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Conduct disorder among Asians and Native Hawaiian/Pacific Islanders in the USA

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Background. Conduct disorder (CD) is a relatively common disorder of childhood and adolescence in the USA with substantial associated morbidity, yet little has been published on CD among Asians and Native Hawaiian/Pacific Islanders (NH/PI) in the USA.

Method. We used the National Epidemiological Survey on Alcohol and Related Conditions (NESARC) to examine the prevalence and correlates of retrospectively reported CD within Asians and NH/PI (18 years and older). We also completed logistic regressions to explore factors associated with CD within Asians ($n=1093$) and, separately, NH/PI ($n=139$) and to explain racial differences in CD prevalence.

Results. Asians were about a third as likely [odds ratio (OR) 0.4, 95% confidence interval (CI) 0.22–0.58] whereas NH/PI were about two and half times more likely (OR 2.6, 95% CI 1.31–5.06) to have had CD compared with Caucasian respondents. Within Asians and NH/PI, CD was strongly associated with adult antisocial behavior, substance use and affective disorders. Demographic factors, the age that subjects came to the USA, measures of family environment and family history could not explain the observed differences in prevalence of CD for NH/PI relative to Caucasians.

Conclusions. Asian and NH/PI youth with CD represent a subgroup of Asian youth at very high risk for a number of serious psychiatric disorders. Further investigation is needed to explain the high CD prevalence among NH/PI.

Introduction

Conduct disorder (CD) is a relatively common childhood and adolescent psychiatric disorder in the USA and is associated with great morbidity (Crowley & Riggs, 1995); associated demographics, family environment and co-morbid problems have been well characterized. CD and antisocial behavior have consistently been shown to be more prevalent among males (Maughan *et al.* 2004), in individuals with greater USA acculturation (i.e. Mexican-Americans) (Samaniego & Gonzales, 1999), in families with parental separation (Fergusson *et al.* 1994), within low-income families (Costello *et al.* 2003), and in individuals with low educational achievement (Hill *et al.* 1999). These disorders have long been known to cluster in families and are significantly more common in individuals with a family history of such disorders (Hicks *et al.* 2004). In addition, CD is commonly associated with many other mental health problems. Adolescents with CD have a high prevalence of substance use disorders, major depression, attention-deficit/hyperactivity disorder, and anxiety disorders (Crowley & Riggs, 1995; Gregory *et al.* 2004). CD is very strongly associated with adult antisocial behavior, such that the DSM-IV requires a CD diagnosis by age 15 to diagnose antisocial personality disorder (ASPD) in adulthood.

Asians represent one of the fastest growing populations in the USA, representing about 3.6, 10.9 and 41.6% of the population in the USA, California and Hawaii respectively (Census Bureau, 2000). However, surprisingly little research has been published on Asians with CD in the USA. Most work to date has focused on measures of delinquency, arrest records or other related but non-diagnostic variables (Wong, 1999; Wyrick, 2000; Le & Stockdale, 2005; Le *et al.* 2005). Common correlates and co-morbidity for CD among Asians and Native Hawaiian/Pacific Islanders (NH/PI) have yet to be well characterized.

Using the current racial classifications, researchers sometimes consider Asian and NH/PI as one racial category for analyses of phenotypes such as

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psychiatric disorders and substance abuse. However, arguments can be made that there are considerable between-group differences. Although Asians consist of non-homogeneous groups with differential migration patterns and differential risk of exposure to war and conflict in their country of origin, many Asian ethnic groups share similar cultural perspectives and experience of immigration. Alternatively, NH/PI generally represent groups whose lands have been claimed by the USA (U.S. Surgeon General, 2001) and, as such, may be more akin to other indigenous communities. A growing body of research suggests that NH/PI represent a vulnerable population at high risk for obesity and asthma (Johnson *et al.* 2004), and suffer high mortality rates (Braun *et al.* 1995).

Although the toll that CD can inflict on individuals and their families is well recognized, limited research has focused in this area among Asians and NH/PI because of the difficulties in studying this population (Joe, 1993) and the relatively low prevalence of anti-social behavior identified among some Asian sub-groups (Kitano, 1973). This may also relate, in part, to stereotypes of Asians as being studious, non-violent and a 'model minority'; there are, of course, many cases that contradict that notion (Tilove, 2007). It could be argued that cultural emphasis on collectivism as opposed to individualism may explain lower rates of antisocial behavior in these populations; however, limited empirical research has examined factors explaining the observed differences.

In some previous studies CD has been assessed retrospectively in adulthood. Such an approach appears about as reliable as the measurement of adult antisocial behaviors (Cottler *et al.* 1998) and has yielded results consistent regarding gender differences and links with other mental health disorders with most studies assessing CD in youth (Robins & Price, 1991; Nock *et al.* 2006). We used a nationally representative epidemiological sample with relatively large numbers of adult Asians (1) to explore the common correlates and co-morbidity of retrospectively reported CD within Asians and separately, NH/PI, and (2) to examine factors explaining differences in retrospectively reported CD prevalence compared with Caucasians.

Method

Study design

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) ascertained a nationally representative sample of non-institutionalized adults (18 years and older) collected in 2001–2002 (http://niaaa.census.gov/). The sample was drawn from households, military personnel living off-base, boarding houses, non-transient hotels/motels, rooming houses, shelters, facilities for housing workers, college quarters and group homes, and consists of 43 093 respondents who were interviewed in face-to-face personal interviews; the overall survey response rate was 81%. The US Census Bureau (2000) conducted the fieldwork and 1800 'lay' interviewers (who averaged 5 years of work with the census or other health-related surveys) administered the interviews. The sampling methodology, imputation methods and weightings are described in detail elsewhere (Grant *et al.* 2003*b*, 2004).

Instrument

Respondents were administered the Alcohol Use Disorder and Associated Disability Interview Schedule – DSM-IV version (AUDADIS-IV). Portions of this extensive instrument have shown good test–retest reliability in both general population (Grant *et al.* 1995) and clinical samples (Hasin *et al.* 1997) and in cross-cultural settings with Hispanic (Canino *et al.* 1999) and East Indian samples (Chatterji *et al.* 1997). ASPD, as measured by the AUDADIS, has also shown good test–retest reliability (Grant *et al.* 2003*a*); 282 original respondents in the NESARC were reinterviewed 10 weeks after their initial interview ($\kappa = 0.67$ for ASPD) (Grant *et al.* 2005). Reliability of the AUDADIS-IV was excellent for alcohol use ($\kappa = 0.74$) and drug use diagnoses ($\kappa = 0.79$) (Stinson *et al.* 2005) and good for major depression ($\kappa = 0.64$–0.67) (Compton *et al.* 2006).

Diagnoses

The CD diagnosis in the publicly available NESARC dataset was used in this report (http://niaaa.census.gov/). Lifetime abuse/dependence diagnoses for alcohol and drug dependence were created by combining information from past year and prior to past year diagnoses. 'Any substance use disorder' included abuse or dependence on nicotine, amphetamines, opioids, sedatives, tranquilizers, cocaine, inhalant/solvents, hallucinogens, cannabis, heroin, and other substances. The AUDADIS questions in the public dataset did not include CD item 10, breaking and entering. To be consistent with previous studies published from the NESARC, we used the CD and ASPD diagnoses available in the public dataset.

Because we were also interested in individuals who exhibited adult antisocial behavior (without requiring CD in childhood or adolescence), we used available questions to create a measure of adult antisocial behavior. Questions were selected to reflect the seven ASPD criteria A (unlawful behavior, deceitfulness, impulsivity, irritability and aggressiveness,

recklessness, consistent irresponsibility and lack of remorse) that occurred since age 15 (see Appendix). Individuals were considered to have adult antisocial behavior if they endorsed at least three criteria and did not report that all of their symptoms were due to symptoms of mania or use of alcohol or drugs. By survey design, individuals had to answer three antisocial behavior questions positively to be asked about lack of remorse, and the age specifier (before or after age 15) was not included for questions regarding lack of remorse. Although three questions were included about being diagnosed with schizophrenia, a question regarding antisocial symptoms occurring during the course of schizophrenia was not included in the public dataset; therefore, the schizophrenia exclusion was not applied.

Race/ethnicity

Respondents were asked first, 'Are you of Hispanic or Latino origin?' and then were asked to 'select one or more categories to describe your race'. We included in the analyses: (1) individuals who selected 'non-Hispanic' and 'Asian' only ($n=1093$), (2) individuals who identified themselves as 'non-Hispanic' and 'Native Hawaiian/Other Pacific Islander' only or 'Native Hawaiian/Other Pacific Islander' and 'Asian' ($n=139$) and (3) those identified in the dataset (variable=ethrace2a) as Caucasian and not selecting 'Asian' or 'Native Hawaiian/Pacific Islander' to describe their race ($n=24\,507$). Those who indicated mixed Asian–Caucasian race heritage were omitted for simplicity and sample size considerations. In the subsequent analyses Asians and NH/PI were analyzed separately. Because relatively few Asians met the criteria for CD, Asian subgroup analyses were not possible. However, we repeated some analyses within Southeast Asians (Asians reporting their origin of descent as Vietnamese, Thai, Laotian, Cambodian or Burmese) and East Asians (Chinese, Japanese, Korean or Taiwanese) mainly to ensure consistent directionality of associations.

Other variables

We used age when came to the USA (age minus number of years lived in the USA; categories were: born in the USA, <5 years, $\geqslant 5$ years but <10 years, $\geqslant 10$ years but <18 years, and $\geqslant 18$ years) as a proxy measure of level of acculturation. Education was measured by a single question about the highest grade or year of school completed; we divided respondents into those with less than a high school education, those who graduated high school or completed their GED, and those with at least some college or completing at least a 2-year associate or technical degree. Household income was measured by a single question regarding the total household income in the previous 12 months. Income categories were those with less than US$20 000, those with US$20 000–US$49 999, and those with $\geqslant$US$50 000 of household income. Childhood family environment was approximated by questions about who the respondent lived with as a child. Categories included (1) lived with biological father or both parents, (2) lived with biological mother only, (3) lived with at least one parent and parents divorced or parent died, and (4) never lived with biological parent.

Data analysis

Analyses were conducted in STATA and SUDAAN (Research Triangle Institute, 2001) to adjust for variances while using the NESARC sampling weights. We compared Asians and Caucasians for prevalence of CD in the overall sample with repeated analyses within gender. Selecting those with CD, we tested the association by race of CD with ASPD. We then tested whether Asians with CD differed from other Asians in terms of (1) demographic factors, (2) adolescent family environment, (3) prevalence of other mental health disorders, and (4) family history of antisocial behavior, and alcohol/drug problems. Log likelihood (LL) χ^2 tests were used to assess for significant differences between those with CD and those without CD within each racial category separately. If a table (or a cross-tabulation) contained one or more cells with no observations, where LL could not be calculated, Pearson χ^2 was used instead. Odds ratios (ORs) using logistic regression were used to measure the strength of an association between the two groups (CD *versus* non-CD) with each measure of demographic, acculturation, family environment, family history and psychiatric factors. We compared regression coefficients (from which ORs were computed) obtained within Asians or NH/PI against those obtained within Caucasians, using a two-tailed t test statistic. Under the assumptions of large sample size and normal distribution of the population regression coefficients, this simple t test procedure provides a significance test between the two groups (i.e. Asians *versus* Caucasians, NH/PI *versus* Caucasians) from separate logistic regressions (Cohen *et al.* 2003; Isaacowitz & Smith, 2003; Grucza *et al.* 2007). Subsequent hierarchical logistic regressions examined factors (demographic, acculturation, family environment and family history) that might explain racial differences in CD prevalence (separately Asian *versus* Caucasian and NH/PI *versus* Caucasian). Stepwise inclusion of covariates allowed examination of which factors may have larger effects on the presence of CD while controlling for race. We

used the c index, which assesses the extent of the model's predictive power and varies between 0.5 (under the null hypothesis) and 1.0 (perfect prediction). This index is asymptotically equivalent to the area under the curve of the receiver operating characteristic (ROC) curve, which takes into account both the specificity and sensitivity of a predictor (Bamber, 1975).

Results

Differences in prevalence of CD and ASPD in Asian and NH/PI versus Caucasians

Asians were about three times less likely [OR 0.4, 95% confidence interval (CI) 0.22–0.58], while NH/PI were about two and a half times more likely (OR 2.6, 95% CI 1.31–5.06), than Caucasians to meet lifetime criteria for conduct disorder. A similar pattern was seen within gender for Asians (males OR 0.4, 95% CI 0.23–0.67; females OR 0.2, 95% CI 0.07–0.85) and for NH/PI males (OR 3.5, 95% CI 1.67–7.41) but not females (OR 0.8, 95% CI 0.14–4.09). For Southeast Asians (OR 0.4, 95% CI 0.15–1.24) and East Asians (OR 0.4, 95% CI 0.21–0.76), samples sizes were relatively small, but directionality of the association was similar to Asians generally. However, among respondents with a lifetime history of CD, race was not a significant correlate of lifetime criteria for ASPD, when Asians (OR 0.56, 95% CI 0.16–1.98) and NH/PI (OR 0.61, 95% CI 0.18–2.02) were compared to Caucasians.

Demographic and adolescent home environment correlates

Table 1 shows that, for Asians and Caucasians, age, male gender, the age that subjects came to the USA and adolescent family environment were associated with CD. Although not shown in Table 1, individuals with CD were more likely to have been born in the USA when compared with individuals without CD within Asians (37.5% *v.* 16.9%, $\chi^2 = 5.49$, $p < 0.05$), NH/PI (90.5% *v.* 49.9%, $\chi^2 = 4.56$, $p < 0.05$) and Caucasians (97.1% *v.* 95.0%, $\chi^2 = 4.29$, $p < 0.05$). The current household income of Asians with CD appeared similar to the income distribution of Asians without CD, although CD was associated with household income among Caucasians. A relatively high percentage of Asians with CD reported having never lived with either biological parent.

Association with psychiatric disorders

Table 2 shows that Asians with CD were very likely to also have an alcohol use disorder, nicotine dependence, cannabis abuse or dependence, any substance use disorder, major depression and adult antisocial behavior when compared with other Asians without CD. The NH/PI group shows a similar pattern of co-morbidity, except for mood disorders. The strength of the associations for Asians as compared to Caucasians between CD and nicotine dependence ($t = 2.35$, $p = 0.02$), CD and alcohol abuse or dependence ($t = 2.16$, $p = 0.03$), and CD and adult antisocial behavior ($t = 2.81$, $p = 0.005$) were significant, suggesting that within Asians, the co-morbidity of CD and some common substance use disorders and adult antisocial behavior is stronger than that seen even within Caucasians. Analyses were repeated within Southeast Asians (nicotine OR 9.7, 95% CI 0.89–106.21; cannabis OR 13.7, 95% CI 0.97–193.83; major depression OR 9.8, 95% CI 1.02–93.91; dysthymia OR 3.2, 95% CI 0.26–40.19) and East Asians (alcohol OR 18.8, 95% CI 5.06–69.94; nicotine OR 24.6, 95% CI 6.85–88.62; cannabis OR 49.5, 95% CI 9.95–246.29; adult antisocial behavior OR 48.1, 95% CI 12.96–178.33; major depression OR 7.0, 95% CI 1.96–25.02; dysthymia OR 9.2, 95% CI 0.98–86.21). The results were generally similar to those of all Asians.

Familiality

Asian respondents with CD were significantly more likely to report antisocial behavior and alcohol problems in their relatives when compared with Asians without CD (Table 3). ORs are large for antisocial behaviors, but more modest for alcohol problems (except mother OR = 33.6). Southeast Asians (OR 29.7, 95% CI 1.63–542.58) and East Asians (OR 20.9, 95% CI 2.15–203.75) with CD were also more likely to report a father with antisocial behavior. Results for NH/PI with CD were similar to those among Asians for antisocial behavior and alcohol problems. However, the estimated ORs for father's antisocial behavior and father's alcohol problem in NH/PI with CD *versus* without CD were much smaller when compared with ORs within Asians. NH/PIs with CD were much more likely to report illicit drug problems in first-degree relatives, especially female relatives, compared to NH/PI without CD; however, given the small sample size, CIs are large. Nonetheless, regression coefficients obtained for NH/PI differed significantly from those obtained within Caucasians in some instances (mother drug problem $t = 3.50$, $p = 0.0004$; sister drug problem $t = 3.22$, $p = 0.001$).

Factors explaining racial differences in CD prevalence

Table 4 shows five logistic regressions, combining samples of Asians and Caucasians and, separately, NH/PI and Caucasians (Table 5). Lower odds of CD

Table 1. *Race-specific prevalence of conduct disorder (CD) by demographic and family environment measures: Asians, Native-Hawaiians/Pacific Islanders (NH/PI) and Caucasians*

	Asian			NH/PI			Caucasian		
	CD (n=21) %	No CD (n=1072) %	LL χ² statistic	CD (n=16) %	No CD (n=123) %	LL χ² statistic	CD (n=1054) %	No CD (n=23453) %	LL χ² statistic
Demographic									
Age									
18–25	44.7	16.2	8.18*	44.9	25.5	3.11	24.1	12.5	140.26*
26–34	20.2	22.6		22.4	15.5		22.1	14.3	
⩾35	35.1	61.1		32.7	58.9		53.8	73.3	
Male gender	82.7	47.7	6.14*	91.6	42.6	9.99*	73.8	46.8	227.76*
Education									
<High school	21.4	13.1	1.05	29.0	14.9	1.85	18.7	10.9	44.86*
High school graduate/GED	21.2	17.0		12.1	23.5		30.9	30.1	
Some college	57.4	69.9		58.9	61.6		50.4	58.9	
Current household income									
<US$20 000	19.1	19.3	0.01	12.3	10.8	3.46	21.0	18.4	10.91*
US$20 000–49 999	33.4	32.1		14.4	37.7		38.8	35.2	
⩾US$50 000	47.6	48.6		73.3	51.5		40.2	46.3	
Acculturation									
Age came to the USA									
Born in the USA	37.7	16.75	4.04*	90.5	48.7	1.76ᵃ	97.0	94.6	3.30*
<5 years	26.3	5.2		0	8.5		0.8	1.2	
⩾5 years but <10 years	13.8	2.7		0	4.9		0.8	0.3	
⩾10 years but <18 years	13.8	12.9		9.5	8.3		0.5	0.8	
⩾18 years	8.4	62.5		0	29.6		1.0	3.1	
Adolescent family environment (before age 18)									
Lived with father/both parents	53.6	79.9	7.23*	48.1	71.0	1.08	48.2	71.2	69.16*
Lived with mother only	1.6	5.5		21.9	7.1		11.5	5.4	
Lived with at least one biological parent and parents divorced or parent died	12.4	12.0		24.7	19.0		37.3	21.6	
Never lived with biological parent	32.4	2.6		5.3	2.9		3.0	1.9	

ᵃ Pearson χ² used because of empty cells.

* $p < 0.05$.

prevalence among Asians did not remain significant in models 2, 3 and 4; the results suggest that age came to the USA, family environment and family history of antisocial behavior explain some of the observed differences in CD prevalence for Asians. For NH/PI (Table 5), inclusion of demographics, acculturation, family environment and family history did not explain the observed differences in CD prevalence (OR 3.6 in

regression model 5). The c statistics (Tables 4 and 5) suggest a range of good to very good fit (range 0.7–0.8).

Discussion

We used a large national epidemiologic study to examine the prevalence, correlates and co-morbidity

Table 2. *Lifetime psychiatric disorders associated with conduct disorder* (CD): *race-specific odds ratios* (95% *confidence interval*)

	Asians CD *v.* no CD (*n* = 1093)	NH/PI CD *v.* no CD (*n* = 139)	Caucasians CD *v.* no CD (*n* = 24 507)
Alcohol abuse or dependence	22.0 (6.30–77.03)*	5.6 (1.57–20.03)*	5.6 (4.73–6.65)*
Nicotine dependence	18.1 (5.91–55.63)*	6.6 (2.09–20.71)*	4.8 (4.05–5.66)*
Cannabis abuse or dependence	18.5 (4.45–76.68)*	12.9 (2.62–63.80)*	7.7 (6.52–9.20)*
Any substance use disorder	16.9 (5.66–50.39)*	5.4 (1.74–16.49)*	7.0 (5.93–8.31)*
Major depression	6.4 (2.28–18.03)*	0.6 (0.11–3.19)	3.3 (2.88–3.87)*
Dysthymia	4.1 (0.74–23.07)	9.0 (1.50–53.83)*	4.1 (3.28–5.12)*
Adult antisocial behavior	69.0 (22.56–211.32)*	22.2 (6.16–79.99)*	14.0 (11.90–16.58)*

NH/PI, Native Hawaiian/Pacific Islanders.

* $p < 0.05$.

Table 3. *Family history of antisocial behavior and substance problems associated with conduct disorder* (CD): *race-specific odds ratios* (95% *confidence interval*)

	Asians CD *v.* no CD (*n* = 1093)	NH/PI CD *v.* no CD (*n* = 139)	Caucasians CD *v.* no CD (*n* = 24 507)
Antisocial behavior			
Mother	15.6 (3.52–68.78)*	23.6 (2.80–199.42)*	7.9 (6.27–9.95)*
Father	21.2 (5.63–79.70)*	9.1 (1.82–45.92)*	6.3 (5.23–7.48)*
Sister	11.2 (2.53–49.33)*	–	4.7 (3.77–5.80)*
Brother	2.6 (0.44–15.85)	24.9 (6.14–101.08)*	3.9 (3.20–4.71)*
Alcohol problems			
Mother	33.6 (6.38–177.10)*	21.5 (2.55–181.83)*	3.5 (2.86–4.23)*
Father	5.5 (1.57–19.25)*	1.3 (0.25–6.66)	3.1 (2.61–3.56)*
Sister	3.5 (0.59–21.07)*	4.8 (0.70–33.70)	3.0 (2.41–3.75)*
Brother	0.9 (0.17–4.80)	0.4 (0.05–4.30)	2.0 (1.64–2.36)*
Illicit drug problems			
Mother	–	252.7 (30.18–2115.86)*	5.9 (4.54–7.73)*
Father	8.9 (1.18–67.51)*	22.2 (2.37–208.41)*	6.6 (5.10–8.48)*
Sister	–	55.0 (10.83–279.35)*	3.9 (3.16–4.89)*
Brother	1.1 (0.19–6.77)	10.4 (3.04–35.87)*	2.6 (2.05–3.23)*

NH/PI, Native Hawaiian/Pacific Islanders; –, odds ratios could not be estimated.

* $p < 0.05$.

of CD in Asians and NH/PI. In regression analyses we also sought to explore explanations for the low prevalence of CD among Asians and high prevalence among NH/PI relative to Caucasians. This work adds to the limited information currently available regarding CD among Asians and NH/PI and extends previous work in this area by using DSM-IV diagnoses and using a nationally representative sample rather than samples collected from one community or region.

This study is not without limitations. First, participants in the NESARC were at least 18 years of age at the time of interview and we used retrospectively reported CD. Recall bias regarding adolescent experiences, including reporting of CD symptoms, may have biased our results. Second, although we started with a large sample of Asians, we had relatively few individuals with CD. We may therefore have lacked power in some analyses and further research should be conducted with larger samples. Third, considerable variability in prevalence rates of CD among Asian subgroups has been identified (Luczak *et al.* 2004); thus, treating Asians as one homogeneous group, although necessary for these analyses, may have not identified more subtle subgroup differences. Fourth, some data exist that suggest that Asians under-report

Table 4. *Factors associated with differences in conduct disorder prevalence by race: regression analyses including Asians and Caucasians*

	Model 1 (c statistic = 0.70) Race Demographics	Model 2 (c statistic = 0.71) Race Demographics Acculturation	Model 3 (c statistic = 0.74) Race Demographics Acculturation Family environment	Model 4 (c statistic = 0.80) Race Demographics Acculturation Family environment Family history
Demographics				
Race (Caucasian = ref.)	0.3 (0.19–0.53)*	0.6 (0.31–1.17)	0.6 (0.32–1.24)	0.6 (0.25–1.34)
Sex (female = ref. group)	3.2 (2.79–3.77)*	3.2 (2.78–3.74)*	3.3 (2.81–3.80)*	3.7 (3.17–4.36)*
Age (⩾35 = ref. group)				
18–25	2.6 (2.19–3.13)*	2.5 (2.10–3.03)*	2.3 (1.87–2.72)*	1.8 (1.46–2.26)*
16–34	2.2 (1.81–2.69)*	2.2 (1.81–2.67)*	1.9 (1.60–2.37)*	1.8 (1.46–2.26)*
Education (some college = ref.)				
<High school	2.1 (1.67–2.59)*	2.1 (1.68–2.61)*	1.8 (1.45–2.26)*	1.9 (1.43–2.41)*
High school graduate/GED	1.2 (1.05–1.43)*	1.2 (1.04–1.42)*	1.1 (0.96–1.31)	1.1 (0.89–1.26)
Income (⩾US$50 000 = ref.)				
<US$20 000	1.2 (0.99–1.47)	1.2 (0.99–1.48)	1.2 (0.97–1.45)	1.1 (0.91–1.43)
US$20 000–49 999	1.1 (0.96–1.36)	1.1 (0.96–1.36)	1.1 (0.93–1.32)	1.1 (0.92–1.38)
Acculturation				
Age came to the USA (born in the USA = ref.)				
<5 years		0.9 (0.49–1.57)	1.1 (0.57–1.94)	0.7 (0.37–1.33)
⩾5 years but <10 years		2.0 (0.68–6.11)	2.3 (0.70–7.25)	3.0 (0.89–10.39)
⩾10 years but <18 years		0.5 (0.22–1.05)	0.5 (0.23–1.09)	0.6 (0.23–1.31)
⩾18 years		0.2 (0.11–0.50)*	0.2 (0.12–0.53)*	0.3 (0.12–0.56)*
Family environment				
Lived with father/both parents (= ref.)				
Lived with mother-only			2.8 (2.18–3.52)*	2.1 (1.55–2.90)*
Lived with at least one biological parent and parents divorced or parent died			2.2 (1.94–2.58)*	1.7 (1.42–1.97)*
Never lived with biological parent			2.7 (1.80–4.06)*	1.8 (0.80–4.00)
Family history (no = ref. group)				
Father with antisocial behavior				4.1 (3.34–5.10)*
Mother with antisocial behavior				3.4 (2.51–4.58)*

* $p < 0.05$.

a history of offenses/convictions (Jolliffe *et al.* 2003). As the NESARC uses self-report measures, CD and ASPD may be under-diagnosed among Asians. Fifth, in the NESARC the AUDADIS was not administered in Asian-specific languages. The NESARC sample may under-represent less acculturated Asians. Sixth, because of the high number of statistical tests used in these analyses, the results should be interpreted with some caution, as some apparently significant results could in fact be of negligible importance. However, our confidence in the findings is strengthened by the large number of significant results relative to the number of tests performed. Finally, measures of peer influences, which have been demonstrated to

be strongly associated with delinquent behaviors within Asians (Le *et al.* 2005), were not available and could not be included in our regression analyses. However, even if such measures were available in the NESARC dataset, the directionality of this association would be difficult to disentangle with a cross-sectional sample.

Given these limitations, this study provides several findings. The first important finding is the relatively low prevalence of CD among Asians and relatively high prevalence among NH/PI compared with Caucasians. The low prevalence rates among Asians are consistent with other studies examining violence and deviant behaviors among Asian or Asian

Table 5. *Factors associated with differences in conduct disorder prevalence by race : regression analyses including NH/PI and Caucasians*

	Model 1 (c statistic = 0.70) Race Demographics	Model 2 (c statistic = 0.71) Race Demographics Acculturation	Model 3 (c statistic = 0.74) Race Demographics Acculturation Family environment	Model 4 (c statistic = 0.79) Race Demographics Acculturation Family environment Family history
Demographics				
Race (Caucasian = ref.)	2.3 (1.25–4.37)*	2.9 (1.54–5.59)*	2.9 (1.50–5.48)*	3.6 (1.78–7.44)*
Sex (female = ref. group)	3.3 (2.82–3.80)*	3.3 (2.80–3.79)*	3.3 (2.83–3.85)*	3.7 (3.20–4.39)*
Age (⩾35 = ref. group)				
18–25	2.6 (2.16–3.10)*	2.5 (2.11–3.03)*	2.3 (1.87–2.71)*	1.8 (1.49–2.30)*
16–34	2.2 (1.84–2.72)*	2.2 (1.83–2.71)*	2.0 (1.62–2.39)*	1.8 (1.49–2.30)*
Education (some college = ref.)				
<High school	2.1 (1.68–2.60)*	2.1 (1.68–2.60)*	1.8 (1.45–2.26)*	1.9 (1.44–2.42)*
High school graduate/GED	1.2 (1.04–1.43)*	1.2 (1.03–1.41)*	1.1 (0.96–1.31)	1.1 (0.89–1.26)
Income (⩾US$50 000 = ref.)				
<US$20 000	1.2 (0.99–1.47)	1.2 (1.00–1.48)	1.2 (0.97–1.44)	1.1 (0.89–1.41)
US$20 000–49 999	1.1 (0.95–1.35)	1.1 (0.95–1.35)	1.1 (0.92–1.31)	1.1 (0.91–1.36)
Acculturation				
Age came to the USA (born in the USA = ref.)				
<5 years		0.6 (0.27–1.16)	0.6 (0.29–1.39)	0.7 (0.34–1.43)
⩾5 years but <10 years		1.7 (0.41–7.28)	2.0 (0.46–8.96)	2.6 (0.54–12.18)
⩾10 years but <18 years		0.6 (0.24–1.37)	0.6 (0.24–1.45)	0.7 (0.26–1.69)
⩾18 years		0.3 (0.15–0.62)*	0.3 (0.16–0.66)*	0.3 (0.15–0.59)*
Family environment				
Lived with father/both parents (= ref.)				
Lived with mother-only			2.8 (2.20–3.54)*	2.2 (1.58–2.93)*
Lived with at least one biological parent and parents divorced or parent died			2.2 (1.95–2.59)*	1.7 (1.42–1.98)*
Never lived with biological parent			2.3 (1.53–3.54)*	1.5 (0.69–3.05)
Family history (no = ref. group)				
Father with antisocial behavior				4.1 (3.31–5.06)*
Mother with antisocial behavior				3.4 (2.52–4.60)*

* $p < 0.05$.

subgroups (Mayeda *et al.* 2006). Some might still argue that, given that Asians may under-report a history of offenses/convictions (Jolliffe *et al.* 2003), perhaps because of shame, embarrassment or mistrust of the interviewer or researchers (i.e. immigrants may come from countries of origin with coercive governments), the low prevalence of CD reported here merely represents differential reporting. Although possible, more objective measures, such as rates of incarceration for Asians or Asian subgroups, are consistent with our findings (Kitano, 1973 ; Kim *et al.* 2001).

Others might question the very high prevalence of CD among NH/PI respondents. Again, our results

are consistent with the existing literature. High rates of arrests (per thousand individuals) have been described for Samoans in some communities relative to other racial/ethnic groups (Le *et al.* 2001), as have higher rearrest rates for Pacific Islanders relative to Asian Americans in general (Le *et al.* 2001). In addition, over-representation of Native Hawaiians has been observed in youth corrections in Hawaii (Kim *et al.* 2001). Native Hawaiians have also been shown to have higher rates of adolescent misconduct (i.e. arrests and juvenile delinquency) relative to other Asians/ Pacific Islanders (Hishinuma *et al.* 2005), and in one study of respondents selected from Hawaiian

high schools, Native Hawaiian participants had almost double the CD prevalence of non-Hawaiian respondents, although the difference was non-significant (Andrade *et al.* 2006).

Viewed within the context of the existing literature, the ordering of CD prevalence rates (Asian <Caucasian<NH/PI) observed here appears valid. An important question is 'Why?' Our results (Table 4) suggest that differences between Asians and Caucasians may be attributable to the differences in factors such as family environment and acculturation. This is consistent with work suggesting that, with greater assimilation into American culture, Asian youth are more prone to engage in deviant behavior (Nagasawa *et al.* 2001) as they move from a cultural emphasis on collectivism to individualism. The relatively low rates of American-born Asians in this national study (Table 1) is of particular interest, as it suggests that the low prevalence rates of CD observed among Asians may trend towards general population prevalence estimates if the American Asian population becomes more assimilated over time. Our results also suggest that the effects of assimilation may, in part, be filtered through changes in the family environment or structure.

By contrast, the results regarding NH/PI only strengthened when other factors, such as demographics, acculturation, family environment and family history, were included in the model. As such, it does not appear that these factors, as measured here, explain the high rates of CD seen in this population. Many other explanations remain. First, the experience of colonization may have had important effects, which, in part, explain these very high rates of CD. For example, after Captain James Cook arrived in Hawaii in 1778, the life and culture of Native Hawaiians were markedly altered and affected. By the time the monarchy was overthrown in 1898, the population had fallen from between 250 000 and 1 000 000 at the time of western contact to about 44 000 full or part Native Hawaiians (Hishinuma *et al.* 2000). Exposure to disease, political change and language assimilation (i.e. Hawaiian language was prohibited in public schools) are important factors in the history and experience of the Native Hawaiians. Such intergenerational disenfranchisement may be one important factor in explaining our results. Second, recent findings have suggested that admixture (i.e. Asian and Caucasian) is associated with higher prevalence of substance use than in either founding population (R. Price, personal communication). As such, a very high rate of admixture between Native Hawaiians and other racial population groups, which arrived later to the islands, might reasonably be hypothesized to be one factor in increasing risky and delinquent

behaviors in this population. Third, it is possible that the measures available and used here do not adequately capture relevant aspects of acculturation or socio-economic disadvantage or early family environment. These factors, if measured more appropriately, may have explained the observed prevalence differences. For example, previous longitudinal studies examining risk and protective factors for delinquency among children in Hawaii (Werner, 1987) suggested that early family instability and socio-economic disadvantage may be particularly relevant. The current study raises interesting questions but the analyses conducted here do not fully explain the high prevalence of CD among NH/PI. Thus the proposed explanations serve as hypotheses that deserve further exploration.

A second important finding in the current analyses is that Asian and NH/PI youth with CD represent a group at substantial risk for serious co-morbid psychiatric disorders including substance use disorders and affective disorders. Smaller samples of Asians and NH/PI relative to Caucasians resulted in wide CIs, but the estimated ORs for risk for substance use disorders and adult antisocial behavior for Asians with CD were very high (18–69). This may, in part, relate to relatively low prevalence rates of substance use disorders and, perhaps, adult antisocial behavior among Asians generally. However, it is important to note that within Asians, CD diagnosis indicates a significantly higher risk for nicotine dependence, alcohol abuse or dependence and adult antisocial behavior relative to other Asians than within Caucasians. Our findings of a very strong link between CD and substance use disorders within Asians fits well with the existing literature. Wells *et al.* (1992) examined a group of fifth-grade Asian, Black, and White students and found that, among Asians, self-reported delinquent behavior was a stronger predictor of substance initiation than among Blacks and Caucasians. There is also support that the transition from childhood CD to alcohol and drug abuse is high in Taiwan and South Korea (Price & Risk, 2001), that rates of ASPD are high (29–62%) among incarcerated and hospitalized heroin addicts in Taiwan (Chen *et al.* 1999) and that CD is associated with alcohol dependence among Thai males (Assanangkornchai *et al.* 2002). A recent report has also shown that CD is associated with alcohol dependence among Asian college students in the USA (Luczak *et al.* 2004). Regarding the link between CD and affective disorders, little has been published on this finding within Asians, although the link is well established in the general population. It is also important to note that the NESARC asks about whether symptoms of affective disorders are better accounted for by another medical condition or are likely to have

been induced by substances. Therefore, there is strong evidence that this co-morbidity excludes co-morbid phenocopy due to other conditions (Schuckit *et al.* 1997). Although some may consider Asian youth to represent a 'model minority', these analyses suggest that multiple serious psychiatric disorders may cluster within at-risk Asian and NH/PI youth who exhibit symptoms of CD during adolescence.

A third important finding is that, although it may be reasonable to hypothesize that the social stress of immigration would be associated with greater rates of mental health disorders, USA-born Asians and NH/PI were significantly more likely to have CD when compared with Asian and NH/PI immigrants respectively. This is consistent with the nativity paradox seen among American Hispanics (Turner *et al.* 2006). Our analyses suggest that with greater American acculturation (i.e. if reproduction among Asians in the USA rather than immigration drives American Asian population growth), rates of CD are likely to rise within this fast-growing population.

Fourth, although some may hypothesize that immigration stress, acculturation, and peer affiliation with non-Asian or delinquent peers may explain much of the risk for antisocial behavior among Asian and NH/PI youth, our analyses suggest that family history is a strong predictor of CD within this population. This is consistent with the literature showing that CD and antisocial behavior in the general US population are heritable (Rhee & Waldman, 2002) and familial (Stallings *et al.* 1997). Given the assumption that these findings would also hold true for youth with CD and not simply retrospectively reported CD in adulthood, there are several implications. First, treatment of Asian youth with CD will probably require family-based approaches to help to assess parental instability and psychopathology and to help to create a more structured home environment that reinforces prosocial behavior. Second, efforts aimed at prevention in this population will probably require not only direct contact with the at-risk youth but also work with high-risk families. Treatment may be further complicated in families with first-generation non-English-speaking parents with differences in intergenerational cultural norms.

Appendix

Questions used to create adult antisocial behavior

Criteria 1

Ever destroy/break/vandalize someone else's property (car, home, etc.) – happen since age 15

Ever start a fire on purpose to destroy someone else's property or just to see it burn – happen since age 15

Ever steal something from someone/someplace when no one was around – happen since age 15

Ever forge someone else's signature, like on a legal document or check – happen since age 15

Ever shoplift – happen since age 15

Ever rob or mug someone or snatch a purse – happen since age 15

Ever make money illegally, like selling stolen property or selling drugs – happen since age 15

Ever do something you could have been arrested for, regardless of whether you were caught or not – happen since age 15

Ever force someone to have sex with you against their will – happen since age 15

Criteria 2

Have a time in your life when you lied a lot, other than to avoid being hurt – happen since age 15

Ever use a false or made-up name or alias – happen since age 15

Ever scam or con someone for money, to avoid responsibility or just for fun – happen since age 15

Criteria 3

More than once quit a job without knowing where you would find another one – happen since age 15

More than once quit a school program without knowing what you would do next – happen since age 15

Travel from place to place for 1+ months without advance plans or without knowing how long you would be gone or where you would work – happen since 15

Ever have time lasting 1+ months when you had no regular place to live – happen since age 15

Ever have time lasting 1+ months when you lived with others because you did not have/own a place to live – happen since age 15

Criteria 4

Ever get into a lot of fights that you started – happen since age 15

Ever get into a fight that came to swapping blows with someone like a husband, wife, boyfriend or girlfriend – happen since age 15

Ever use a weapon like a stick, knife or gun in a fight – happen since age 15

Ever hit someone so hard that you injured them or they had to see a doctor – happen since age 15

Ever physically hurt another person in any way on purpose – happen since age 15

Criteria 5

Ever do things that could easily have hurt you or someone else, like speeding or driving after having too much to drink – happen since age 15

Ever get more than 3 tickets for reckless/careless driving, speeding, or causing an accident – happen since age 15

Ever have driver's license suspended or revoked for moving violations – happen since age 15

Criteria 6

Ever fail to pay off debts – like moving to avoid rent, not making payments on loan or mortgage, failing to pay alimony or child support or filing bankruptcy – happen since age 15

Criteria 7

Since time when destroyed property, stole something or mistreated/harmed another person, have you regretted doing these things or wished they never happened?

Did you feel you had a right to do these things (destroy property, steal something, mistreat/harm another person)?

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Declaration of Interest

None.

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