Immigrant Status, Parenting, and Trajectories of Substance Use*

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Using the National Longitudinal Study of Adolescent Health, this study examines differences in health risk behavior trajectories for immigrant and non-immigrant adolescents in the U.S. It also investigates how parenting behaviors mediate the effects of immigrant status on health risk behaviors. The data indicate that first-generation immigrant adolescents show significantly lower levels of alcohol, cigarette, and marijuana use at baseline. With respect to the trajectories of substances, however, first generation-immigrants demonstrate steeper development in alcohol drinking compared to non-immigrant adolescents but not in cigarette or marijuana use. The data also suggest that healthier behaviors among first-generation immigrant adolescents can be explained in part by 'parental control' rather than 'parental warmth.' Finally, overall, this study finds that second-generation immigrants are statistically indistinguishable from non-immigrants in terms of substance use.

Keywords: Immigrant Status, Substance Use, Parenting

The ethnic composition of immigrant streams into the United States has changed substantially over the past few decades. The origin of immigrants has shifted from Europe to Asia and Latin America, and the increased volume of immigration from developing countries has renewed discussions concerning the social and economic impacts of immigration in the United States. In

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addition, there has been substantial debate over the well-being of immigrants and their children. Some scholars (e.g., Portes and Zhou 1993; Zhou 1997) have argued that the adaptation processes of new immigrants and their children are grounded in fundamentally different structural circumstances that distinguish them from earlier immigrants from European countries. Others are more optimistic about new immigrants and their children's successful assimilation into U.S. society (e.g., Alba and Nee 2003).

Despite the controversial debates over the future of new immigrant families, a growing body of literature has documented that, on average, immigrants are less likely to engage in health risk behaviors, such as alcohol consumption, smoking, and illegal drug use, than U.S.-born residents of the same race/ethnicity or the U.S.-born population in general (see e.g., Acevedo-Garcia et al. 2005; Blake et al. 2001; Cabral et al. 1990; Chen, Unger and Johnson 1999; Gfroerer and Tan 2003; Johnson, Vangeest and Cho 2002; Landale et al. 1999; Lucas, Barr-Anderson, and Kingston 2003; Perez-Stable et al. 2001; Singh and Siahpush 2002; Singh and Yu 1996; Taylor et al. 1997). Another well-documented fact, however, is that immigrants are negatively assimilated over time in the host society. Strong evidence suggests that the number of years that immigrants spend in the United States is correlated with increases in health risk behaviors, including smoking, alcohol consumption, and illegal drug use (e.g., Blake et al. 2001; Gfroerer and Tan 2003; Lucas, Barr-Anderson and Kingston 2003; Johnson, Vangeest and Cho 2002; Landale et al. 1999; Singh and Siahpush 2002; Velez and Ungemack 1989).[1]

While previous research suggests two general patterns in immigrants' health risk behaviors, our knowledge of the dynamic nature of immigrants' health behaviors remains incomplete because most findings are cross-sectional, thus much less is known about the stability of the observed differences in these behaviors. Furthermore, although the literature emphasizes that immigrants tend to retain protective factors in terms of family structure and social networks in order to explain immigrants' better health-related outcomes in comparison to U.S.-born residents (cf. Abraido-Lanza et al. 1999; Palloni and Arias 2004; Vega and Amaro 1994), to date, relatively few studies identify the protective factors that promote the health of immigrants (Harker 2001). Given the ever-expanding immigrant population in the United States, identifying the specific mechanisms by which immigrant status is associated with health-related outcomes is critical to understanding the impact of international migration on the health of the nation.

The primary purpose of this study is to examine the association between immigrant status and health risk behaviors. In so doing, this paper extends prior research in two important ways. First, this study employs longitudinal data to compare the developmental trajectories of health

[1] Although we limit our attention to health risk behaviors, the literature on immigrant health indicates that this discussion can be generalized to other health outcomes such as infant/adult mortality and physical health.

risk behaviors for immigrant and non-immigrant adolescents. Most existing studies on immigrant health have explored health risk behaviors at a single point in time, and we do not know much about temporal changes in health risk behaviors. Further, there is an increasing awareness that there are inter-individual (or between-individual) differences in intra-individual (or within-individual) change in developmental outcomes among children and adolescents, indicating the importance of examining well-being in terms of both change and stability during the early life course (Steyer, Partchev and Shanahan 2000). In this study, we estimate overall population means and variances of initial levels and rates of change in substance use to assess levels of health risk behaviors at baseline and changes over time. We also examine whether there are systematic differences in substance use across immigrant status and whether the differences between immigrant and non-immigrant adolescents are stable over time.

Second, this study examines the influences of parenting on health risk behaviors among immigrant adolescents in comparison to non-immigrant adolescents. Parenting behaviors have been found to predict the well-being of children and adolescents in the domains of academic performance, problem behaviors, psychosocial development, and social skills (Dornbusch 1989; Steinberg 2001). The most frequently studied dimensions of parenting have been parental warmth (i.e., responsiveness, nurturance, and attachment) and parental control (i.e., monitoring, supervision, discipline, and punishment) (Barnes et al. 2000; Chiu and Feldman 1992). Research on parenting behavior has found that, in general, parental warmth and adequate control are most oftentimes associated with positive developmental outcomes among children and adolescents (see e.g., Barnes and Farrell 1992; Baumrind 1989, 1991; Dornbusch 1989; Lamborn et al. 1991; Maccoby and Martin 1983; Weiss and Schwarz 1996).

Despite the wealth of research in parenting, relatively little attention has been given to differences in parenting by immigrant status. Evidence indicates that Asian parents (primarily first- or second-generation immigrants) tend to be more demanding but less responsive (Dornbusch et al. 1987). Chao (2001) and Chiu, Feldman, and Rosenthal (1992) reported that first- and second-generation immigrant adolescents were more likely than non-immigrant adolescents to rate their parents as controlling, yet there were no significant differences in parental closeness or warmth. Similarly, Pong, Hao, and Gardner (2005) found that, in general, Hispanic parents of first- and second-generation adolescents are more likely than native-born white parents to be firm and make unilateral decisions without involving their children (see also Kao 2004).

In sum, we attempt to contribute to the literature by examining the effects of immigrant status on health risk behaviors in a longitudinal framework. Using data from the National Longitudinal Study of Adolescent Health, we address two research questions: (1) How is immigrant status associated with substance use in terms of stability and change over time? (2) How does parenting mediate the effect of immigrant status on substance use?

DATA, MEASUREMENTS, AND ANALYSIS

Data

Our analyses rely on data from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative survey of adolescents in grades 7 through 12 in the United States. The Add Health study includes a sample of 80 high schools and 52 middle schools from the U.S. with unequal probability of selection. Systematic sampling methods and implicit stratification were incorporated into the Add Health study design to ensure a representative sample of U.S. schools with respect to region of country, urbanicity, school size, school type, and race/ethnicity. Add Health was primarily designed to investigate health-related behaviors and sexual activities of adolescents, and the baseline survey was completed between 1995 and 1996. Respondents' parents were also interviewed separately at Wave 1. In Wave 2, except for those who had been in the 12th grade during Wave 1 and thus had become ineligible due to the design of the study, the Wave 1 respondents were re-interviewed between 1995 and 1996. Wave 3 interviews were completed in 2002 with all Wave 1 respondents who could be located, including high school seniors during Wave 1. The response rates for each wave were 78.9 (Wave 1), 88.2 (Wave 2), and 77.4 (Wave 3) percent (see Harris et al. 2003 for more details on the Add Health study). For this paper, we use the Add Health public-use data, and the analytic sample includes respondents who were interviewed from Wave 1 to Wave 3 (N = 3,844). To adjust for the complex sample design, sampling weights were used in the analyses.

Measurements

Substance Use

This study addresses health risk behaviors in terms of substance use. These behaviors often put adolescents at a greater risk for health problems that are extremely costly to society, such as premature mortality, morbidity, and disability (Segal and Stewart 1996; Skiba, Monroe, and Wodarski 2004). To provide a more comprehensive picture of substance use, this study includes three substances as outcome variables: alcohol, cigarette, and marijuana. Adolescent substance use was measured via self-report items assessing the use of each of the three substances in the past month or past 12-month period. For alcohol drinking, levels on an 8-point scale reflect: (1) never; (2) previous use but no use in the past 12 months; (3) 1 or 2 days in the past 12 months; (4) once a month or less; (5) 2 or 3 days a month; (6) 1 or 2 days a week; (7) 3 to 5 days a week; and (8) every day or almost every day. The 7-point scales of cigarette and marijuana use also reflect both the current status and the frequency of cigarette and marijuana use during the past 30 days, ranging from (1) never to (7) every day (cigarette) / 30 times or more (marijuana).[2]

Parenting Behaviors

Parenting behaviors at baseline were measured in terms of parental warmth and control. Parental warmth was measured by respondents' self-reports regarding their feeling of closeness to their parents ("How close do you feel to your mother/father?"), attention from their parents ("How much do you think she/he cares about you?"), affection from their parents ("Most of the time, your mother/father is warm and loving toward you."), and satisfaction with their relationships with their parents ("Overall, you are satisfied with your relationship with your mother/father."). These four items used an ordinal scale, ranging from 1 (not at all/strongly disagree) to 5 (very much/strongly agree) (α = .83). The average score was used if each item was answered for both parents in the baseline survey. Regarding parental control, respondents were asked whether or not they make their own decisions in seven domains: time they must be home on weekend nights, choice of friends, clothing, amount of television watching, television programs, bedtime, and diet. All seven items used to measure parental behavioral control were dichotomous in this study, resulting in the relatively low Cronbach's alpha coefficient due to the small amount of variability in yes-no responses (α = .60). We constructed two composite indexes of parental warmth (range 4-20) and control (range 0-7) by adding up corresponding items. For both parental warmth and control, lower scores represent lower parental warmth and control, while higher scores represent higher parental warmth and control. To identify the relative contribution of each component in parenting across immigrant status, this study examines the parental warmth and control dimensions separately rather than creating a typology of parenting styles.[3]

Socio-demographics

Immigrant status was identified by both the child's and the parent's country of birth. First generation immigrants are those who were not born in the United States. Second generation immigrants are those who were born in the United States but have at least one foreign-born parent. In this study, non-immigrant is the reference category against which the other adolescents are compared and this includes those who were born in the United States to parents born in the United States.

This study also controls for several socio-demographic characteristics. Age at baseline is measured as a continuous variable and is centered on the median (age 16). Gender is measured

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[2] We use the original scales of substance use in the analysis to facilitate interpretation of our findings. Additional analyses show that the transformation of outcome variables using a logarithmic scale does not make any differences. Compared to alcohol and cigarette use, the Add Health study measured marijuana use in terms of the frequency of marijuana smoking rather than the number of days in the past 30 days or past 12-month period. Here, we report the results based on a 7-point scale. To examine the robustness of this approach, we also carried out additional analyses and found (data not shown) that the results presented in this study were consistent, regardless of the classification of marijuana use.

[3] This study follows the dimensional approach to parenting. For the configurational approach to parenting, see Baumrind (1991) and Maccoby and Martin (1983).

in terms of biological sex (females are coded 1). Race/ethnicity is measured by respondent's self-identified race/ethnicity and is categorized into five mutually exclusive groups: non-Hispanic white (reference), non-Hispanic black, Hispanic, non-Hispanic Asian, and other non-Hispanic racial/ethnic group. Although Asians and Hispanics are not homogeneous racial/ethnic groups, this study does not disaggregate Asian and Hispanic populations due to the limited sample size. Family background variables are measured in terms of family income and parental education – family income is measured as a continuous variable, and parental education is categorized into three groups: less than high school, high school diploma (including GED), and more than high school (reference).

Table 1 shows the weighted percentage distributions of the socio-demographics by immigrant status at baseline. The data indicate that the percentage distributions of age and gender are fairly similar across immigrant status. However, first- and second-generation immigrant adolescents were more likely to be racial/ethnic minorities than were non-immigrant adolescents ($\chi^2 = 1537.96$, $p < .001$). Further, compared to second-generation immigrants, first-generation immigrants are more likely to belong to racial/ethnic minority groups ($\chi^2 = 29.37$, p

Table 1. Percentage Distributions of Socio-Demographic Characteristics by Immigrant Status

Variables	First-Generation Immigrants	Second-Generation Immigrants	Non-Immigrants
Age (mean)	15.92	15.45	15.49
Gender			
Male	48.25	51.34	50.60
Female	51.75	48.66	49.40
Race/Ethnicity			
White	17.12	31.79	75.42
Black	1.11	5.91	17.63
Hispanic	53.19	45.73	5.20
Asian	25.95	13.80	.64
Other	2.63	2.78	1.11
Parental Education			
Less than high school	38.35	34.00	12.33
High school	21.54	27.17	38.94
Post high school	40.11	38.83	48.73
Family Income ($1,000s)			
< $25,000	48.98	34.36	26.82
$25,000 - $49,000	30.03	32.80	34.55
$50,000 - $74,000	13.81	22.39	23.54
≥ $75,000	7.17	10.45	15.09
Sample Size	186	402	3,256

Source | Add Health.

< .001). Table 1 also reveals that both first- and second-generation immigrant adolescents are more likely than their non-immigrant counterparts to be from socio-economically disadvantaged families in terms of parental education ($\chi^2 = 200.96$, $p < .001$) and family income ($\chi^2 = 40.50$, $p < .001$).

Analytical Strategy

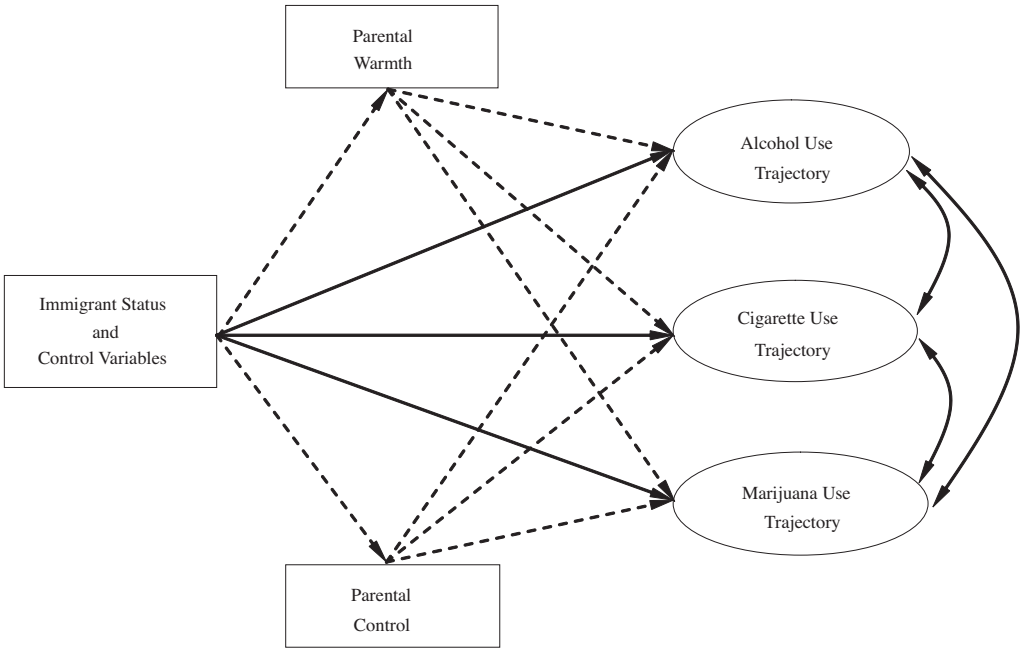
We fit a series of latent growth curve models to examine (1) intra-individual change over time, (2) inter-individual differences in intra-individual change, and (3) the determinants of inter-individual differences in intra-individual change in substance use. With respect to the change in substance use over time, this study assumes that each respondent's change in substance use during the observation period can be adequately represented by a straight line. If there were more waves of data, we might test more complex substance use trajectories. However, the data set has only three waves, so this study fits linear growth curve models over three time points. Empirical growth plots based on the sample also indicate that the linear representation of time is appropriate.

Prior research on immigrants' health risk behaviors examined one substance at a time. Evidence suggests, though, that the developmental trajectories of alcohol, cigarette, and marijuana use are interrelated over time (e.g., Duncan et al. 1995; Duncan, Duncan, and Hops 1998). This study fits associative growth curve models (see Duncan et al. 1999; MacCallum and Kim 2000) in which developmental changes in alcohol, cigarette, and marijuana use are estimated simultaneously. The growth of each substance use was investigated before the three growth processes were combined into the associative growth curve model. The associative nature of this study provides an examination of the similarities and differences in the developmental trajectories of the three substances.

We assess model fit with multiple criteria, and the overall fit indexes for evaluating latent growth curve models include the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). A model is considered a good fit to the data if CFI > .95, RMSEA < .06, and SRMR < .08 (Hu and Bentler 1999).

To illustrate these associations, Figure 1 shows a simplified representation of the associative latent growth curve model predicting alcohol, cigarette, and marijuana use in this study. The solid lines represent paths estimated in the model of the relationships between immigrant status, control variables, and substance use. The dashed lines represent the effects of immigrant status on parenting behaviors and the effects of parenting behaviors on substance use.

Figure 1. Simplified Path Diagram for a Latent Growth Curve Model Predicting Alcohol, Cigarette, and Marijuana Use



RESULTS

Immigrant Status and Substance Use

Table 2 presents growth parameter estimates of the unconditional associative growth curve model. These parameter estimates offer useful information about the typical developmental trajectories of substance use and serve as a baseline for discussing the predictive models that follow. The intercepts represent the population average levels of substance use at baseline; all intercepts are significantly different from zero. Further, their variances are also significantly different from zero, indicating that substantial variation existed in individual differences regarding initial levels of the three substances. The slopes represent the average change in substance use per year during the observation period. The slopes for all substances are statistically significant, indicating meaningful development in the use of all substances over these three time points. Like the intercepts, slope variances are also statistically significant, showing evidence of variability in the individual differences in the rates of change in substance use over time.

Table 3 shows the estimated correlations of the intercepts and slopes of the three substances. This table illustrates that the initial levels of all three substances are highly

Table 2. Unconditional Growth Parameter Estimates of Substance Use

	Alcohol		Cigarette		Marijuana	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Mean	2.495***	.231***	2.467***	.128***	1.584***	.103***
Variance	2.227***	.059***	3.064***	.085***	1.165***	.022**

Notes | ** $p < .01$, *** $p < .001$ (two-tailed test); N = 3,844.
CFI = .959, SRMR = .023, RMSEA = .062.

Table 3. Correlations among the Intercepts and Slopes of Alcohol, Cigarette, and Marijuana Use

		Alcohol		Cigarette		Marijuana	
		Intercept	Slope	Intercept	Slope	Intercept	Slope
Alcohol	Intercept	1.000					
	Slope	-.513	1.000				
Cigarette	Intercept	.639	-.357	1.000			
	Slope	-.207	.367	-.280	1.000		
Marijuana	Intercept	.690	-.431	.684	-.273	1.000	
	Slope	-.158	.611	-.189	.532	-.331	1.000

Notes | All correlations are statistically significant ($p < .001$).

correlated, indicating that those who use greater amounts of one substance are more likely to use more of another. The rates of change in the three substances are also highly correlated, ranging from .367 to .611. However, Table 3 also shows that the rates of change in the three substances are negatively associated with the initial levels, indicating that adolescents with higher initial levels of substance use are associated with lower rates of increase over time.

The unconditional growth model reveals the existence of heterogeneity in initial levels and rates of change in substance use, suggesting that it is meaningful to investigate the relationships between predictors, such as immigrant status, and growth parameters. Table 4 displays the maximum likelihood estimates from the conditional growth model that assesses the systematic relationships between growth parameters (intercept and slope) and predictors. The results indicate that, compared to non-immigrants, first-generation immigrant adolescents have a lower initial level of alcohol drinking, holding the other variables constant ($p < .001$). Cigarette and marijuana use also show similar patterns. With respect to the rate of change in substance use, however, a slightly different picture emerges. The data indicate that first-generation immigrants show steeper development in alcohol consumption than non-immigrant adolescents ($p < .01$). For cigarette and marijuana use, though, the rates of change for first-generation immigrants over the three time points are indistinguishable from the non-immigrants, indicating that the growth trajectories of first-generation immigrants and non-

Table 4. Maximum Likelihood Estimates for Intercepts and Slopes of Substance Use

Variables	Alcohol		Cigarette		Marijuana	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Immigration Status						
First-generation	-.839***	.074**	-.633***	-.005	-.551***	-.003
Second-generation	-.006	.026	-.228	-.013	-.145	.015
Age	.316***	-.034***	.278***	-.037***	.155***	-.028***
Female	-.166**	-.072***	.030	-.033**	-.073	-.060***
Race/Ethnicity						
Black	-.337***	-.098***	-.942***	-.012	-.026	-.025*
Hispanic	.202	-.063**	-.254	-.026	.309**	-.050**
Asian	.047	-.122***	-.364*	.031	.123	-.061**
Other	.206	-.056	-.113	-.077	.260	.030
Parental Education						
Less than high school	-.025	-.122***	.227*	.020	-.019	-.013
High school	-.046	-.027*	.220**	.023†	.024	-.021*
Family Income	.001	.000**	-.001	.000	.000	.000
Constant	2.787***	.283***	2.756***	.127***	1.674***	.139***

Notes | * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test); N = 3,844.
CFI = .963, SRMR = .012, RMSEA = .044.

immigrants are parallel during the observation period. Compared to first-generation immigrants, these data show that second-generation immigrants are indistinguishable from non-immigrant adolescents in terms of their initial levels and rates of change for all three substances.

Immigrant Status, Parenting, and Substance Use

Table 5 presents the results regarding the mediating effects of parenting behaviors on substance use. The first two columns show the regression coefficients for parental control and warmth. The results indicate that first-generation immigrant adolescents are significantly and positively associated with higher parental control compared to their non-immigrant counterparts ($p < .01$). However, second-generation immigrants are not significantly different from non-immigrant adolescents in terms of parental control. Further, the data indicate that both first- and second-generation immigrants are indistinguishable from non-immigrant adolescents in terms of parental warmth.

The last three pairs of columns in Table 5 show the effects of parenting behaviors along with the other predictors of substance use. First, it is noteworthy that the intercept coefficients for first-generation adolescents remain statistically significant, even after including parenting

Table 5. Maximum Likelihood Estimates for Intercepts and Slopes of Substance Use and the Mediating Effects of Parental Control and Warmth

Variables	Parental Control	Parental Warmth	Alcohol		Cigarette		Marijuana	
			Intercept	Slope	Intercept	Slope	Intercept	Slope
Immigration Status								
First-generation	.412**	-.186	-.826***	.077**	-.615***	-.006	-.551***	-.003
Second-generation	.206	-.260	-.020	.029	-.239	-.012	-.161	.016
Age	-.324****	-.214***	.262***	-.032***	.220***	-.033***	.120***	-.028***
Female	-.128*	-.503***	-.239***	-.067***	-.045	-.028*	-.127**	-.060***
Race/Ethnicity								
Black	.164*	.208	-.298**	-.100***	-.899***	-.015	.001	-.025*
Hispanic	-.004	.129	.216	-.065**	-.238	-.028	.321**	-.050**
Asian	-.067	-.562	-.027	-.116***	-.438*	.036	.065	-.060**
Other	-.307	.027	.179	-.057	-.141	-.075	.248	.030
Parental Education								
Less than high school	.342***	-.049	-.002	-.121***	.255*	.018	-.010	-.013
High school	.138*	.038	-.030	-.027*	.238**	.022	.033	-.021*
Family Income	-.001*	.001	.001	.000***	-.001	.000	.000	.000
Parental Control		-.085***	-.002	-.098***	.007	-.043*	-.001	
Parental Warmth		-.121***	.012***	-.121***	.009**	-.097***	.001	
Constant	1.789***	17.937***	5.110***	.073	5.103**	-.040	3.496***	.126**

Notes | * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test); N = 3,844.
CFI = .966, SRMR = .011, RMSEA = .040.

behaviors in the model. This is not surprising since parenting does not exhaust the ways in which immigrant status is associated with lower levels of substance use. Further, higher parental control and warmth are associated with lower initial levels of all three substances, and the effects of parental control are only significantly associated with *initial* levels of the three substances. Parental warmth, on the other hand, is positively associated with steeper *development* in alcohol and cigarette use but not for marijuana use. In sum, with respect to the mediating effects of parenting behaviors, these findings suggest that parental control – not parental warmth – plays a positive role in explaining healthier behaviors of immigrant adolescents relative to non-immigrant adolescents.

DISCUSSION

There is substantial evidence that, on average, immigrants are less likely than non-immigrants to engage in high-risk behaviors. Studies also suggest, however, that the immigrant advantage tends to dissipate as duration of residence in the United States increases. Using the Add Health

panel data, this study extends previous research by examining the effects of immigrant status on health risk behaviors in terms of change and stability over time, and we compare the role of parenting behaviors in promoting healthy behaviors of immigrant adolescents with that of non-immigrant adolescents.

First, the data reveal that first-generation immigrants show significantly lower levels of alcohol, cigarette, and marijuana use at baseline, and this is consistent with previous research based on cross-sectional data. We also find that first-generation immigrants rapidly developed their alcohol consumption (but not cigarette or marijuana use) during the observation period. Compared to first-generation immigrants, second-generation immigrants are not different from non-immigrant adolescents in terms of initial levels and rates of change in substance use. It appears from these findings that second-generation immigrants may have assimilated to an extent in terms of these health risk behaviors and are no longer significantly different from non-immigrants.

Second, this study examines how parenting behaviors mediate the effects of immigrant status. Specifically, the data show that first-generation immigrants are associated with higher parental control, yet they are statistically indistinguishable from non-immigrant adolescents in terms of parental warmth. Thus, this study indicates that lower levels of substance use among first-generation immigrants can be explained in part by parental control rather than parental warmth. In addition, this study finds that the positive impacts of parental control and warmth are only related to *initial* levels of substance use. Parental control is not significantly associated with the rates of change in substance use trajectories; though, parental warmth is positively associated with steeper development in alcohol and cigarette use (but not marijuana use).[4]

Although we do not have sufficient evidence to explain the different effects of parental control and warmth, these results suggest that the effect of parental warmth may be relatively limited as a deterrent against high-risk behaviors over time. Although research on parenting behaviors does not present consistent patterns, the existing literature also reveals that, in general, parental control predicts better outcomes in problem behaviors and school performance, while parental warmth is more positively associated with social skills and psychosocial development (see e.g., Baumrind 1991; Lamborn et al. 1991; Steinberg 2001; Steinberg et al. 1994; Weiss and Schwarz 1996). Our results also show that parental warmth is not significantly associated with steeper development in marijuana use, indicating that marijuana use may be qualitatively different from alcohol and cigarette use.

Another plausible explanation is that higher levels of parental warmth may be more

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[4] Although this study mainly focuses on the main effects of immigrant status, we also investigated whether immigrant status has differential impacts across other variables such as gender and race/ethnicity. We did not find any meaningful evidence to suggest that the effects of immigrant status differ across gender and racial/ethnic groups. However, caution is required because the sample size of the Add Health public-use data is not large enough to address subgroup differences in substance use adequately.

susceptible to peer influences on problem behaviors. Evidence suggests that, compared to parental influences, peer groups tend to exert greater influences on adolescent risk behaviors as the adolescent ages (see e.g., Aseltine 1995; Crosnoe, Muller and Frank 2004; Duncan et al. 1995; Hawkins, Catalano and Miller 1992; Kandel and Andrews 1987). However, this interpretation should be regarded as speculative because data limitations inhibited our ability to examine the trajectories of parental influences as well as peer pressures over time.[5]

Further, it should be noted that the relationship between parental influences and problem behaviors is a complex process. Although parenting is treated as a predictor of adolescent substance use in this study, the relationship could be reciprocal in that parental influences increase or decrease as a result of adolescent risk behaviors. For example, parents may increase their involvement as a result of adolescent substance use. Investigating the developmental trajectories of parenting, peer influence, and adolescent health risk behaviors simultaneously will lend new insights into the dynamics of parenting.

Compared to prior research on immigrant health, this study employs associative growth curve models to illustrate that the developmental trajectories of alcohol, cigarette, and marijuana use are closely related. Furthermore, although this study is not a formal test of progression in substance use, the findings suggest the progressive nature of substance use. Prior research on substance use indicates that there are sequential patterns of substance use involvement (e.g., Duncan, Duncan and Hops 1998; Kandel, Yamaguchi and Chen 1992). Alcohol and cigarettes have been labeled as "gateway" drugs. In general, adolescents are unlikely to initiate marijuana use without prior experimentation with alcohol or cigarettes, and marijuana use often precedes other illegal drugs (Kandel et al. 1992). This research suggests that first-generation immigrants show steeper development in alcohol consumption but not in cigarette and marijuana use. Furthermore, the findings show that parental warmth is associated with rapid development in alcohol and cigarette use but not in marijuana use.

Finally, several limitations of this study should be acknowledged. First, as mentioned above, this study does not incorporate the longitudinal components of parenting behaviors and peer influences into the analysis due to data limitations. For first-generation immigrant adolescents, migration may sever peer networks associated with problem behaviors and increase parental control over adolescents. However, immigrant families are more likely to live in poverty and face strong pressures arising from work, such as long working hours and having atypical schedules (Martin and Midgley 2003; Wall and Jose 2004). Economic hardships reduce parents' abilities to be supportive and nurturing of their children (Elder et al. 1992; McLoyd 1990). Furthermore, sharing activities between parents and their children is critical to

[5] Regression towards the mean may be another explanation for this finding. Regression towards the mean suggests that, for purely statistical reasons, those with extreme scores on substance use at one point in time will probably have less extreme scores the next time. However, regression towards the mean cannot explain why first-generation immigrants do not show steeper development in marijuana use compared to non-immigrants.

preventing children's problem behaviors (Krohn, Massey and Zielinski 1988). Thus, balancing work and parenting may be an increasingly difficult challenge for low-income immigrant parents (Chiu and Feldman 1992). Future research is needed to examine how the interplay between parenting behaviors and peer influences takes place in the context of socio-economically disadvantaged immigrant families.

Second, data restrictions also prevent us from a detailed investigation of heterogeneity among immigrant adolescents. Prior research on immigrant health suggests that race/ethnicity may play an important role in the development of health risk behaviors among immigrant adolescents. Furthermore, this study only considers heterogeneity among immigrant adolescents in terms of generational status and does not incorporate immigrants' cultural values and practices. Future research on the heterogeneity among immigrants is needed to understand more completely the impact of international migration on the health of the nation.

Another limitation of this study is related to the reliance on self-reported measures of parenting. Evidence suggests that the extent of agreement between adolescent and parent reports of parenting is rather low (e.g., Pelegrina, Garcia-Linares and Casanova 2003; Tein, Roosa and Michaels 1994). Thus, caution should be exercised in interpreting the effects of parenting, and it would be desirable to consider both sources if available. It is also plausible that, compared to non-immigrant adolescents, immigrant adolescents may be less willing to report their substance use behaviors. To date, little is known about this potential bias, however.

Despite these shortcomings, this study improves our current understanding of the developmental trajectories of alcohol, cigarette, and marijuana use by immigrant status and the effects of parenting behaviors on these health risk behaviors during the early stage of the life course. The size and influence of the U.S. immigrant population warrant increased attention to immigrant assimilation and adaptation, and this paper aims to extend that discourse and encourage future research on the topics of immigration, parenting, and health risk behaviors.

Finally, another contribution of this study is that our results may be applicable to immigrant populations in other countries, including South Korea. Although the U.S. continues to have many more immigrants than Korea, Korea's foreign-born population is growing. Presently, data are not available that would allow us to research similar patterns in Korea, but we can expect that – in many cases – levels of substance use and degrees of adaptation/assimilation may be similar. Indeed, because Korean society tends to be more 'collectivist' than that of the U.S., it is plausible that immigrants to Korea will try to emulate their native peers even more quickly than U.S. immigrants. Consequently, first- and second-generation immigrants to Korea are unlikely to differ from their peers for these outcomes.

On the other hand, research on immigrant adolescents may find different patterns from this study when comparing immigrants with native Koreans. In particular, because immigrants most frequently come from other Asian nations in Korea, levels of substance use are likely to be similar. Consequently, there may be fewer differences in substance use between immigrants

and native Koreans. Future research should address these issues so that we may understand better health risk behaviors of immigrants in non-western nations such as South Korea.

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[Submitted March 26, 2008; Accepted June 9, 2008]