower risk of developing high blood pressure, Type 2 diabetes, and cardiovascular disease (CDC, 2015a; NHLBI, 2015; Warburton et al., 2006). Transportation-related physical activity (TPA) itself could benefit cardiovascular health (Hamer and Chida, 2008; Gordon-Larsen et al., 2009; Bopp et al., 2015) and lower the odds of being overweight or obese (Frank et al., 2004; Lindström, 2008; Gordon-Larsen et al., 2009; Bere et al., 2011). This association might be relevant to emerging adults, who are at high risk of weight gain (Burke et al., 1996; Greaney et al., 2009). In contrast to active transportation, routine motor vehicle travel has been associated with higher odds of obesity (Frank et al., 2004; Qin et al., 2012; McCormack and Virk, 2014).

Most studies that have analyzed the TPA habits of emerging adults focus on college students while few have examined a sample inclusive of non-students and working young adults (Simons et al., 2014). A study of Belgian students in their last year of high school and second year of college found that active transportation habits did not change significantly when they moved from their family's house to their own residence near campus (Van Dyck et al., 2015). Other studies indicated that the university campus itself might enable TPA engagement (Balsas, 2003; Sisson and Tudor-Locke 2008; Greaney et al., 2009; Bopp et al., 2011). A shortage or high cost of parking space could encourage active travel as well (Greaney et al., 2009; Bopp et al., 2011; Simons et al., 2014). In one of the few studies on emerging adults who work, Gordon-Larsen et al. (2005) found that those who worked part-time were more likely than those who worked full-time to commute to their job by physically active means, yet most working young adults commuted by car.

Another possible determinant of transportation is access to a vehicle for personal use (Molina-García et al., 2010; Simons et al., 2014). Studies have suggested that vehicle access facilitates motorized travel over active transportation among young adults (Molina-García et

al., 2010; Simons et al., 2014). A driver's license could serve as a measurement proxy for vehicle access because a license allows the independent, personal use of a motor vehicle if one is available. Licensure may encourage independent car travel among emerging adults whereas nonlicensed individuals need to rely on other people if they want to commute by motor vehicle (Simons et al., 2014). Reasons that emerging adults might delay their licensure include the availability of transportation from other people and the financial costs of a personal vehicle (Schoettle and Sivak, 2014; Tefft et al., 2014). In a study of older adults, having a driver's license was negatively associated with walking transportation and positively associated with car travel (Frank et al., 2010). Another study reported that licensure was associated with less TPA among 16–18 year old adolescents (Grow et al., 2008). Hence, obtaining a license to drive might improve transportation mobility, but it may also reduce transportation-related physical activity. Few studies have examined the possible association between licensure status and young adult TPA.

To study this topic further, we examined potential moderation effects of driving licensure status (licensed vs. not licensed) on the cross-sectional association between environmental context and TPA to and from school/and or work. The analysis of a nationally representative sample extends previous research on college students by including emerging adults who were not attending traditional four-year universities.

Methods

Data Source and Sampling

We analyzed data from Wave 4 ($n = 2,026$) of the NEXT Generation Health Study. The NEXT Study is a seven-year, annual assessment of a nationally representative cohort across the nine U.S. Census Divisions. Assessments began when participants were in 10th grade during the 2009–2010 school year. In Wave 4 (mean age = 19.16 years, $SE = 0.02$ years), surveys were completed during the 2012–2013 academic year, which was the cohort's first year after high school. The sampling strategy is described in other papers (Hingson et al., 2013; Li et al., 2014). Among participants who were less than 18 years old, parents gave informed consent and the participants provided assent. Participants who were at least 18 years old at any point in the study provided consent. The protocol for the study was approved by the Institutional Review Board of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development.

Transportation-Related Physical Activity

Transportation-related physical activity to and from school and/or work (TPA-SW), the outcome variable, was measured with two separate items. One asked participants how many days in a typical week they walked to and from school and/or work. The other item asked how many days in a typical week (0–7) they cycled to and from school and/or work. Responses were summed resulting in a possible range of 0–14 days per week. About 2.5% of the sample had a value greater than seven, which we coded as seven days/week. The final value, with a possible range of 0–7, estimated the number of days per week typically engaged in TPA-SW.

Demographics

Race/ethnicity was categorized into four groups: white, African-American, Hispanic, or other. Family affluence was categorized as low, moderate, or high according to the Family Affluence Scale (Currie et al., 2008). Parental education was the highest level of education attained by either parent (from the parent report) and categorized as high school diploma/GED or less, some college education, or bachelor's degree or more.

Weight Status

BMI was calculated using participants' self-reported height in inches and self-reported weight in pounds (CDC, 2015b). Weight status categories were based on age appropriate guidelines from the United States Centers for Disease Control and Prevention (CDC, 2014; CDC 2015b).

For participants younger than 20 years old, we used percentile cutoffs by age and sex as recommended by the CDC (CDC, 2014; Barlow et al., 2007). Underweight was a BMI < 5th percentile; normal weight was a BMI 5th and < 85th percentiles; overweight was a BMI 85th and < 95th percentiles; and obese was a BMI 95th percentile.

For participants who were 20 or older, we used the BMI cutoffs recommended by the CDC for twenty-and-over adults (CDC, 2015b). A BMI < 18.5 was categorized as underweight; BMI between 18.5 and < 25.0 was normal weight; BMI 25.0 and < 30 was overweight; and BMI 30 was obese.

Driving Licensure Status

Participants were asked if they had an independent driver's license. Response choices included the following: no license or permit, a learner's permit for classroom education, a learner's permit for supervised practice driving, or a license allowing independent, unsupervised driving. The responses were dichotomized: licensed (having a license that allows independent driving) or not licensed (having no license/permit or having a learner's permit for driver's education).

Residence

Individuals were asked where they currently lived, and the responses were placed into three categories: at home/with relatives, in their own place (rented room or apartment), or on a college campus (school dormitory/residence hall or fraternity/sorority house).

College Attendance

Participants were asked if they were currently attending school and if so, which type of school they were attending. The responses were placed into three categories: not attending school, attending a technical school/community college, or attending a four-year college/university.

Work Status

Work status was measured as the number of hours per week working in paid and/or unpaid jobs. The responses were placed into three categories: not working, working 1–30 hours/week, or working at least 30 hours/week.

Statistical Analyses

The TPA-SW variable was a positive count variable, and its distribution was inflated at zero with the majority of the sample (53.4%) engaging in no weekly TPA-SW. Also, the variance of TPA-SW was greater than its mean, indicating over-dispersion. Thus, Poisson regression models that accounted for over-dispersion were used whenever TPA-SW was the outcome. To identify confounders, we used bivariate Poisson regression. If the bivariate association between a possible confounder (e.g. race/ethnicity) and TPA-SW met a significance level cutoff of $p = 0.10$, it was considered a confounder.

All three multivariate models controlled for identified confounders and analyzed two independent variables. Driving licensure status was an independent variable in each model. In Model 1 the second independent variable was residence. In Model 2, college attendance was the second independent variable. In Model 3, work status was the second independent variable. Since there were overlaps between environmental contexts (e.g. most college campus residents were attending a four-year university), we examined the environmental contexts in separate models to avoid having independent variables that are strongly associated with each other in the same model. We also analyzed the interaction between licensure and environmental context in each model. If the interaction in a model was significant, we used interaction contrasts to analyze the difference in TPA-SW by licensure status within each category of the given environmental context.

All analyses were conducted with SAS 9.4 software. Means, frequencies, and percentages were calculated while taking the complex survey design into account. The PROC GENMOD procedure was used for Poisson regression and the SLICE statement was used to test the interaction contrasts.

Results

Because the questions regarding transportation asked about modes of travel that were taken to and from school and/or work, we checked for responses by participants who were neither attending school nor working. Some of these participants responded with more than zero days per week of any mode of transportation ($n = 151$), and they were removed from the analytic sample, reducing it from 2,177 to 2,026.

The frequency and weighted percentage of sample characteristics are listed in Table 1. The majority of the sample was White (63.75%), and the rest of the sample was comprised of Hispanics (18.87%), African-Americans (12.93%), and other races/ethnicities (4.46%). Almost half of the participants came from families of moderate affluence (49.26%) while the rest came from either low affluence (20.54%) or high affluence (30.19%). Most participants had a parent with some college education (39.99%). Other participants had a parent with a high school diploma/GED or less (31.16%), and slightly fewer had a parent with a

bachelor's degree or more (28.85%). Few individuals were underweight (4.56%) while the majority was normal weight (63.23%); the rest were either overweight (17.68%) or obese (14.53%).

On average, participants in the sample walked or cycled (i.e. engaged in TPA) to and from school and/or work for 2.41 days/week (95% CI = 2.09–2.73, data not shown). They commuted by motor vehicle (as a driver or passenger) for an average of 3.67 days/week (95% CI = 3.35–4.00, data not shown) and used public transportation 0.61 days/week (95% CI = 0.36–0.85, data not shown). The days per week of walking/cycling was negatively correlated with the days per week of motor vehicle travel ($r = -0.55$, $p < 0.001$, data not shown) and positively correlated with weekly public transit use ($r = 0.16$, $p < 0.001$, data not shown).

Based on our test for confounders, we controlled for the following in each of the multivariate models: race/ethnicity, family affluence, parental education, and weight status. Results of the multivariate models are found in Table 2. Model 1 analyzed the association of residence and driving licensure with TPA to and from school and/or work (TPA-SW). Adjusted for the potential confounders, the main effect of licensure was not significant. Compared to participants living on a college campus, those living at home/with relatives ($\beta = -2.12$, $p < 0.001$) or in their own rented room/apartment ($\beta = -1.26$, $p < 0.001$) engaged in significantly less TPASW. There was a significant interaction between residence and licensure. Model 2 examined the association of college attendance and driving licensure with TPA-SW. The main effect of licensure was not significant. Compared to four-year college/university students, those not attending a post-secondary school ($\beta = -1.60$, $p < 0.001$) and those attending a technical school or community college ($\beta = -1.66$, $p < 0.001$) were significantly less engaged in active travel to and from school and/or work. There was a significant interaction between college attendance and licensure. Model 3 tested the association of work status and driving licensure with TPA-SW. Non-licensed individuals were less engaged in active transportation than licensed individuals ($\beta = -0.22$, $p = 0.05$). Also, compared to those who were not working, participants working 1–30 hours/week ($\beta = -0.61$, $p < 0.001$) or 30+ hours/week ($\beta = -1.26$, $p < 0.001$) experienced less TPA-SW. There was a significant interaction between work status and licensure.

Table 3 shows the estimates of the interaction contrasts. These estimates indicated the difference in TPA-SW between non-licensed individuals and licensed individuals at each level of environmental context (with licensed individuals as the reference group). In Model 1 (Table 3), individuals living at home/with relatives without a driver's license engaged in more TPA-SW ($\beta = 1.06$, $p < 0.001$) than at-home residents who had a license. There was no significant difference in TPA-SW by licensure status among those living in their own rented room/apartment or on a college campus (Table 3). In Model 2 (Table 3), not having a license was associated with more TPA-SW among non-students ($\beta = 0.73$, $p < 0.001$) and technical school/community college students ($\beta = 1.13$, $p < 0.001$). There was no significant difference among four-year college/university students (Table 3). In Model 3 (Table 3), the difference in TPA-SW by licensure was significant at each level of work status. Those who were not working experienced less TPA-SW if they did not have a driver's license and ($\beta = -0.22$, $p = 0.05$). Non-licensed participants working 1–30 hours/week ($\beta = 0.69$, $p < 0.001$)

or working 30+ hours/week ($\beta = 1.12$, $p < 0.001$) engaged in more TPA-SW than their counterparts who had a driver's license (Table 3). The interactions were linear-transformed to enhance interpretability and illustrated in Figure 1. The figure exhibits the typical weekly engagement in TPA-SW by environmental context and licensure status.

Discussion

This cross-sectional study of a nationally representative U.S. sample examined walking and cycling to and from school and/or work as a source of physical activity among emerging adults in their first year after high school. There were interactions between environmental settings and driving licensure status that were associated with TPA-SW. In the context of residence, not having a driver's license was associated with greater engagement in TPA-SW among those who were living at home/with relatives. In the context of college attendance, individuals who were not attending school and did not have a license obtained more TPA-SW from their commute. Participants attending a technical school/community college without a driver's license experienced more TPA to and from school and/or work than their licensed counterparts. In the context of work status, among those working a job, not having a license was associated with more TPA-SW to and from work and/or school. However, not having a license was associated with less TPA-SW among those who were not working a job.

Even though active travel is better for health (Frank et al., 2004; Hamer and Chida, 2008; Gordon-Larsen et al., 2005; Lindström, 2008; Gordon-Larsen et al., 2009; Bere et al., 2011; Bopp et al., 2015) than motorized travel (Frank et al., 2004; Qin et al., 2012; McCormack and Virk, 2014), evidence is mixed on young adult preference for one over the other (Shannon et al., 2006; Paéz and Whalen, 2010; Simons et al., 2014; Schoettle and Sivak, 2014). Some research suggested that the health and ecological implications of driving do not heavily influence their transportation use (Simons et al., 2014; Schoettle and Sivak, 2014). In our overall sample, we found that average weekly use of a motor vehicle to and from school and/or work was greater than the average weekly use of walking or cycling. In addition, public transportation was barely used, which is consistent with other studies that indicated emerging adults either scarcely use or do not prefer public transit (Shannon et al., 2006; Paéz and Whalen, 2010; Simons et al., 2014; Schoettle and Sivak, 2014). Furthermore, the correlation between TPA-SW engagement and vehicle use was negative in our study. Although these findings together do not necessarily elucidate preferences, they do suggest that motorized travel was the primary alternative to walking/cycling in this study.

Environmental settings seem to be associated with emerging adult transportation use. Another factor that may be important is the possession of a driver's license, which allows more flexibility in choosing motorized travel (Simons et al. 2014). However, the greater mobility offered by the independent use of a motor vehicle may have the tradeoff of fewer health benefits (Frank et al., 2004; Qin et al., 2012; McCormack and Virk, 2014). We investigated interactions between licensure status and environmental settings to determine if an association between licensure and TPA-SW may be contextual.

According to Figure 1, while living at a parent's or relative's home, participants with a driver's license were engaged in very little TPA-SW, suggesting they had ample access to a motor vehicle they could personally use. Their counterparts without a license experienced more active travel, but they were moderately engaged. Because car travel was the primary alternative to TPA-SW in the study, it suggests there were still other people available to offer a ride. In contrast, no difference by licensure was found among participants living on their own or on a college campus. Among those living on their own without a driver's license, there might have typically been an adequate driver available who could give a ride such as a roommate, spouse, or friend. Figure 1 indicates that TPA-SW among college campus residents was at a relatively high level, suggesting this environment is facilitative of active travel, which is consistent with findings from previous studies (Balsas, 2003; Sisson and Tudor-Locke, 2008; Greaney et al., 2009; Bopp et al., 2011).

The findings among four-year college/university students in Figure 1 were similar to those of college campus residents: the difference in TPA-SW by licensure status was not significant, but the engagement was relatively high. The availability of campus housing may have facilitated the engagement in TPA-SW among the four-year university students. In addition, four-year colleges might have social elements such as committees and educational programs that promote active transportation (Balsas, 2003). These factors together could make walking and cycling accessible to four-year university students.

Among non-students in Figure 1, licensed drivers had very low engagement in TPA-SW, suggesting they found driving to be convenient for their commute. Active travel among nonstudents without a license was modest, indicating they usually had other drivers available to give them a ride to and from work. Among technical school/community college students in Figure 1, licensed drivers scarcely engaged in TPA-SW. Their counterparts without a license exhibited more TPA-SW, which might be indicative of limited access to other drivers. For the technical school/community college students who might have also worked a job, a driver's license would offer the flexibility of driving themselves between multiple places with the same vehicle. However, non-licensed students who worked would have less transportation mobility. They would either need someone to bring them to different locations, or they would have to walk/cycle between destinations.

Finally, non-workers seemed to be substantially engaged in TPA-SW in Figure 1, even with a driver's license, possibly because most of them attended a four-year university. Among those who were working and did not have a driver's license, access to other drivers may have been low, making walking/cycling a more attractive commuting option. There were likely some workers who were also students. As discussed earlier with respect to technical school/community college students who worked, the lack of a license may have limited transportation mobility by motor vehicle to multiple destinations, making walking/cycling more viable.

Study Limitations and Strengths

One study limitation is the cross-sectional nature of the analysis, which limits the ability to derive causal inferences. The cross-sectional analysis also limited the ability to determine which environmental context had the stronger association with TPA-SW, given that the

environmental contexts could jointly have an effect on the engagement in active transportation. The surveys were self-reported, so the responses may have been affected by human bias.

We did not measure the proximity to school and work locations. Distance might have been a strong predictor of the mode of transportation. In addition, the responses to walking and cycling did not detail the amount of time each day engaged in either mode of transportation. Without knowing these details, we could not ascertain the metabolic intensity of TPA-SW.

Finally, we did not know which days of the week the participants used certain modes of travel, so some individuals walked and cycled on the same days. Because we initially summed the number of days of walking and the number of days of cycling, walking and cycling on the same day was initially counted as two separate days of TPA-SW. This might have overestimated TPA-SW for some individuals.

A strength of this study is the nationally representative sample, which provides confidence that the findings are generalizable to the emerging adult population in the U.S. Furthermore, our sample included participants beyond the college student population, thereby expanding on previous research on the TPA engagement of emerging adults. Lastly, this study examined a topic—the association between driving licensure and TPA—that has not been widely studied.

Conclusion

Active travel may be an underutilized source of physical activity among emerging adults. However, transportation-related physical activity to and from school and/or work appeared to occur more often among those who delayed obtaining a driver's license, particularly in the environmental contexts of work, community college/technical school, and a family member's home. Hence, delayed licensure presents a potentially unexpected health benefit with the possible tradeoff of less transportation mobility. In a setting that may inherently promote walking or cycling, such as a college campus or four-year university, the tradeoff could be small.

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Abbreviations

TPA	transportation-related physical activity
TPA-SW	transportation-related physical activity to and from school and/or work

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Highlights

- A college campus may be facilitative of active transportation to school/work
- Those with no driver's license might walk/cycle more to school/work
- Licensure's association with active travel to school/work could be contextual
- Delayed driver licensing may present an unexpected benefit to emerging adult health

Figure 1.

Linear-transformed interactions between driving licensure and environmental context and their associations with TPA to and from school and/or work.

Abbreviations: TPA-SW – transportation-related physical activity to and from school and/or work

Note: The p-value above one pair of bars indicates the significance of the difference between those two bars. Each environmental context was examined in a separate model.

Table 1

Participant characteristics. Frequencies and weighted percentages accounted for complex survey design.

Model Variable	Variable Category	n	Weighted Percentage (%)	95% CI (%)
Race/Ethnicity^a	White	822	63.75	(51.76, 75.73)
	Hispanic	580	18.87	(10.40, 27.33)
	African-American	513	12.93	(6.01, 19.83)
	Other	105	4.46	(3.18, 5.74)
Family Affluence^a	Low Affluence	535	20.54	(15.31, 25.76)
	Moderate Affluence	857	49.26	(45.52, 53.03)
	High Affluence	421	30.19	(24.51, 35.86)
Highest Parental Education Level^a	High School/GED or Less	676	31.16	(25.82, 36.50)
	Some College	685	39.99	(36.03, 43.95)
	Bachelor's Degree or More	491	28.85	(22.74, 34.96)
Weight Status^a	Underweight	83	4.56	(2.79, 6.34)
	Normal Weight	1214	63.23	(58.17, 68.29)
	Overweight	309	17.68	(14.14, 21.22)
	Obese	268	14.53	(11.60, 17.46)
Driving Licensure Status	Have a Driver's License	1317	77.87	(70.82, 84.92)
	Not Licensed	680	22.13	(15.08, 29.18)
Residence	At Home or With Relatives	1186	54.09	(47.77, 60.41)
	Living on Own (rented room/apartment)	247	16.99	(12.47, 21.51)
	College Campus (dormitory/residence hall or fraternity/sorority house)	533	28.92	(23.91, 33.93)
College Attendance	Not Attending School	403	25.97	(21.34, 30.61)
	Technical School/Community College	637	29.55	(25.26, 33.84)
	Four-year College/University	915	44.48	(39.39, 49.56)
Work Status	Not Working	1040	43.32	(37.00, 49.65)
	Working 1–30 hours/week	672	37.27	(32.87, 41.67)
	Working 30+ hours/week	302	19.41	(15.07, 23.75)

^aEach multivariate Poisson model was adjusted for potential confounders

Abbreviations: CI – confidence interval

Table 2

Adjusted Poisson regression models testing the association of driving licensure status and environmental context with TPA-SW.

	Model 1 (Residence)		Model 2 (College Attendance)		Model 3 (Work Status)	
Intercept	β	95% CI	β	95% CI	β	95% CI
Race/Ethnicity (Ref = White)						
Hispanic	0.14	(-0.04, 0.33)	-0.01	(-0.20, 0.18)	-0.16	(-0.35, 0.03)
African-American	0.17	(-0.02, 0.35)	0.14	(-0.05, 0.34)	0.02	(-0.17, 0.22)
Other	0.31*	(0.05, 0.57)	0.09	(-0.18, 0.36)	0.06	(-0.21, 0.34)
Family Affluence (Ref = High Affluence)						
Low Affluence	0.24*	(0.06, 0.43)	0.06	(-0.12, 0.25)	0.06	(-0.13, 0.25)
Moderate Affluence	0.06	(-0.07, 0.18)	0.02	(-0.11, 0.15)	0.07	(-0.06, 0.21)
Parental Education Level (Ref = or more) degree						
High School Diploma/GED or Less	-0.17*	(-0.33, 0.00)	-0.16	(-0.33, 0.01)	-0.50***	(-0.67, -0.33)
Some College	-0.09	(-0.23, 0.04)	-0.23**	(-0.37, -0.09)	-0.46***	(-0.60, -0.32)
Weight Status (Ref = Normal Weight)						
Underweight	-0.20	(-0.50, 0.09)	-0.20	(-0.50, 0.11)	-0.27	(-0.58, 0.04)
Overweight	-0.14	(-0.29, 0.02)	-0.11	(-0.28, 0.05)	-0.19*	(-0.35, -0.02)
Obese	-0.04	(-0.23, 0.15)	0.02	(-0.16, 0.21)	-0.19*	(-0.38, 0.00)
Driving Licensure Status (Ref = Have a Driver's License)						
Not Licensured	0.03	(-0.19, 0.26)	0.15	(-0.06, 0.36)	-0.22*	(-0.44, 0.00)
Residence Status (Ref = College Campus)						
At Home/With Relatives	-2.12***	(-2.30, -1.91)	-----	-----	-----	-----
On Own	-1.26***	(-1.46, -1.06)	-----	-----	-----	-----
Residence x Licensure						
At Home/With Relatives with No License	1.07***	(0.74, 1.40)	-----	-----	-----	-----
On Own with No License	0.15	(-0.36, 0.65)	-----	-----	-----	-----
College Attendance Status (Ref = Four-year College/University)						
Not Attending School	-----	-----	-1.60***	(-1.86, -1.34)	-----	-----

	Model 1 (Residence)		Model 2 (College Attendance)		Model 3 (Work Status)	
	β	95% CI	β	95% CI	β	95% CI
Technical School/Community College	----	----	-1.66***	(-1.89, -1.42)	----	----
College Attendance $\times$ Licensure						
Not Attending School with No License	----	----	0.58**	(0.17, 1.00)	----	----
Technical School/Community College with No License	----	----	0.98***	(0.58, 1.38)	----	----
Work Status (Ref = Not Working)						
Working 1–30 hours/week	----	----	----	----	-0.61***	(-0.76, -0.47)
Working 30+ hours/week	----	----	----	----	-1.26***	(-1.50, -1.01)
Work Status $\times$ Licensure						
Working 1–30 hrs/wk with No License	----	----	----	----	0.92***	(0.61, 1.23)
Working 30+ hrs/wk with No License	----	----	----	----	1.33***	(0.82, 1.85)

*
p 0.05

**
p 0.01

p 0.001

Abbreviations: CI – confidence interval; TPA-SW – transportation-related physical activity to and from school and/or work

Note: Each model is denoted by its respective environmental context variable. The coefficients estimate the change in log(TPA-SW). Each model controlled for race/ethnicity, family affluence, parental education level, and weight status.

Table 3

Interaction contrasts comparing the difference in TPA-SW between non-licensed participants and licensed participants at each level of environmental context.

Environmental Context	Category	Driving Licensure Status			
		Have a Driver's License		Not Licensed	
		β	95% CI	β	95% CI
Residence	At Home/With Relatives		Ref	1.10 ^{***}	(0.85, 1.36)
	Living on Own		Ref	0.18	(-0.28, 0.64)
	College Campus		Ref	0.03	(-0.19, 0.26)
College Attendance	Not Attending School		Ref	0.73 ^{***}	(0.37, 1.10)
	Technical School/Community College		Ref	1.13 ^{***}	(0.78, 1.49)
	Four-year College/University		Ref	0.15	(-0.06, 0.36)
Work Status	Not Working		Ref	-0.22 [*]	(-0.44, 0.00)
	Working 1-30 hours/week		Ref	0.70 ^{***}	(0.46, 0.93)
	Working 30+ hours/week		Ref	1.11 ^{***}	(0.64, 1.58)

* p 0.05

** p 0.01

*** p 0.001

Abbreviations: CI – confidence interval; TPA-SW – transportation-related physical activity to and from school and/or work

Note: The coefficients estimate the difference between the log(TPA-SW) of non-licensed participants and the log(TPA-SW) of licensed participants within a given category of environmental context. Each environmental context was examined in a separate model.