

Health and Behavior Risks of Adolescents with Mixed-Race Identity

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A considerable literature attests to the emotional, health, and behavior risk problems of mixed-race adolescents. The most common explanation for the high-risk status is the struggle with identity formation, leading to lack of self-esteem, social isolation, and problems of family dynamics in mixed-race households.^{1–6} This literature is not entirely consistent. In some studies no differences are found between mixed-race and single-race children.^{7–9} This article explores the risk status of self-identified mixed-race compared with single-race adolescents using a large, nationally representative sample.

Most studies are based on clinical reports or reports of mixed-race samples without comparison to single-race groups. It is not surprising that such samples lead to the conclusion of emotional and behavior problems, as clinical samples are self-selected for problems. No national data on adolescents have been reported, except from the sample we used.

In 2000, the Bureau of the Census introduced a new system of reporting race, providing a list of races and asking respondents to check all that apply. Because an adult in the household filled out the census, children and adolescents had their race reported by a household adult. The National Health Interview Survey (NHIS) has been using a check-all-that-apply race classification for data collection for 20 years, but data on the health of those reporting mixed race is only recently being reported.¹⁰ In the NHIS, race for adolescents and children is reported by a household adult.

These 2 national sources will provide new data on mixed-race adults and children. However, such data are not suitable for examining the racial identity of adolescents, as their race is reported by another person in the household.

We test the prevailing view of the literature that mixed-race adolescents are at higher health and behavior risk than single-race individuals because of stress associated with mixed racial identity. An alternative and sim-

Objectives. This study compared the health and risk status of adolescents who identify with 1 race with those identifying with more than 1 race.

Methods. Data are derived from self-reports of race, using the National Longitudinal Study of Adolescent Health (Add Health), which provides a large representative national sample of adolescents in grades 7 through 12. Respondents could report more than 1 race.

Results. Mixed-race adolescents showed higher risk when compared with single-race adolescents on general health questions, school experience, smoking and drinking, and other risk variables.

Conclusions. Adolescents who self-identify as more than 1 race are at higher health and behavior risks. The findings are compatible with interpreting the elevated risk of mixed race as associated with stress. (*Am J Public Health.* 2003;93:1865–1870)

pler hypothesis is that mixed-race adolescents are affected by the cultural experience of both races and will have risk status in between their 2 component races. We test the hypothesis that mixed-race adolescents are within the boundary values for the nonrisk individual and family attributes of the 2 single-race groups that constitute their identities.

METHODS

This study presents data comparing mixed-race adolescents with single-race adolescents in the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative school-based probability sample of U.S. children in grades 7 through 12 in 1994–1995. A stratified probability sample of 80 high schools was selected from a list of all high schools. A feeder school was selected (by probability proportional to its contribution to the high school) for each high school where required, to provide a full range of grades. All students attending on a specific day in each school completed a self-administered op-scan questionnaire (a paper and pencil questionnaire with an electronic scoring sheet for answers to be recorded by the respondent) under the supervision of a classroom teacher. The questionnaire collected demographic characteristics, health and behavior reports, and race self-identification. Questionnaires

were placed in a sealed envelope by the respondent when completed and deposited in a box for project staff pickup. Teachers had no access to the completed questionnaires.

About a year later, a probability subsample of school respondents (plus those on the school roster but not present at school administration) were interviewed at home, using a laptop questionnaire (questionnaire recorded in a laptop computer with answers electronically recorded) that was administered by an interviewer. Sensitive questions were self-administered using earphones to listen to the questions read from the computer while shown on the screen. The home interview collected a broader range of data than the school questionnaire. A parent or guardian was also interviewed for most respondents. The same race question was asked on the school, home, and parental surveys.

Add Health respondents were asked to identify their race answering the following question: “What is your race? You may give more than 1 answer: White, Black or African American, American Indian or Native American, Asian or Pacific Islander, Other.”

Racial reporting of respondents was based on self-identification in self-administered school questionnaires and interviewer-administered home interviews. Add Health used the check-all-that-apply technique, allowing respondents to choose as many races as they wished.

Cooney and Radina¹¹ exploited another Add Health possibility for multiple race classification from this same data source. Cooney and Radina used the small, public use subset of Add Health cases and further limited their analysis to adolescents living with both biological parents, 1 of whom had provided a parental interview. Because only slightly more than half of Add Health respondents lived with both biological parents, this analytic strategy resulted in a much reduced sample size, consisting only of adolescents in biologically intact families. If the parent self-identified as 1 race and identified the other parent as another, Cooney and Radina classified the child as mixed race. This strategy does not provide the adolescents' racial self-concepts. Parker and Lucas¹² found that parents who reported a spouse of a different race did not necessarily report that their child was of more than 1 race.

This article uses the child's report of his own race without reference to parents races. It should not be assumed that the child reported what parents or coresident adults would have reported for the child, nor that the parents would report themselves as the same race combination (if any) as the child self-reported. This self-identification assures us that the adolescent racial self-concept is what we are working with.

Measurement of Dependent Variables

Variables to be correlated with race were derived from both the self-administered school questionnaire and the home laptop interview. They fall into 3 general categories: risk variables (school questionnaire), risk variables (home interview), and nonrisk attributes (school and home surveys).

Risk variables (school questionnaire). General health: Self-reported health—fair or poor (vs excellent or good); wake up feeling tired often or every day in last month; have skin problems such as itching or pimples often or every day last month; have headache often or every day in last month; have aches, pains, or soreness in your muscles or joints every day last month; have trouble falling asleep or staying asleep often or every day in last month; feel depressed or blue often or every day in last month.

Substance use: Smoked cigarettes at least 2 days/month during last 12 months; drink beer, wine, or liquor at least 2 days/month during last 12 months; get drunk at least 2 days/month during the last 12 months.

Risk variables (home interview). Access to guns: Guns easily available in the home.

- Suicidal thoughts: Seriously thought about committing suicide during the last 12 months.
- Sexual behavior: Ever had sexual intercourse.
- School behavior: Skipped school more than 10 times in the last year; repeated a grade; ever received an out-of-school suspension.

Nonrisk attributes (school and home surveys). Vocabulary score/picture vocabulary test (PVT): Add Health short version of Peabody PVT,¹³ percentage in category that are above the overall 75th percentile (home interview).

- Grade point average (GPA): Self-reported grades (averaged across school subjects), percentage in category with GPA above the 75th percentile for the sample as a whole (school questionnaire).
- Family structure: Percentage in category who live with 2 parents (vs other; school questionnaire).

- Family education: Percentage in category with at least 1 parent with a college degree (school questionnaire).

School questionnaires with sampling weights were completed by 83 135 respondents, and home interviews by 18 924 adolescents. Analysis is computed in Stata (Stata Corp, College Station, Tex) to adjust for differential probabilities of selection and clustering of the sample. Weighted analyses provide estimates that are representative of the adolescent U.S. population.

RESULTS

Table 1 reports the race classifications for school and home surveys. Included in the table are respondents who did not answer the race question. Seventy-eight percent of school respondents omitting race identified themselves as Hispanic. Table 1 shows that 86.9% of school respondents chose 1 race (including Other only), and 7.4% chose more than 1. Add Health did not ask respondents what was meant by "Other" race. In a question before and independent of the race question, respondents were asked whether they were "Latino

TABLE 1—Race Combinations (Includes Missing Race)

Race/ethnicity	School Questionnaire (Percentage of Total)			Home Interview (Percentage of Total)		
	Frequency	Unweighted	Weighted	Frequency	Unweighted	Weighted
White only	46 364	55.8	58.2	11 032	58.3	69.8
Black only	13 530	16.3	17.9	3 867	20.4	15.2
Asian only	4 133	5.0	3.5	1 289	6.8	3.4
American Indian only	1 275	1.5	1.7	211	1.1	0.9
Other only	5 817	7.0	5.6	1 553	8.2	6.4
White and Black	416	0.5	0.5	138	0.7	0.5
White and Asian	583	0.7	0.6	130	0.7	0.5
White and American Indian	1 573	1.9	2.0	268	1.4	1.6
White and Other	1 024	1.2	1.2	109	0.6	0.5
Black and Asian	294	0.4	0.4	26	0.1	0.1
Black and American Indian	590	0.7	0.8	91	0.5	0.3
Black and Other	151	0.2	0.2	50	0.3	0.1
Asian and American Indian	83	0.1	0.1	6	0.0	0.0
Asian and Other	294	0.4	0.2	19	0.1	0.1
American Indian and Other	93	0.1	0.1	18	0.1	0.1
≥ 3 categories	1 045	1.3	1.3	81	0.4	0.3
Missing race	5 870	7.1	5.8	36	0.2	0.2
Total	83 135	100.0	100.0	18 924	100.0	100.0

or Hispanic.” In the home interviews, 86% of those who chose only “Other” race also marked “Hispanic,” and 46% of those marking “Hispanic” chose “Other” as their only race. Nevertheless we treat “Other” as a race in Table 1. To be consistent with census and Office of Management and Budget definitions of race, we did not define “Hispanic or Latino” as a race. Also of note from Table 1 is the fact that 72% of school respondents who chose American Indian also chose another race (mostly White).

We compared race identification for individuals who responded both in school and at home. About 16% of home responses were different from school responses. For White only, Black only, and Asian only at school, exact agreement at home was above 90%, and most changes made at home involved adding or substituting “Other.” Exact agreement at home was below 50% for school respondents who reported more than 1 race. American Indian has a unique pattern. Agreement was low, with 34% of those who selected American Indian only at school selecting White only at home, and 77% of those who identified as White/American Indian at school identified as White only at home. Except for American Indians, we may conclude that single-race responders are highly consistent. Multiple-race responders are inconsistent. Their inconsistency may be to the result of differences in method of administration (self-report op-scan vs report to interviewer), context (school vs home), ambiguity in the question used, or lack of a fully developed self-concept in the adolescent.

In the 1997 NHIS, unpublished data collected on a representative sample of Americans indicate that only 1.4% selected more than 1 race, a figure stable over the last 20 years.¹⁰ The 2 sources from which data on mixed-race children have been estimated (census and NHIS) use reports of child race given by a household adult.

To measure the differences in health and behavior risks between single-race and mixed-race respondents, we used 2 different methods of race comparison. In the first method, we compared respondents who reported that a specific race alone with those who reported race plus any other race by computing the odds ratio between the mixed-

TABLE 2—Health and Behavior: Odds Ratios for Mixed-Race Adolescents Compared With Single-Race Adolescents

Attribute	White	Black	American Indian	Asian	Other
General health					
Health fair/poor	1.69*	1.60*	0.84	1.68*	1.31
Wake up tired	1.12*	1.37*	1.26*	1.55*	1.74*
Skin problems	1.23*	1.63*	1.32*	1.18	1.38*
Headaches	1.19*	1.28*	1.12	2.11*	1.48*
Aches/pains	1.34*	1.48*	1.27*	1.98*	1.56*
Sleep problems	1.58*	1.63*	1.24	1.72*	1.33*
Depressed/blue	1.50*	1.94*	1.45*	1.46*	1.45*
Substance use					
Smoke	1.24*	2.17*	1.03	2.25*	1.39*
Drink	1.22*	1.66*	1.00	2.37*	1.17
Get drunk	1.10	2.09*	0.95	2.96*	1.33*
Access to guns^a					
Gun easily available	0.84	1.12	1.75	1.57	1.74
Suicidality^a					
Seriously considered	1.34*	1.50	1.10	1.84*	1.31
Sexual behavior^a					
Ever had sex	1.50*	0.83	1.50	2.87*	1.16
School behavior^a					
Skipped school ≥ 10 times	1.43	1.97	0.77	1.84	1.17
Repeated a grade ^a	1.64*	0.91	1.02	2.11*	0.89
Ever suspended ^a	1.94*	1.06	1.08	2.58*	0.82

^aHome interview. Odds ratio is defined as (1/[1 - rate for mixed race]) / (1/[1 - rate for one race]).
*P < .05

race group and the single-race group. The ratio is more than 1.0 when the mixed-race group is at greater risk and less than 1.0 when the mixed-race group is at lower risk. These ratios are shown in Table 2. If single-race and mixed-race groups have the same risk, their odds ratio will not differ from 1.0 (evaluated here at the .05 level, 2-tailed test). Home-interview risk variables are based on a sample only one fourth as large as variables from the school questionnaire.

As a global test we examined what proportion of the ratios in Table 2 are significantly greater than 1.0. Most of the ratios are significantly greater than 1.0, indicating that the mixed-race adolescents are at greater overall risk. Looking at the general health items only, the ratios are significantly greater than 1.0 for 7 out of the 7 variables for Whites and for Blacks, and 6 out of the 7 variables are significantly greater for Asians and for Others. For American Indians, only 4 of 7 variables are

significantly greater than 1.0. For the 3 substance-use variables, a similar pattern holds, with mixed-race American Indians not more at risk than single-race American Indians. Of the remaining 6 variables (all from the home interviews), no variables show significantly greater risk for mixed-race Blacks, American Indians, and Others. Mixed-race Whites and Asians show significantly greater risk for considering suicide, having sex, repeating a grade, and being suspended. Support for the hypothesis of greater risk status of mixed race compared with single race is most strongly supported for general health, supported for substance use, and less strongly supported for the variables from home interviews based on a much smaller sample, even though 24 out of 30 odds ratios for home interview variables are greater than 1.0 when significance is ignored.

In the analysis in Table 2, various race combinations are subsumed in the mixed-race

TABLE 3—Odds Ratios for Specific 2-Race Adolescents Compared With Single-Race Adolescents

Virgule	Health Fair/Poor	Wake Up Tired	Skin Problems	Headaches	Aches/Pains	Sleep Problems	Depressed/Blue	Regular Smoker	Regular Drinker	Drunk Regularly
White/Black										
White	1.36	0.86	1.22	0.93	0.93	1.09	1.53*	0.90	1.11	1.28
Black	1.05	1.23	1.65*	0.88	1.04	1.23	1.76*	2.66*	1.52*	2.09*
White/American Indian										
White	1.73*	1.10	1.24*	1.15	1.56*	1.77*	1.54*	1.54*	1.37*	1.14
American Indian	0.79	1.26*	1.35*	1.01	1.26*	1.33	1.40*	1.36*	1.13	1.04
White/Asian										
White	1.50*	1.28*	1.26*	1.16	0.94	1.58*	1.21	1.17	1.14	1.16
Asian	1.12	1.80*	1.08	1.78*	1.33*	1.54*	1.11	2.24	2.06*	1.97*
Black/American Indian										
Black	1.31	1.42*	1.24*	1.31	1.35*	1.61*	1.65*	1.03	1.12	1.02
American Indian	0.78	1.13	1.00	1.21	0.99	1.07	1.30	0.31*	0.68*	0.57*
Black/Asian										
Black	2.25*	1.38*	1.76*	1.23	1.25	2.11*	2.14*	3.44*	2.22*	4.08*
Asian	2.17*	1.36*	1.11	2.00*	1.60*	1.83*	1.70*	2.22*	2.92	4.25*
Asian/American Indian										
Asian	1.93	1.45	0.83	3.00*	4.64*	2.18*	1.26	1.83	2.00*	2.23
American Indian	1.19	1.18	1.05	1.71	2.65*	1.68	1.24	0.85	0.91	1.20

Note. Odds ratio is defined as (1 / [1 - rate for mixed race]) / (1 / [1 - rate for one race]).
*Different from mixed race at $P < .05$.

comparisons. For example, the unweighted mixed-race computation for Blacks from the school questionnaire puts in the same category the 294 Black/Asian, 590 Black/American Indian, 416 Black/White, 151 Black/Other, and 474 from 3 or more race combinations. If particular race combinations for Blacks have different risks, the differences are obscured in the table.

To examine this issue, we prepared a race-specific analysis in which each single-race group is compared with a specific combination with that race. We eliminated those who chose “Other” either alone or with another race because of a perceived ambiguity in meaning. These data are displayed in Table 3. The sole purpose of Table 3 is to show whether the patterns of Table 2 are maintained when the mixed-race comparison is a specific 2-race category.

The analysis shows that the general pattern (mixed race a higher risk than single race) is consistent with those in Table 2. By direction of differences alone, ignoring statistical significance, of the 10 risk variables from school data, 6 fit the hypothesized pattern for

White/Black versus White, 10 fit the pattern for White/American Indian versus White, 9 fit the pattern for White/Asian versus Asian, 4 fit the pattern for Black/American Indian versus American Indian, 10 fit the pattern for Black/Asian versus Black, and 9 fit the pattern for Asian/American Indian versus Asian. Thus the Black/American Indian versus Black results from Table 3 do not fit the pattern.

We have interpreted our data with no controls. These analyses answer the question of whether mixed-race-identified adolescents are at higher risk than single-race-identified adolescents. Given that mixed-race-identified adolescents may differ from single-race-identified adolescents on other important attributes, would they be at higher risk if these differences were statistically controlled? We repeated the analyses presented in Tables 2 and 3 with statistical controls for age, sex, PVT, GPA, family structure, and family education (data available from the authors upon request). Although for many individual risk items the odds ratios change in identification of statistical significance, very few entries change odds ratios from above to below 1.0.

Therefore, the overall inference from the controlled analysis is that the differences between single-race and mixed-race identifiers on the control variables we introduced are not the source of the higher risk encountered by mixed-race adolescents.

Previous analyses in this article have been limited to health and behavior risk variables. We examined a set of variables measuring individual and family characteristics that are not in and of themselves health and behavior risk variables, i.e., they are not attitudes, voluntary behaviors, or health symptoms. We offer 4 comparisons (family education, family structure, GPA, and PVT), each of them correlated with socioeconomic status. GPA is a measure of success in school. The PVT is highly correlated with success in school and is correlated with general intelligence tests. Because single-race respondents differ by race on these variables, it is possible that single-race respondents also differ from mixed-race respondents on the same variables. These measures are all considered here as not caused by personal motivations, decisions, or actions with respect to family structure, family

TABLE 4—Percentage of Adolescents With Individual and Family Attributes on School Questionnaire, by Race Ethnicity (Except PVT)

Virgule	GPA (High)	PVT (High)	College-Educated Parent	2-Parent Household
White/Black	24.19	18.20	39.46	52.77
White	32.27	26.98	41.30	78.41*
Black	15.45*	7.94*	35.39	47.25
White/American Indian	27.10	24.08	29.63	74.07
White	32.27*	26.98	41.30*	78.41*
American Indian	14.97*	10.29*	25.83	60.77*
White/Asian	37.58	23.08	52.36	73.54
White	32.27	26.98	41.30*	78.41
Asian	43.16	20.99	60.80	78.78
Black/American Indian	18.79	7.92	38.55	48.21
Black	15.45	7.94	35.39	47.25
American Indian	14.97	10.29	25.83*	60.77*
Black/Asian	18.57	^a	35.81	47.76
Black	15.45	^a	35.39	47.25
Asian	43.16*	^a	60.80*	78.78*
Asian/American Indian	21.82	^a	49.46	49.17
Asian	43.16*	^a	60.80	78.78*
American Indian	14.97	^a	25.83*	60.77

GPA = grade point average; PVT = Picture Vocabulary Test.

^aCell size too small.

*Different from mixed race at $P < .05$.

education, and PVT, and at least partially for GPA. They represent cultural opportunities and cultural handicaps. Mixed-race adolescents may be supposed to have had exposure to the cultural fates of 2 racial groups. They may therefore be hypothesized to be between the 2 racial groups with which they identify on such attributes.

Table 4 compares the GPA, PVT, family education, and family structure for mixed-race and single-race adolescents by specific race combinations. These variables were all measured from the school questionnaire except for PVT, which was taken from the home interview. Comparisons are evaluated by direction of differences only.

GPA

In only 1 case (Black/American Indian) does the mixed-race group value fall beyond the values of its constituent races.

PVT

In no case is the mixed-race group value beyond the values of its constituent races. The Black/Asian group and the Asian/American Indian group are omitted because they have cell sizes too small.

American Indian group are omitted because they have cell sizes too small.

Family Structure

In only 1 case (White/Asian) is the mixed-race group outside the range of its constituent races.

Family Education

In only 2 cases (Black/Asian and Black/American Indian) was the mixed-race group outside the range of its constituent rates.

The general pattern of these nonrisk attributes is that the mixed-race groups have values that are between the values of the 2 constituent races. This lends support to the hypothesis that the mixed-race adolescents have been influenced by both racial groups and, therefore, have an experience that is between those who report the single constituent races.

DISCUSSION

The preponderance of our evidence supports the conclusion that adolescents who

identify more than 1 race are at higher health and behavior risks when compared with those who identify with 1 race only. This applies in a general way and is not distinctive to any particular race combinations. Further, it is not peculiar to any particular type of risk, but to most risks, both health and behavior.

Because risk among mixed-race adolescents is higher for all race combinations, some across-the-board explanation must be inferred. The most common explanation in the literature is stress associated with identity conflict. We cannot test this hypothesis directly. Many of the school variables tested for mixed-race risk are possible consequences of stress (e.g., most of the general health items, considered suicide, and drinking). Stress, then, is a possible explanation of mixed-race high risk because our risk assessment is based on possible stress symptoms. Whether the stress is associated with identity conflict is beyond our resources to test. Gibbs³ warns against jumping to the conclusion without direct evidence that the stresses of mixed-race adolescents are a consequence of race identity problems.

The findings of this study are subject to the limitations of respondent reporting and cell sizes. Adolescents did not always report their race. Of those who were in both the school and the home survey, 16% gave different answers to the 2 surveys. For a sociological interpretation of the inconsistency in race responses of Add Health respondents, see Harris and Sim.¹⁴ Previous studies have found that answers to race questions vary by nativity (foreign or native born), parental ethnicity, national origin, and school racial composition.^{15–18}

CONCLUSION

Adolescents who identify themselves as mixed race are at higher health and behavior risk than those of 1 race. Nevertheless, most mixed-race adolescents are at low risk. Most of the risk items we assessed may be interpreted as related to stress, so we may therefore choose to interpret mixed race as a source of stress. We cannot identify further the source of the stress. Subsequent research can start with the assumption of greater risk for the mixed-race-identified adolescent and

try to identify the sources of stress. Only then can we recommend programmatic attention to mixed-race youths. Our comparison of mixed-race-identified adolescents on family structure, parent education, GPA, and PVT shows that on these culture-related nonrisk characteristics, mixed race youths have values in-between the constituent races, confirming a mixed-race cultural experience. ■

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Contributors

J.R. Udry directed the study and edited the article. R.M. Li conceived the paper and wrote the preliminary draft. J. Hendrickson-Smith conducted the statistical analyses and participated in writing the article.

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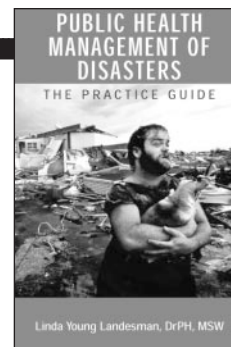
Human Participant Protection

Add Health is under continuous monitoring and approval of the institutional review board for the protec-

tion of human subjects of the School of Public Health, University of North Carolina at Chapel Hill.

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