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Final Report:

Anchorage Disproportionate Minority Contact Study

by

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Final Report: Anchorage Disproportionate Minority Contact Study

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Abstract

This project examined disproportionate minority contact in Anchorage, Alaska. It was designed to provide a more nuanced understanding of disproportionate minority contact at the referral stage (when law enforcement officers refer youth to the Alaska Division of Juvenile Justice). To do so, we relied on community involvement and utilized different statistical techniques to examine the geography and development of disproportionate minority contact. Researchers partnered with practitioners from the Anchorage Disproportionate Minority Contact Initiative to structure the research process and to interpret and disseminate results. Geographic analyses were conducted to examine where the highest levels of disproportionate minority contact were occurring and longitudinal analyses were conducted to examine at what age disproportionate minority contact began. These analyses provided an understanding of disproportionate minority contact that was obscured when examining relative rate indices. Geographic analyses, for example, revealed high levels of disproportionate minority contact for Pacific youth (a group that would have traditionally been ignored because of its ‘small population’). Longitudinal analyses revealed that disproportionate minority contact began at age 13. Although relative rate indices are useful to identify broad patterns in disproportionate minority contact, they are less useful to drive action. We overcame this limitation with strong community partnerships and different statistical methods for disproportionate minority contact research. In the end, practitioners and researchers used data and research to develop strategic plans to reduce disproportionate minority contact.

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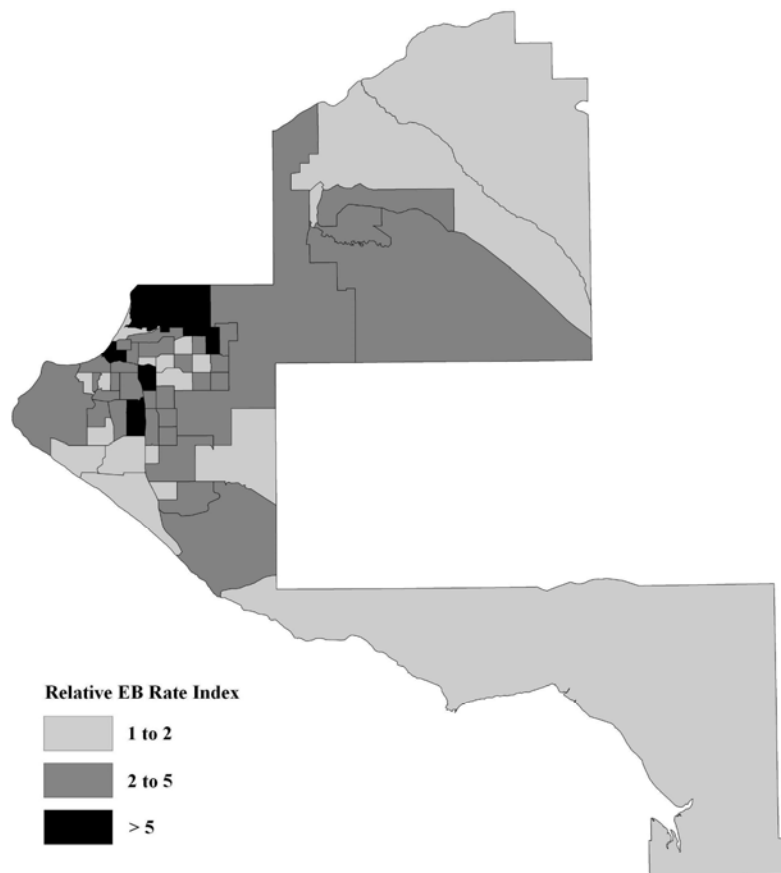
Data for this project were generously provided by the Division of Juvenile Justice, Department of Health and Social Services, State of Alaska. We especially thank Steve McComb, Patty Ware, Barbara Learmonth, Karen Forrest, Barb Murray, Susan McDonough, Linda Moffitt, Barbara Henjum, Rob Wood, Lizbeth Meredith, Jerry Bailey, and David Salmon.

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than the risk of referral for White youth. The risk of referral for all minority youth was one to two times greater than the risk of referral for White youth in 19 (35%) of the 55 census tracts, was two to five times greater than the risk of referral for White youth in 31 (56%) of the census tracts, and was more than five times greater than the risk of referral for White youth in the remaining five (9%) of the census tracts.

The key advantage of this statistical approach was the ability to examine levels of disproportionate minority contact in small census tracts, where the at-risk population was often small. This was particularly true for Pacific youth. On average, there were only 8.9 Pacific youth per census tract ($s = 12.7$, maximum = 72). By using relative EB rate indices (rather than relative rate indices), we were able to determine that the risk of referral for Pacific youth far exceeded the risk of referral for White youth. In half of the 44 census tracts where Pacific Islander youth (age 10 to 17) resided, the risk of referral was almost four times greater for Pacific youth than for White youth. Because Pacific youth represent a small at-risk population, their data would have been ignored with traditional raw rates or relative rate indices. Using EB rates and relative EB rate indices, we uncovered high levels of disproportionate minority contact for Pacific youth.

Disproportionate Minority Contact Levels for all Minority Youth



More detailed results showed that the risk of referral for minority youth was more than five times greater than the risk of referral for White youth in 14% of census tracts

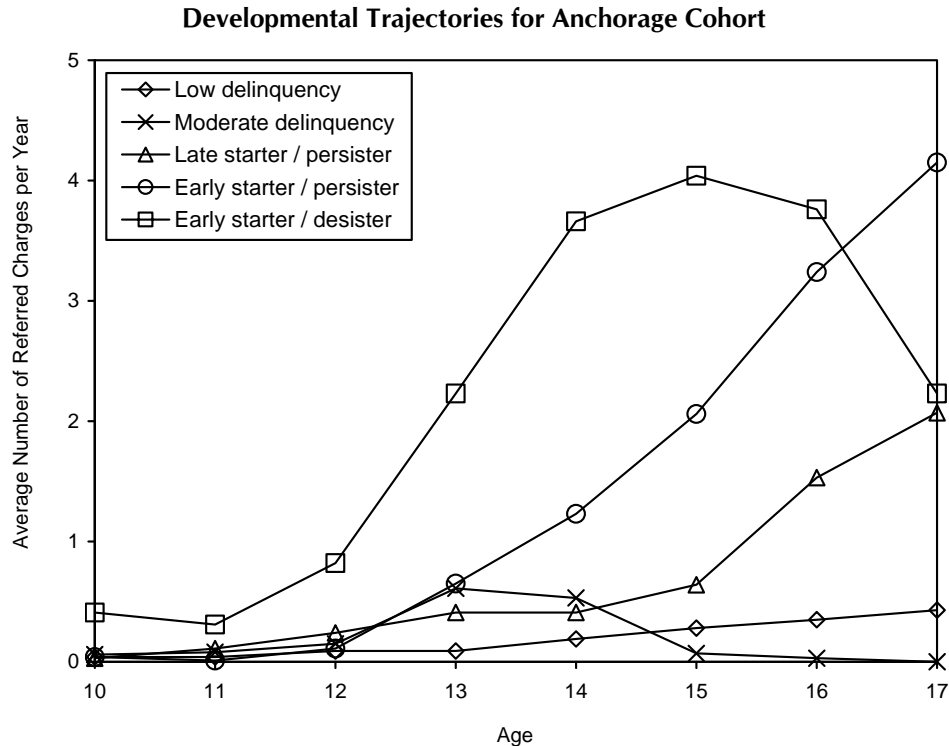
for Black youth, in 24% of census tracts for Native youth, in 7% of census tracts for Asian youth, in 27% of census tracts for Pacific youth, in 13% of census tracts for other minority youth, and in 6% of census tracts for multiracial youth. Even in racial groups with lower levels of disproportionate minority contact (e.g., Asian), we found evidence of small geographic areas where disproportionate minority contact levels were high. The maximum relative EB rate indices varied from a low of almost 10 for Black, Asian, and multiracial youth to a high of 110 for Native youth. In one census tract, the risk of referral was 110 times higher for Native youth than for White youth.

Previous research had often ignored disproportionate minority contact in small geographical regions, jurisdictions, or racial groups. As we had hypothesized, it is often in these small geographical regions, jurisdictions, or racial groups that we found the highest levels of disproportionate minority contact. This was particularly true for Pacific youth. Explaining the patterning of disproportionate minority contact was beyond the scope of this quantitative analysis. Nonetheless, understanding the geography of disproportionate minority contact provided a much more nuanced understanding of disproportionate minority contact than previously available. The key result from this analysis was that disproportionate minority contact varied substantially by geography and race. Understanding this geographical pattern can have important implications for theory and practice. Efforts to reduce disproportionate minority contact will be most effective when they target geographical areas that have both a high number of minority youth referred and a high level of disproportionate minority contact.

Development of Disproportionate Minority Contact

We examined the development of delinquency from age 10 to 17 for 1,131 youth born in 1989 who, at some point, had been referred to the Alaska Division of Juvenile Justice in Anchorage. This analysis required longitudinal data. As a result, we utilized different data than the data used for the geographic analysis. For each of the 1,131 youth, we calculated the total number of charges referred to the Alaska Division of Juvenile Justice from age 10 to 17. This total number included all referrals, throughout the entire State of Alaska. However, it did not include out-of-state referrals. Using group-based models, we uncovered five distinct developmental trajectories for the number of referred charges over time.

Of the 1,131 youth in this cohort, 51% were in the low delinquency group whose referral rate (number of referred charges per year) very slowly increased over time, but always remained very low; 17% were in the moderate delinquency group whose referral rate remained low up to age 12, moderately increased at ages 13 and 14, and decreased thereafter; 17% were in the late starter / persister group whose referral rate remained low up to age 15 but then steadily increased to peak at a moderate level at age 17; 5% were in the early starter / persister group whose referral rate remained very low up to age 12 but then steadily increased from age 12 to 17 to peak at a high level at age 17; and 6% were in the early starter / desister group whose referral rate began to increase early, peaked at a high level at age 15, but decreased thereafter.



When comparing the composition of each trajectory by race and gender, we found two key differences. Not surprisingly, males were overrepresented in the three high delinquency groups (late starter / persister, early starter / persister, early starter / desister) while females were overrepresented in the two low delinquency groups (low and moderate delinquency). White youth were overrepresented in the low and moderate delinquency groups and Native youth were overrepresented in the early starter / desister group. No other differences by race were uncovered.

These findings are important because they show that disproportionate minority contact began at age 13. At that age, Native youth were already disproportionately referred to DJJ relative to White youth. Native youth were 3.67 times more likely to belong to the early starter / desister group than White youth. From age 10 to 16, youth in the early starter / desister group were referred at a higher rate than others, and that was especially true from age 13 to 15. Although the early starter / desister group was small (6% of the cohort), it was responsible for 29% of the referred charges. The most important policy implication from these results is that successful interventions will need to begin early enough to affect youth in the early starter / desister group. Stated differently, successful interventions must begin before age 13.

Section I

Disproportionate Minority Contact

The 2002 reauthorization of the Juvenile Justice and Delinquency Prevention Act requires states that participate in the Formula Grants program to comply with the expanded Disproportionate Minority Contact core requirement to “address juvenile delinquency prevention efforts and system improvement efforts designed to reduce, without establishing or requiring numerical standards or quotas, the disproportionate number of juvenile members of minority groups, who come into contact with the juvenile justice system.” Disproportionate minority contact occurs when the rate of contact for minority youth is different than the rate of contact for White youth.

There is a significant amount of state and national literature to show that disproportionate minority contact is a severe problem, particularly for American Indian and Alaska Native youth (Pope and Feyerherm, 1990; Feld, 1991; Leiber, 1994; Poupart, 1995; Wordes and Bynum, 1995; Pope, Lovell, & Hsia, 2002; Hsia et al., 2004; Leiber, Johnson, & Fox, 2006; Kempf-Leonard, 2007; Ayra & Rolnick, 2008; Hartney, 2008; Piquero, 2008; Hartney and Vuong, 2009). Pope et al. (2002:5) examined the research literature from 1989 through 2001 and concluded that “taken together, the research findings support the existence of disparities and potential biases in juvenile justice processing.” Puzzanchera and Adams (2008) provided national data for 2005 showing the differences in rates of contacts for White, Black, American Indian or Alaska Native, and Asian, Hawaiian, or Pacific Islander youth. These national data are shown in Table 1.

Table 1. Summary of National Relative Rate Indices, 2005

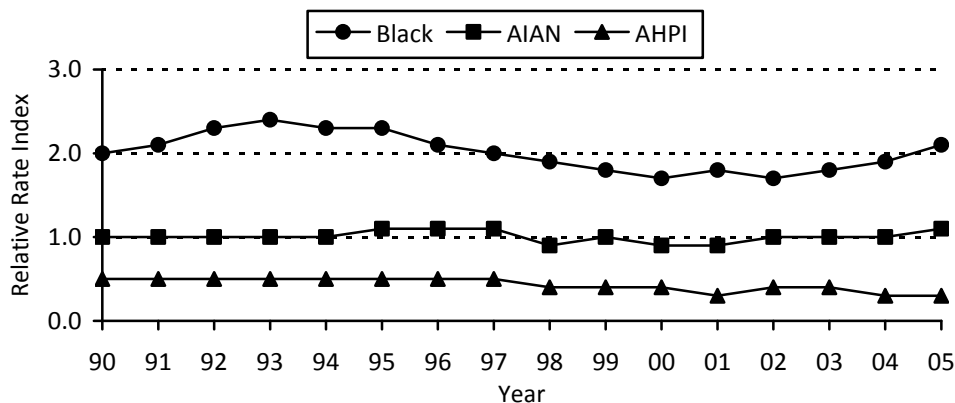
Stage	Race			
	All minority	Black	American Indian / Alaska Native	Asian / Hawaiian / Pacific Islander
Arrest rate	1.7	2.1	1.1	0.3
Referral rate	1.2	1.2	1.2	1.2
Diversion rate	0.7	0.7	0.9	0.8
Detention rate	1.4	1.5	1.1	1.2
Petitioned rate	1.2	1.2	1.1	1.1
Adjudicated rate	0.9	0.9	1.0	1.0
Probation rate	0.9	0.9	0.9	1.0
Placement rate	1.2	1.2	1.3	1.1
Waiver rate	1.1	1.1	1.9	0.6

Source of data: <http://ojjdp.ncjrs.gov/ojstatbb/dmcd/b/>

Much of the research on disproportionate minority contact has shown high levels of disproportionality at the early stages of arrest and referral (and this was particularly true for person offenses, result not shown). For all minority youth and for Black youth specifically, the arrest stage was where the highest levels of disproportionality were

occurring. The arrest rate for Black youth, for example, was 2.1 times higher than the arrest rate for White youth. For person offenses, the arrest rate for Black youth was 3.6 times higher than the arrest rate for White youth (result not shown). Figure 1, shows the relative rate indices for the arrest stage from 1990 to 2005 for Black, American Indian or Alaska Native (AIAN), and Asian, Hawaiian, or Pacific Islander (AHPI) youth.

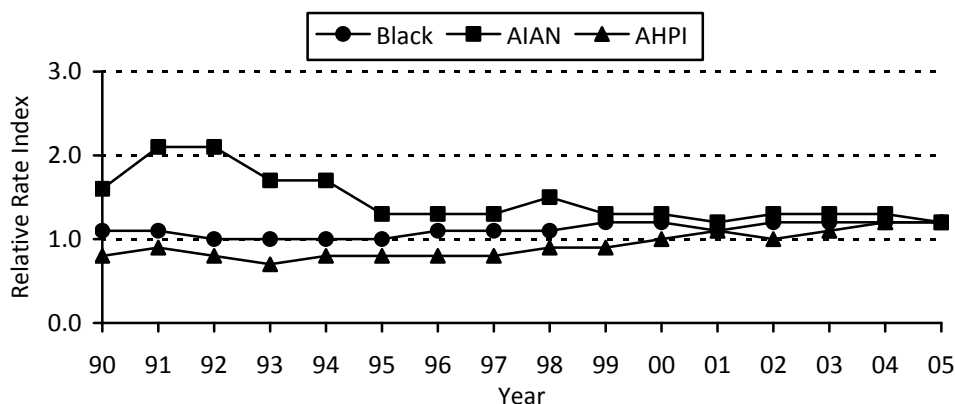
Figure 1. National Relative Rate Indices for Arrest Stage: 1990-2005



Source of data: <http://ojjdp.ncjrs.gov/ojstatbb/dmcd/b/>

Details in Figure 1 clearly show that Black youth were disproportionately arrested from 1990 to 2005. By comparison, very little disproportionality was shown for American Indian and Alaska Native youth. Asian, Hawaiian, and Pacific Islander youth had lower arrest rates than White youth. Disproportionality for American Indian and Alaska Native youth was more pronounced at the referral stage, particularly from early to mid-1990, as shown in Figure 2.

Figure 2. National Relative Rate Indices for Referral Stage: 1990-2005



Source of data: <http://ojjdp.ncjrs.gov/ojstatbb/dmcd/b/>

These data from the National Disproportionate Minority Contact Databook tend to obscure the vast differences that often occur for American Indian and Alaska Native youth. A significant amount of research has shown that disproportionate minority contact

is particularly problematic among American Indian and Alaska Native youth (Feld, 1991; Leiber, 1994; Poupart, 1995; Wordes and Bynum, 1995; Leiber, Johnson, & Fox, 2006; Arya & Rolnick, 2008; Hartney, 2008). As outlined by Arya and Rolnick (2008:4), “Native youth suffer disproportionately from risk factors known to be common precursors to delinquency.” However, they also carefully acknowledged that “focusing exclusively on problem behaviors creates a skewed picture of Native youth” (Arya and Rolnick, 2008:7). Silmere and Stiffman (2006), for example, found that more than half of Native youth surveyed reported no official or unofficial delinquency, almost half reported good educational attainment, and almost one third reported very little involvement with alcohol or drugs. Nonetheless, levels of disproportionate contact for Native youth remain high. Hartney (2008) examined the disproportionate contact of Native American youth, relative to White youth. He uncovered large differences in referrals per arrests, placements per adjudications, and waivers per petitions. The rate of referrals per arrests was 30% higher for Native youth than for White youth and the rates of placements per adjudications and waivers per petitions were both 50% higher for Native youth than for White youth. These national data are congruent with data for Alaska and Anchorage.

A. Disproportionate Minority Contact Research in Anchorage

Alaska’s efforts to address disproportionate minority contact date back to 1994 when the Alaska Juvenile Justice Advisory Committee first created a Disproportionate Minority Contact Workgroup. With federal technical assistance, the state began to collect and analyze data on disproportionate minority contact¹. The first disproportionate minority contact data summary was published in 1996. A detailed Phase I Assessment report was published by Dr. N. E. Schafer in 1997, followed by a Phase II report in 1998, and an assessment of disproportionate contact by gender in 2003. Dr. M. J. Leiber then conducted a thorough assessment of disproportionate minority contact in Anchorage (and Fairbanks) in 2006.

A summary of relative rate indices for Fiscal Year 2005 in Anchorage is presented in Table 2. Relative rate indices have persistently shown that minority youth were overrepresented in juvenile arrests and delinquency referrals, overrepresented in cases involving secure detention, overrepresented in cases petitioned, and underrepresented in cases diverted. Without exception, the largest overrepresentation occurred at the juvenile arrest and delinquency referral stage. Overall, minority youth were arrested and referred at a rate that was 3.61 times higher than White youth. More specific results indicated that relative to the rate of juvenile arrest and referral for White youth, the rates of juvenile arrest and referral were 3.92 times higher for Black youth, 3.73 times higher for Native youth, 1.85 times higher for Asian youth, 5.19 times higher for Pacific youth, and 4.24 times higher for other minority youth (including multiracial youth). Because the greatest source of disproportionate minority contact clearly (and persistently) occurred at the juvenile arrest and delinquency referral stage, our research focused on this first point of contact.

¹ Additional information is available on the Disproportionate Minority Contact webpage with the Alaska Division of Juvenile Justice (<http://www.hss.state.ak.us/djj/dmc/>).

Table 2. Summary of Relative Rate Indices for FY05

Stage	Race					Total
	Black	Native	Asian	Pacific	Other	
Juvenile arrests (delinquency referrals)	3.92	3.73	1.85	5.19	4.24	3.61
Refer to juvenile court (viable referrals)	1.04	1.03	1.03	1.04	1.02	1.03
Cases diverted	0.77	0.88	0.82	0.94	0.84	0.84
Cases involving secure detention	1.62	1.63	1.24	1.38	1.32	1.48
Cases petitioned	1.53	1.23	1.45	1.15	1.29	1.33
Cases resulting in delinquent findings	0.75	1.03	1.70	**	1.07	1.05
Cases resulting in juvenile justice care	**	**	**	**	1.85	1.04
Cases resulting in probation supervision	**	**	**	**	1.97	0.95
Cases resulting in probation custody	**	**	**	**	**	**
Cases resulting in secure confinement	**	**	**	**	**	0.95
Cases transferred to adult court	**	**	**	**	**	**

Note: ** - Insufficient number of cases or missing data

Source of data: http://www.hss.state.ak.us/djj/information/stats_fy2005/DMC_AncRRI.htm

Using a slightly different sample, we further examined the disproportionality that occurred at the juvenile arrest and delinquency referral stage. Our sample included 1,936 youths who resided in Anchorage and were referred to the Division of Juvenile Justice (DJJ) in Anchorage during fiscal year 2005 for new crimes, probation violations, or conduct violations (additional details are provided in Section III).

Table 3. Relative Rate Indices by Race

Race	Youth referred		Youth in population (age 10 to 17)		Rate of referrals per 1,000 youth	Relative rate index
	N	%	N	%		
White	752	38.8 %	22,308	65.7 %	33.7	—
Black	273	14.1	2,277	6.7	119.9	3.56
Native	362	18.7	2,808	8.3	128.9	3.83
Asian	121	6.3	2,041	6.0	59.3	1.76
Pacific	81	4.2	487	1.4	166.3	4.94
Other minority	77	4.0	817	2.4	94.2	2.80
Multiracial	270	13.9	3,233	9.5	83.5	2.48
Total	1,936		33,971		57.0	

Source of data: Alaska Division of Juvenile Justice (FY05) & 2000 US Census (SF1)

Table 3 shows the number of youth referred to DJJ in each racial group, the number of youth in the population in each racial group, the rate of referral per 1,000 youth in the population, and the relative rate index for each minority racial group. The relative rate index is a comparison of the minority rate of referral to the White rate of referral. As shown in Table 3, all minority rates of referral were higher than the White rate of referral. For example, the rate of referral per 1,000 youth was 119.9 for Black youth versus 33.7 for White youth. As a result, the rate of referral per 1,000 youth was 3.56 times higher for Black youth than for White youth. Overall, the rate of referral for minority youth was three times higher than the rate of referral for White youth (result not shown). Respectively, the rates of referral for Black, Native, Asian, Pacific, other

minority, and multiracial youth were 3.56, 3.83, 1.76, 4.94, 2.80, and 2.48 times higher than the rate of referral for White youth. All of these differences were highly statistically significant (as determined by Z-statistics for testing the statistical significance of the difference between two proportions from independent samples, using a two-tailed significance level of 0.05).

Table 4. Relative Rate Indices by Race, Gender, and Type of Referral

Race by Gender	New Crime		Probation Violation	
	Rate	RRI	Rate	RRI
Male				
White	38.9	—	8.4	—
Black	129.8	3.34	44.4	5.28
Native	127.6	3.28	37.3	4.43
Asian	71.7	1.85	29.5	3.50
Pacific	184.3	4.74	58.8	6.99
Other minority	88.7	2.28	24.6	2.93
Multiracial	79.0	2.03	30.0	3.57
Female				
White	18.6	—	0.6	—
Black	58.5	3.14	6.2	11.14
Native	72.2	3.87	21.2	38.15
Asian	16.6	0.89	1.0	1.76
Pacific	81.9	4.39	0.0	0.00
Other minority	73.0	3.92	2.4	4.37
Multiracial	50	2.68	7.5	13.47

Source of data: Alaska Division of Juvenile Justice (FY05) & 2000 US Census (SF1)

Additional details by race, gender, and type of referral are shown in Table 4. Overall, it was clear that disproportionate minority contact at the juvenile arrest and delinquency referral stage was not limited by gender or type of referral. Minority youth were generally overrepresented at the juvenile arrest and delinquency referral stage, regardless of gender and/or type of referral. There were only two exceptions to this finding. Asian females were referred for new crimes at a lower rate than White females and no Pacific females were referred for probation violations. Asian and other minority females were referred for probation violations at a higher rate than White females, but the differences were not statistically significant. Every other difference was statistically significant. Relative to White males, minority males always had a significantly higher rate of referral, for both new crimes and probation violations. The highest relative rate indices were for Pacific males. The rate of referral for new crimes was 4.74 times higher for Pacific males than for White males and the rate of referral for probation violations was 6.99 times higher for Pacific males than for White males. Relative to White females, Black females, Native females, and multiracial females were referred at a significantly higher rate for both new crimes and probation violations. The differences in the rates of referral for probation violations were quite large. The rates of referral for probation violations were 11.14 times higher for Black females than for White females, 38.15 times higher for Native females than for White females, and 13.47 times higher for multiracial females than for White females. The rates of referral for Asian females were not

significantly different than the rates of referral for White females. Finally, the rates of referral for Pacific and other minority females were significantly higher for new crimes only. Overall, it was clear that disproportionate minority contact was not limited by race, gender, or type of referral.

Although these results were informative, they did not lead to clear policy implications. As Pope et al. (2002:6) explain, “data on disproportionality often are adequate for identifying rather broad patterns, but inadequate for a precise understanding of which factors are most important and how these factors operate to produce the observed results.” Attempts to narrow the sources of disproportionate minority contact to specific subgroups (i.e., race, gender, or type of referral) were generally unsuccessful. These data only confirmed the magnitude of broad patterns in disproportionate minority contact.

B. Anchorage Disproportionate Minority Contact Study

Because the highest levels of disproportionate minority contact were found at the juvenile arrest and delinquency referral stage, we focused on this first step in the juvenile justice process (i.e., the referral from law enforcement to juvenile justice). Law enforcement agencies make referrals to the Alaska Division of Juvenile Justice if there is probable cause that a youth committed an offense which would be criminal if committed by an adult, committed a felony traffic offense, or committed an alcohol offense after two prior convictions for minor consuming in District Court. The Anchorage Disproportionate Minority Contact Study was designed to assess racial disparities in referrals to the Alaska Division of Juvenile Justice. We examined the utility of three different approaches to garner a more nuanced understanding of disproportionate minority contact (or disparities in referrals), hoping that these approaches would have more direct implications for theory and practice. The traditional relative rate index analyses were not sufficient to drive action. The Anchorage Disproportionate Minority Contact Study explored the utility of community involvement, geographic analyses, and longitudinal analyses. Each technique is now briefly described. These are then presented in more detail in Sections II-IV.

The importance of community involvement has long been recognized as a critical component for addressing disproportionate minority contact. As succinctly summarized by Hsia, Bridges and McHale (2004:36),

“Systems change occurs through ongoing partnerships among researchers, legislators, and juvenile justice administrators and practitioners. As researchers study trends in the administration of juvenile justice, they must collaborate with legislators and practitioners in developing policy initiatives grounded in the research results. Forging collaborative relationships with officials who shape and implement policy is essential to integrating research into an agenda of systems and institutional change. Officials who contribute to the design and implementation of the research—at least to the framing of research questions—are more inclined to embrace the research results, using them to inform administrative operations of juvenile justice agencies.”

Because the roots of disproportionate minority contact are often at the local level, disproportionate minority contact is best addressed at the local level, with support from the state and federal level. The Anchorage Disproportionate Minority Contact Study was vetted and supported by the Anchorage Disproportionate Minority Contact Initiative. As suggested by Hsia et al. (2004), the Initiative included legislators, juvenile justice administrators, and practitioners, but it also included diverse representation from local agencies and community groups. One of the strategies identified by the Initiative focused on research, evaluation, and data collection. Most of the research activities for the Anchorage Disproportionate Minority Contact Study were conducted in concert with the Initiative. The Initiative provided support for the research, assisted with the formulation and interpretation of research findings, actively disseminated research findings, and pushed for empirically-based solutions to disproportionate minority contact. Dissemination occurred in a variety of formats, including print, radio, and television. As researchers, we benefited tremendously from the Initiative. At the same time, the Initiative benefited tremendously from the research. Having both the Initiative and the Study allowed us to bridge the gap between practitioners and researchers. A detailed account of this mutually beneficial relationship is provided in Section II.

An important element of our community involvement was the addition of focus groups with youth, community groups, and school and juvenile justice officials. As in most jurisdictions, the available quantitative data were quite limited. Although the Division of Juvenile Justice maintains a statewide Juvenile Offender Management Information System (JOMIS), electronic data extractions fail to provide rich explanations for disproportionate minority contact. In the Anchorage Disproportionate Minority Contact Study, qualitative data were used to obtain a richer understanding of disproportionate minority contact. The value of qualitative methods in disproportionate minority contact research was recognized early on. As Pope and Feyerherm argued in 1995 (p. 10):

“More qualitative approaches are needed in examining minority status and juvenile justice processing. Researchers should go beyond a quantitative analysis of case records and incorporate a qualitative approach. Ideally, a triangulated research design will use a variety of quantitative and qualitative approaches.”

In the Anchorage Disproportionate Minority Contact Study, we relied on focus groups with youth, community groups, and school and juvenile justice officials. Together, they further defined the problem of disproportionate minority contact by identifying the critical issues and possible interventions and solutions.

In addition to strong community involvement, we also relied on geographic analyses of disproportionate minority contact. Feld’s (1991) exposition of justice by geography clearly emphasized the need to understand geographic variations in juvenile justice processes. The impact of geographic variation on disproportionate minority contact has also been recognized. The Office of Juvenile Justice and Delinquency Prevention’s (2006) Disproportionate Minority Contact Technical Assistance Manual briefly mentions the importance and value of geocoding and community mapping. These

data analytic techniques allow the identification of geographic regions (or target areas) with the highest levels of disproportionate minority contact. Understanding where disproportionate minority contact occurs can provide important insights into the causes of disproportionate minority contact and can assist in the creation of promising solutions. In the Anchorage Disproportionate Minority Contact Study, we examined variations in disproportionate minority contact by census tract. Using this very small geographic unit, we examined variations in disproportionate minority contact *within* a single jurisdiction (rather than across jurisdictions). Disproportionate minority contact was measured by referrals to the Alaska Division of Juvenile Justice. The purpose of this analysis was to very narrowly identify where the highest levels of disproportionate minority contact were occurring. If disproportionate minority contact occurred only in specific geographical areas, then our efforts should naturally focus on these specific areas. We should focus on both the characteristics of these areas (e.g., lack of pro-social opportunities for youth) and characteristics of justice responses to these areas (e.g., greater likelihood of formal rather than informal social controls). Reducing disproportionate minority contact elsewhere would have little effect on overall rates of referral for minority youth. To be most effective, reductions in disproportionate minority contact should concentrate on the greatest sources of disproportionate minority contact.

We also hypothesized that the likelihood of disproportionate minority contact would vary by offender group. Since Wolfgang et al.'s (1972) birth cohort studies, both researchers and practitioners recognized that not all delinquents were the same. In particular, chronic delinquents represented a small group of offenders who accounted for the majority of recorded offenses. Using longitudinal models, offenders can be categorized into groups that share common developmental histories. Identifying different groups of offenders allowed us to examine the groups with the highest levels of disproportionate minority contact. This has important policy implications because it provides significantly more information than relative rate indices. For example, it has the potential to identify whether disproportionate minority contact is more likely in low offending groups or in high offending groups. In addition, it has the potential to identify when disproportionate minority contact begins. We can, for example, examine whether disproportionate minority contact is more likely to occur among youth who begin to offend early in life than among youth who begin to offend at a later age. All of these findings were important from a policy perspective because interventions to prevent disproportionate minority contact should target the offending groups with the highest levels of disproportionate minority contact. In the Anchorage Disproportionate Minority Contact Study, we therefore examined what the offending groups were and then assessed the extent of disproportionate minority contact in each group. Again, disproportionate minority contact was measured by referrals to the Alaska Division of Juvenile Justice. These results, presented in Section IV, provide details that have more direct policy implications than the relative rate indices previously summarized.

To summarize, the Anchorage Disproportionate Minority Contact Study advanced the research on disproportionate minority contact by forging strong community involvement, by examining the geography of disproportionate minority contact, and by exploring the development of disproportionate minority contact in different offending groups. These three investigative strategies were deemed important because they had the potential to more directly impact our understanding of disproportionate minority contact

than relative rate analyses. In this final report, we provide a more detailed overview of each component within the Anchorage Disproportionate Minority Contact Study and provide examples for each component. We hope that this report will illustrate the benefits of our approach to addressing disproportionate minority contact. In Anchorage, these results provided a strong platform for the Disproportionate Minority Contact Initiative to develop empirically-based interventions and solutions. The Initiative and its activities are now presented in Section II.

Section II

Community Involvement

Strong community partnerships are critical components of disproportionate minority contact (DMC) research. As Pope et al. (2002:8-9) argued, “the national DMC agenda should include and emphasize the development of local partnerships at jurisdiction/community levels” because “such local initiatives are likely to generate policies and actions tailored to local needs and relevant to the local context.” In addition, Pope et al. (2002) further argued for strong sustained partnerships between DMC researchers and practitioners. More specifically, they argued that “Federal and State research agendas should strive to develop and nourish infrastructures that will ensure such ongoing partnerships between DMC researchers and practitioners to maximize the utility of DMC research” (Pope et al., 2002:10). The Anchorage DMC Study benefited tremendously from its association with the Anchorage DMC Initiative. As Pope et al. (2002) had hypothesized, the collaborative relationship between researchers and practitioners provided significant advances in both research and practice. Community involvement allowed us to bridge the gap between practitioners in the Initiative and researchers in the Study. Together, we had a common goal – to reduce disproportionate minority contact in Anchorage.

The relationship between the Anchorage DMC Initiative and the Anchorage DMC Study was further strengthened when other workgroups and initiatives included disproportionate minority contact within their strategic plans. By ensuring that race and minority concerns were considered, the Anchorage DMC Initiative and Study affected the development of the Tri-Borough Anti-Gang and Youth Violence Policy Team and Anchorage United for Youth. The coalescence of these teams and initiatives provided a unique opportunity to formalize relationships between researchers and practitioners in addressing disproportionate minority contact. These partnerships also provided excellent opportunities for the dissemination and interpretation of research results. Practitioners from the Initiative joined researchers from the Study to actively disseminate results in a variety of formats, both locally and nationally. At the same time, these partnerships allowed practitioners to guide the Anchorage DMC Study. Through these mutual exchanges, the Anchorage DMC Initiative gained the ability to ensure that strategies designed to reduce disproportionate minority contact were data-driven. Because of the importance and success of community involvement, our collaborative partnerships are described in greater detail, beginning with the Anchorage DMC Initiative.

A. Anchorage Disproportionate Minority Contact Initiative

The Anchorage DMC Initiative was formed by practitioners in 2005 to address disproportionate minority contact with the juvenile justice system in Anchorage, Alaska. Key partners on the Anchorage DMC Initiative include diverse individuals from varied community and governmental agencies. These include the Alaska Division of Juvenile Justice, the Alaska Juvenile Justice Advisory Committee, the Alaska Court System, the

Anchorage District Attorney's Office, the Alaska Public Defender Agency, the Alaska Office of Public Advocacy, the Alaska Office of Children's Services, the Anchorage Police Department, the Anchorage Community Police Relations Task Force, the Anchorage School District, its Minority Educational Concerns Committee, the Anchorage School Board, the Anchorage Assembly, the Anchorage Parks and Recreation Commission, the Anchorage Anti-Gang and Youth Violence Policy Team, the University of Alaska Anchorage, the Anchorage Equal Employment Office, the Anchorage Human Rights Commission, the Alaska Native Justice Center, Cook Inlet Tribal Council, the Native Village of Eklutna, the Polynesian Association of Alaska, Bridge Builders, Boys and Girls Clubs of Southcentral Alaska, Volunteers of America Alaska, the Anchorage Youth Development Coalition, United Way of Anchorage, Reclaiming Futures of Anchorage, the Pride Club, Communities in Schools, the Alaska Initiative for Community Engagement, Nine Star Education and Employment Services, and the Anchorage Youth Court.

One of the goals of the Anchorage DMC Initiative is to systematically address disproportionate minority contact in the juvenile justice system using a data-driven process. While recognizing the need to avoid 'analysis paralysis,' the Anchorage DMC Initiative also emphasizes the need for solutions to disproportionate minority contact to be data-driven and empirically supported. As part of this effort, practitioners in the Anchorage DMC Initiative provided significant support to the researchers in the Anchorage DMC Study. At the same time, the Anchorage DMC Study augmented the Anchorage DMC Initiative by supplying important data on disproportionate minority contact. Together, the Anchorage DMC Initiative and Study orchestrated efforts to engage others in the development of strategic plans (described in Section II.B), to organize key community events (described in Section II.C), and to conduct focus groups with youth, community groups, and school and juvenile justice officials (described in Section II.D). Most importantly, the Anchorage DMC Initiative and Study worked together to disseminate results and to influence both policy and practice.

B. Strategic Plans to Reduce Disproportionate Minority Contact

Through its activities and with support from the Anchorage DMC Study, the Anchorage DMC Initiative identified seven key strategies for its strategic plan:

- (1) Family support and engagement,
- (2) Stronger community involvement and relations with justice system,
- (3) Stronger cultural understanding and resources,
- (4) Improved school environment,
- (5) Greater network of after-school and employment opportunities,
- (6) Research, evaluation, and data collection, and
- (7) Governance and support.

Details on each strategy and their objectives are provided in Table 5. Many of the strategies outlined by the Anchorage DMC Initiative were subsequently supported by other groups and initiatives including the Tri-Borough Anti-Gang and Youth Violence Policy Team and Anchorage United for Youth².

² A joint report from the Tri-Borough Anti-Gang and Youth Violence Policy Team and Anchorage United for Youth is available at <http://www.muni.org/mayor/gangs.cfm>, retrieved in February 2009.

Table 5. Strategies and Objectives for Anchorage DMC Initiative

Strategy	Objectives
<p>1. Family support and engagement: To impact DMC by responding to the basic needs of youth and families and assist them in navigating the juvenile justice and social service systems</p>	<ul style="list-style-type: none"> • Develop a Family Assessment and Support Center • Early identification • Proper assessment of family functioning • Family input in decision-making • Strength-based approach to assessment and case planning • Addressing family resource needs to enhance participation in progress • Education and advocacy to navigate systems of care and accountability
<p>2. Stronger community involvement and relations with justice system: To impact DMC by building connections and support between the community and juvenile justice agencies</p>	<ul style="list-style-type: none"> • Increase number of minorities employed with justice system agencies • Reduce barriers to services (e.g., transportation) • Community-based / neighborhood solutions to delinquency issues • Connect homeless youth with community and family support systems • Develop media resources to inform community about juvenile justice system efforts and activities in community
<p>3. Stronger cultural understanding and resources: To impact DMC by embracing the diversity of culture and language in the community</p>	<ul style="list-style-type: none"> • Developing a pool of translators (language) for various situations, including phone calls, face-to-face meetings, and court hearings • Developing a pool of cultural translators • Multicultural education and training for professionals and the community • Begin a cultural community fair
<p>4. Improved school environment: To impact DMC through enhancing school resources to engage all students</p>	<ul style="list-style-type: none"> • Non-traditional options for suspended and expelled students • Expand informal solutions to student issues; youth-to-youth outreach/peer mediation • Earlier response when youth present with issues/concerns • Revive “community schools” concept and/or develop smaller units within schools • School counselors in all schools • Social worker in all schools • Develop resource coordinators within schools to tie children, youth, and families to available services • Meet nutrition/food needs of children and youth in school
<p>5. Greater network of after-school and employment opportunities: To impact DMC by engaging youth in meaningful opportunities for recreation and employment</p>	<ul style="list-style-type: none"> • Positive and accessible activities for youth after school • Locate after-school opportunities in the schools • Increase mentoring opportunities for youth • Youth outreach – peer mediation • provide opportunities for youth to develop positive values with respect to family and community • More youth input in development of youth activities and opportunities • Tutors for children and youth • Meet nutrition/food needs of children and youth after school
<p>6. Research, evaluation, and data collection: To impact DMC through research and evaluation to facilitate informed decision-making and maximize the effectiveness of financial and personal resources</p>	<ul style="list-style-type: none"> • Statutory provisions for automatic waiver to the criminal system for certain juveniles • Gathering more information about probation violations and conduct violations • Greater youth and family input in developing DMC solutions
<p>7. Governance and support: To impact DMC by committing time and resources to keep the planning, implementation and evaluation process moving forward</p>	<ul style="list-style-type: none"> • Develop a Memorandum of Understanding between DMC partners • Develop small staff/professional support system to help speed up planning and implementation process

Source of data: Anchorage Disproportionate Minority Contact Initiative

The Tri-Borough Anti-Gang and Youth Violence Policy Team includes representatives from the U.S. Attorney’s office, the Municipality of Anchorage Mayor’s

Office, the Kenai Peninsula Borough Mayor's Office, the Matanuska-Susitna Borough Mayor's Office, the Anchorage School District, the Kenai Peninsula Borough School District, the Matanuska-Susitna Borough School District, the Municipality of Anchorage Police Department, the Municipality of Anchorage Prosecutor's Office, the Municipality of Anchorage Department of Health & Human Services, the Anchorage District Attorney's Office (State of Alaska, Department of Law), the Department of Corrections (State of Alaska), the Division of Juvenile Justice (State of Alaska, Department of Health & Social Services), and the University of Alaska Anchorage Justice Center. In addition, the Policy Team includes six community members (including a non-profit representative, a business representative, and a faith-based representative) and two ex-officio members (a Presiding Judge and Children's Court Master from the State of Alaska Judiciary). The Anchorage Municipal Assembly passed in May 2007 a resolution to endorse the work of the Anti-Gang and Youth Violence Policy Team to reduce gang-related and youth violence.

The Policy Team includes three sub-committees, each with workgroups. The prevention sub-committee includes a family support and engagement workgroup, a media and public education workgroup, and a positive youth development workgroup. The intervention sub-committee includes a workgroup on safe places and youth alternatives and a workgroup on school engagement. The law enforcement sub-committee includes a community justice center workgroup, a community policing workgroup, and a legislation workgroup. Several of the key strategies identified by the Tri-Borough Anti-Gang and Youth Violence Policy Team also appear in the strategic plan for the Anchorage DMC Initiative.

Anchorage United for Youth is a broad network of individuals and agencies united to help youth graduate from high school and reduce substance use and violence. Agencies that have officially endorsed the goals and objectives of the plan include Abused Women's Aid in Crisis (AWAIC), Alaska Job Corps (Anchorage Office), the Alaska National Guard Child and Youth Program, the Alaska Pride Program, the Alaska Youth and Family Network, the Alaska Youth and Parent Foundation, the American Diabetes Association, Anchorage Community Mental Health Services, the Anchorage Park Foundation, the Anchorage School District, Anchorage Youth Court, the Anchorage Youth Development Coalition, Assets, Inc., the Association Alaska School Boards, Big Brothers Big Sisters of Alaska, the Great Alaska Council of Boy Scouts of America, Boys and Girls Clubs of Alaska, the Alaska Council of CampFire USA, Challenge Alaska, Cook Inlet Region, Inc., the Food Bank of Alaska, Leaders Involved Furthering Education (LIFE), the Municipality of Anchorage, Nine Star Enterprises, Inc., Reclaiming Futures, the Spirit of Youth Foundation, the State of Alaska Division of Behavioral Health, the State of Alaska Division of Juvenile Justice, the State of Alaska Office of Faith-based & Community Initiatives, United Way of Anchorage, the University of Alaska Anchorage Justice Center, the U.S. Attorney's Office, and Volunteers of America of Alaska.

Anchorage United for Youth aims to reduce substance use, decrease delinquency, and increase high school graduation through environmental strategies, family support, supportive adult relationships, meaningful opportunities and youth development, substance use interventions, and delinquency / disengagement interventions. Addressing

disproportionate minority contact was included as an important intervention for delinquency and truancy (or school disengagement).

By incorporating components of the strategic plan from the Anchorage DMC Initiative in both the Tri-Borough Anti-Gang and Youth Violence Policy Team and Anchorage United for Youth, the Initiative gained tremendous local support and ensured that cultural and minority concerns were not inadvertently omitted from other strategic plans. In particular, key objectives in Table 5 related to supportive adult relationships, meaningful opportunities, and effective interventions for delinquent and truant youth were referred to the Anchorage United for Youth plan, where they were strengthened and formalized. As part of that process, the Anchorage DMC Study assisted with the setting of measurable goals for program and population success.

The coalescence of these three strategic plans – from the Anchorage DMC Initiative, the Tri-Borough Anti-Gang and Youth Violence Policy Team, and Anchorage United for Youth – was an important local development in successfully addressing disproportionate minority contact. At the same time, it was an important development for the Anchorage DMC Study. The broad representation of individuals and agencies behind these strategic plans provided an excellent avenue for the presentation and interpretation of research results, ensuring that actions would be data-driven. They also provided an excellent opportunity for the local community to have an input in disproportionate minority contact research and for the local community to comment and respond to research. These opportunities were best formalized with community forums on disproportionate minority contact and focus groups.

C. Community Forums

The Anchorage DMC Initiative supported three key events related to the Anchorage DMC Study. These included a disproportionate minority contact forum in June 2006, strategic planning sessions in September and October 2007, and a second forum in July 2008. These community forums were important avenues to present research from the Anchorage DMC Study. Geographic analyses were presented at the first forum. Longitudinal and qualitative analyses were presented at the second forum. Together these presentations were useful to drive data into action and to solidify a strategic plan to reduce disproportionate minority contact. The forums were also useful to provide qualitative explanations for quantitative results. As part of each forum, time was allocated for reflections on the data presentations.

The first forum in June 2006 provided an overview of all geographic analyses of disproportionate minority contact in Anchorage (summarized in Section III). The forum began with an introduction where participants learned about disproportionate minority contact and federal, state, and local efforts to address the disproportionate number of minority youth entering the juvenile justice system. It was followed with a detailed presentation on the geography of disproportionate minority contact. These formal presentations were followed by focus group work and large group activities. Focus groups were utilized for community members to offer their reflections on the data and insights on the struggles of minority youth. Focus group participants were asked to reflect on the research results and to offer ideas and explanations for the patterning of results. Large group activities were then used to reassemble and review the work of the

smaller groups. At the same time, large group activities were used to galvanize local communities to envision, support, and implement data-driven solutions.

In July 2008, the Second Forum on Minority Overrepresentation in the Juvenile Justice System was convened by the Anchorage DMC Initiative. The Forum was sponsored by the University of Alaska Anchorage Justice Center in cooperation with the Alaska Department of Health and Social Services Division of Juvenile Justice, the Alaska Juvenile Justice Advisory Committee, the Alaska Native Justice Center, the Anchorage Police Department, the Anchorage School District, and the Municipality of Anchorage. Key results from the longitudinal and qualitative analyses were presented. The Forum also included presentations from Dr. Finn Esbensen (University of Missouri – St. Louis) on youth gangs and gang-involved youth and from Dr. Elmar Weitekamp (University of Tuebingen) on recent developments in victim-offender mediation. The Forum concluded with discussions of what we were doing and what we hoped to accomplish.

Through these Forums, the Anchorage DMC Study gained the ability to formally join the Anchorage DMC Initiative to disseminate findings. The Anchorage DMC Initiative gained the ability to ensure that its actions were data-driven. The Forums also provided an opportunity for practitioners to guide the research process and for researchers to gain interpretations of both quantitative and qualitative research results. In addition to these three key events, results were also disseminated locally with the Anchorage Minority Community Police Relations Task Force and nationally at the Annual Disproportionate Minority Contact Conference and the Oregon Summit on Eliminating Disproportionate Minority Contact in the Juvenile Justice System. In all of these activities, we actively disseminated information about the collaborative effort between researchers in the Anchorage DMC Study and practitioners in the Anchorage DMC Initiative. An important catalyst for community involvement was the addition of focus groups with youth, community groups, and school and juvenile justice officials. These are now described in the next section.

D. Focus Groups

Community outreach and active involvement was a critical strategy to increase understanding of disproportionate minority contact and ultimately create reasonable policies to address the issue. The Anchorage Disproportionate Minority Contact Study used focus group as one method to sustain community participation while gathering information on community perceptions of the disproportionate minority contact problem. More specifically, we conducted focus groups of community members, juvenile probation officers, assistant vice principals, and youth. These different groups were selected because they have some knowledge, experience or concerns with the issue of disproportionate minority contact. Although each group shares a common concern with the problem of disproportionate minority contact, they each have a unique perspective on the problem. The focus group questions were designed to capture these different perspectives in defining the problem of disproportionate minority contact within the Anchorage community and in developing possible interventions and ultimately solutions to the universal and enduring problem of disproportionate minority contact.

The most significant and policy relevant finding generated from the focus groups concerns the understanding of what are interpreted as the causes of disproportionate

minority contact. Although investigators often take the definition of disproportionate minority contact for granted, it is clear that different groups see the problem differently. Not surprisingly, individual views are shaped by social and cultural networks and by the structured relationships to disproportionate minority contact.

Juvenile probation officers have the most formal relationship to the problem of disproportionate minority contact and their views are shaped by their vantage point within the juvenile justice system. It is commonly assumed that their role includes at least some responsibility to do something about the problem of delinquency generally and the problem of disproportionate minority contact specifically. They are aware that some research has suggested that one source of disproportionate minority contact is the operation of the juvenile justice system itself. It is therefore significant that when asked about the causes of disproportionate minority contact and corresponding interventions, they identified the role of the family and family interventions as most critical – both as an explanation for disproportionate minority contact and a point of intervention. At the same time, they tended to minimize the importance of the juvenile justice system feeling that such differential contact reflected differential offending. In the area of system improvements, most acknowledged the critical importance of the schools. Specifically, most felt that information sharing with the schools was limited, not timely, and lacked the necessary coherence to understand the life trajectories of the youth who end up in secure detention.

To complement the system views of the juvenile probation officers, we conducted focus groups of Assistant Vice Principals for middle schools in Anchorage. One of the primary responsibilities of Vice Principals is to respond to disciplinary problems and to be liaisons with the juvenile justice system. When asked what they felt were some of the primary factors that could explain disproportionate minority contact, they instantly mentioned socio-economic status and family structure. Many argued that the ability of the family to understand and engage the juvenile justice system was critical in keeping youth from being formally processed and sanctioned. Based on their experiences and observations, it seemed clear that poor families lacked the time, resources and sophistication to interact effectively with the juvenile justice system. Additionally, they felt that this was compounded by past negative experiences with schools and the juvenile justice system that undermined their willingness to trust that anything good could result from their participation.

Focus groups of different racial/ethnic community groups were also included within the community involvement portion of the Anchorage Disproportionate Minority Contact Study. Because Alaska Natives are the primary minority group overrepresented in the Alaska Juvenile Justice System, we conducted focus groups of Alaska Native community members. These members were specifically selected for participation based on their having some experience and/or knowledge of the issue of disproportionate minority contact. Although acknowledging the importance and role of the family, the members of this group felt that the most important factors explaining disproportionate minority contact were the problems of rural to urban migration and the lack of cultural understanding on the part of schools and the juvenile justice system. This reveals an interesting contrast, in perceptions of the problem, between two groups intimately involved in the problem of disproportionate minority contact. It quite starkly

demonstrates that different groups have different perceptions of the problem and that these logically suggest alternative policy solutions.

Several focus groups of youth were conducted. The youth participants included those in secure detention and other youth in the community with some having experience with the juvenile justice system and others with none. Somewhat surprisingly, the youth offered the broadest and most varied perspectives on the problem of disproportionate minority contact. In particular, youth felt that family and community influences undermined their self efficacy. Disrupted and dysfunctional families limited their options and several indicated they felt little choice in many decisions. As an example, several youth revealed that they may not graduate from high school because they will, as they see it, have to drop out and get a fulltime job to help support their family financially. Although they had positive feelings about their neighborhood, they felt that others perceived it negatively and they felt some stigma from these wider community views. They agreed with the perception that their neighborhood lacked resources and the social and cultural capital they saw in other areas of the community. Few of the community youth focus groups seemed to feel in control of their fate.

The focus group of youth in secure confinement was revealing and disturbing but also hopeful. None of the youth participating in the focus group offered excuses and all accepted responsibility, at least verbally, for their circumstances. Their perceptions of the issues surrounding disproportionate minority contact are complex and capture all of what was identified by others. The strongest and most widely held perception was of bias within the schools and juvenile justice system. Their comments revealed a sense that at some point in time they had been labeled as trouble and that after that time they were treated differently. At that point, and to some degree even before, everyone expected them to fail. This was nearly a universal perception that ultimately society and the system expected them to fail. To some extent, this is what youth in secure confinement saw in their future. What is more hopeful is that while they perceive bias in the system, they all mentioned teachers or probation officers who have treated them fairly, who believed in them, and who made a difference in their lives.

Policies and interventions to eliminate the problem of disproportionate minority contact in the juvenile justice system have had limited success for many reasons. One critical reason is a lack of appreciation of how all the people involved with the problem understand the problem. Objective assessment is necessary and tells us much about this problem, but the subjective understanding of the various individuals involved is necessary to shape successful long term solutions. Many of the accomplishments of the Anchorage Disproportionate Minority Contact Study relied on strong community involvement and focus groups were instrumental to solidify strong community partnerships. At the same time, these provided substantial clarity on perceived causes and solutions for disproportionate minority contact.

Section III

Geography of Disproportionate Minority Contact

Many significant problems have been effectively solved when examined from a geographical perspective. An early example includes the containment of the London cholera epidemic of 1854 after John Snow geographically mapped the incidence of deaths due to cholera and linked those deaths to the presence of various water pumps in London. As noted by Scott Crosier with the Center for Spatially Integrated Social Science³, “Snow's classic study offers one of the most convincing arguments of the value of understanding and resolving a social problem through the use of spatial analysis.” But while spatial analysis has proven itself to be a useful epidemiological tool, it has rarely been used to study disproportionate minority contact.

It is important to understand where disproportionate minority contact is occurring because if disproportionate minority contact is geographically concentrated, our efforts to reduce disproportionate minority contact should be also be geographically concentrated, or geographically congruent. We should focus on both the characteristics of the areas with the highest levels of disproportionate minority contact (e.g., lack of pro-social opportunities for youth) and the characteristics of justice responses in these areas (e.g., greater likelihood of formal rather than informal social controls). Efforts to reduce disproportionate minority contact will be less effective if they are not targeted where the highest levels of disproportionate minority contact exist. To be most effective, reductions in disproportionate minority contact should concentrate on the greatest sources of disproportionate minority contact.

In part, the rarity of spatial analyses is due to the ‘small sample size’ problem – a problem that occurs when the number of referred youth from a specific racial group is small and/or when the population at-risk from a specific racial group is small. Statistically speaking, these situations are problematic because of resulting instability in the variance of rates (Anselin, Lozano, & Koschinsky, 2006). The precision of rate estimates varies by the size of the population at risk in each geographical unit. Geographical units with small populations at risk produce imprecise raw rates. The Office of Juvenile Justice and Delinquency Prevention, in their relative rate index template, summarized the ‘small sample size’ problem as follows:

“The Relative Rate Index is based on the computation and comparison of rates. Under some circumstances these rates may be computed based on small numbers, which makes the rates relatively unreliable. In general, rates based on five or fewer events from a possible base of 50 or fewer potential events should be viewed with caution. In the individual work sheets for each race / ethnic group, a column appears which indicates whether the data meets these standards.”

³ <http://www.csiss.org/classics/content/8>, retrieved in February 2009.

In the disproportionate minority contact literature, ‘small sample size’ problems have traditionally been addressed by not analyzing geographical areas, jurisdictions, or racial groups where the populations at-risk are small (e.g., when they include fewer than 50 cases or represent less than one percent of the total population). Alternatively, geographical areas, jurisdictions, and racial groups are merged to increase sample size (e.g., into ‘other race’ categories). These approaches are totally unsatisfying because areas, jurisdictions, and racial groups with small populations at-risk may be precisely those with highest levels of disproportionate minority contact. Although they may contribute little to overall levels of disproportionate minority contact (because of their low sample sizes), high levels of disproportionate minority contact in small populations should not be ignored and do have important policy implications.

To resolve this ‘small sample size’ problem, we examine relative empirical Bayes (EB) rate indices that are ratios of two empirical Bayes rates. Given that this relative EB rate index has never been used in disproportionate minority contact research, a bit of (technical) justification and explanation is provided in Appendix A. Standard relative rate indices are just ratios of two raw rates. Similarly, the relative EB rate index is a ratio of two EB rates. EB rates have been used extensively in epidemiology to study rates of rare events in small populations (Marshall, 1991; Leyland and Davies, 2005). A primary advantage of EB rates is that they are less susceptible to variance instability problems than raw rates. As a result, we gain the ability to examine disproportionate minority contact in geographical areas, jurisdictions, and racial groups with small populations at-risk. Second, we gain the ability to detect true outliers. Outliers are geographical areas with unusually high levels of disproportionate minority contact. The primary limitation of EB rates is that they are far less interpretable than raw rates. They are best interpreted as measuring the risk of contact, rather than the rate of contact. Similarly, relative EB rate indices are less interpretable than relative rate indices. They are best interpreted as differences in the risk of contact, rather than differences in the rate of contact.

For our purposes, the advantages of the relative EB rate index far outweighed the loss of interpretability. Many jurisdictions have similar problems with ‘small sample size’ or data sufficiency. The relative EB rate provides an efficient (though somewhat technically challenging) solution to this problem. It allows us to examine differential rates that cannot be reliably examined using raw rates. In this section, we examine the levels of disproportionate minority contact in the 55 census tracts within the Municipality of Anchorage. We describe the sample and data, summarize our analyses (additional details are available in Appendix A), present our results, and conclude with a summary. Although we discussed community involvement in a separate section, it is important to emphasize that all of the Study’s analyses were informed by practitioners in the Anchorage DMC Initiative. In addition, researchers from the Study and practitioners from the Initiative joined forces to disseminate results and to generate empirically-based solutions to disproportionate minority contact.

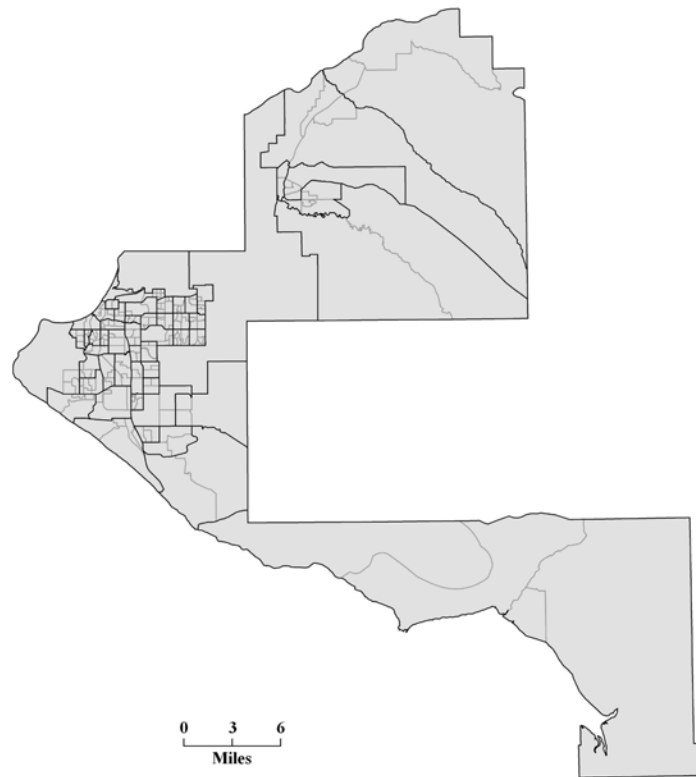
A. Sample and Data

The sample selected for this analysis included all youths referred to the Division of Juvenile Justice in Anchorage in fiscal year 2005 (7/1/04 to 6/30/05). Law enforcement agencies make referrals to the Alaska Division of Juvenile Justice if there is

probable cause that a youth committed an offense which would be criminal if committed by an adult, committed a felony traffic offense, or committed an alcohol offense after two prior convictions for minor consuming in District Court. The geographic analyses of disproportionate minority contact examine disparities by race in the referral of youth to the Alaska Division of Juvenile Justice. Three sources of data were utilized – geographic, census, and juvenile justice data. Each is now described in greater detail.

All geographic data were obtained from an ArcMap shape file of U.S. census tracts for the Municipality of Anchorage that was purchased from Geographic Information Services (Information Technology Department, Municipality of Anchorage). Census tracts are defined by the U.S. Census as “small, relatively permanent statistical subdivisions.” Within the Municipality of Anchorage, there are 55 census tracts. These census tracts averaged 3.89 block groups ($s = 1.36$) and 4,732 inhabitants ($s = 1,577$). Census tracts for the Municipality of Anchorage are displayed with dark outlines in Figure 3 (lighter outlines show the census block groups within each census tract).

Figure 3. Census Tracts in Municipality of Anchorage



Demographic data for each census tract were obtained from Summary File 1 of the 2000 U.S. Census (<http://www.census.gov>). Summary File 1 includes detailed information on race and age at the tract level. Although these data are several years old, they offer the best available demographic information at the census tract level of geographic aggregation. Tables P12A to P12G were utilized to calculate the number of juveniles, age 10 to 17, in each racial group. Respondents were asked to self-report their

race and were allowed to identify multiple racial groups. Race categories included White only (i.e., White with no other racial group identified), Black only, American Indian and Alaska Native only, Asian only, Native Hawaiian and other Pacific Islander only, some other race only, and two or more races. Hereinafter, these categories are referred to as White, Black, Native, Asian, Pacific, Other, and Multiracial.

The number of individuals in each racial group (age 10 to 17) was computed for each census tract. All census data were then merged with the geographic data. In Table 6, we provide basic descriptive statistics on the racial composition of the census tracts. For each racial group, there is at least one census tract that fails to meet the minimum sample size required to calculate a reliable raw rate.

Table 6. Composition of Census Tracts by Race

Racial Group	Number of 10-17 Year Olds per Census Tract			
	Minimum	Maximum	Mean	St. Dev.
White	24	1364	405.6	266.0
Black	0	152	41.4	38.8
Native	3	156	51.1	34.0
Asian	0	237	37.1	40.2
Pacific	0	72	8.9	12.7
Other	1	58	14.9	11.6
Multiracial	9	134	58.8	28.6

Source of data: 2000 US Census (SF1)

All juvenile data were electronically retrieved from the Juvenile Offender Management Information System (JOMIS) maintained by the Division of Juvenile Justice (Department of Health and Social Services, State of Alaska). For each of the 2,098 referrals to the Division of Juvenile Justice in Anchorage during fiscal year 2005, we retrieved the juvenile's race. Race was coded following the previously described U.S. Census categorizations. For each referral, we also gathered the youth's residential address at the time of the referral. Because some addresses may not be updated immediately at the referral, we selected the last known address at the time of the first hearing after the referral. Our sample of 2,098 referrals was then limited to include only referrals from youths in Anchorage. Nine referrals (0.4%) were eliminated because no address information was available. Of the remaining 2,089 referrals, five (0.2%) were eliminated because the youths resided outside of Alaska. Of the remaining 2,084 referrals, 98 (4.7%) were eliminated because the youths resided outside the Municipality of Anchorage. This created a sample of 1,986 youths who resided in Anchorage. Of these 1,986, we were able to successfully geo-code 1,977 addresses (99.5%). The other nine did not match a known residential address. Finally, we selected only youths who had been referred for new crimes, probation violations, or conduct violations. This eliminated eight youths. We also eliminated 33 youths whose race was unknown. Our final sample therefore included 1,936 youths who resided in Anchorage and were referred to the Division of Juvenile Justice in Anchorage during fiscal year 2005 for new crimes, probation violations, or conduct violations.

B. Analysis

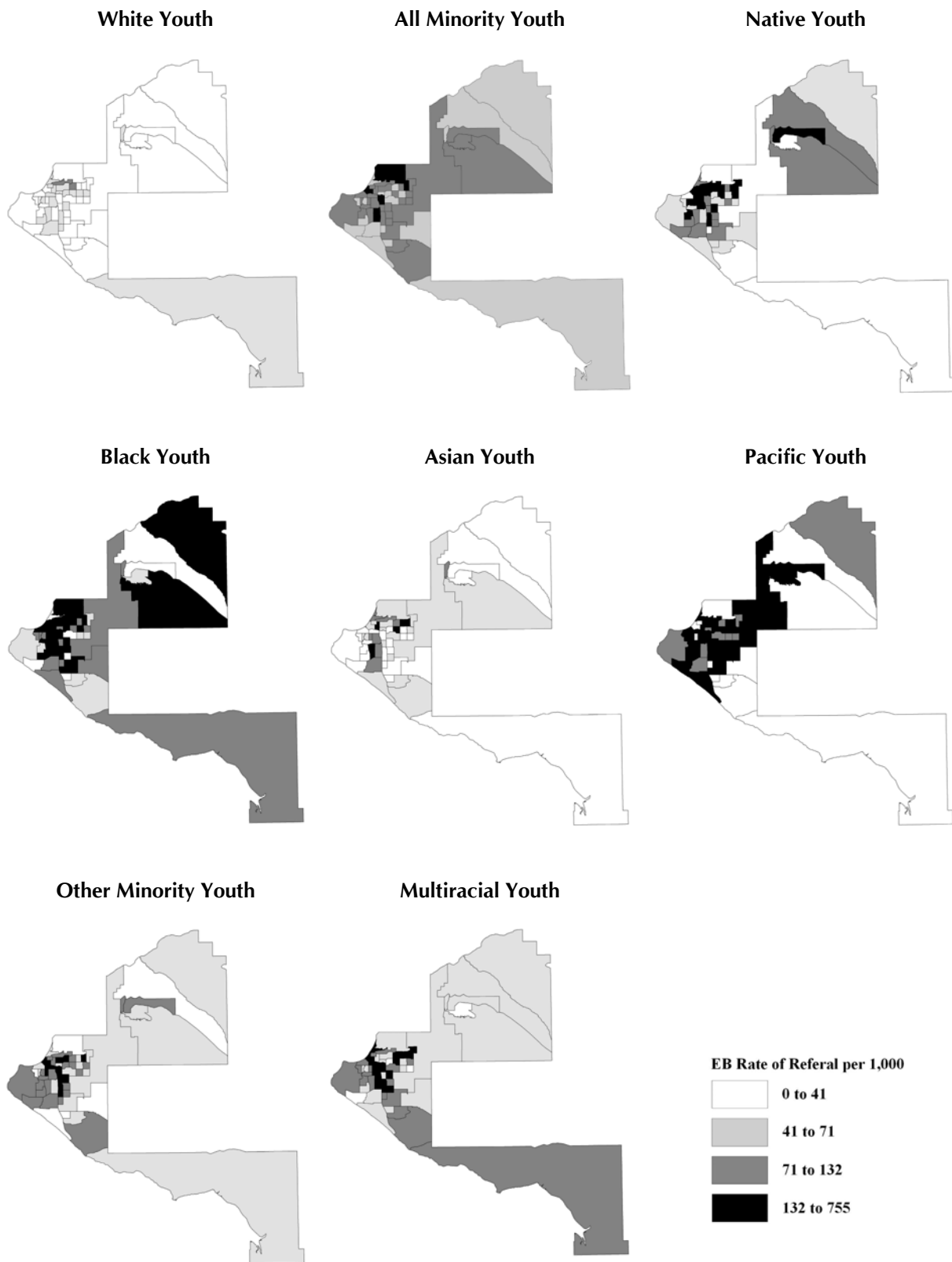
We first calculated the EB rates of referral by race, for White youth, all minority youth, Native youth, Black youth, Asian youth, Pacific youth, other minority youth, and multiracial youth. EB rates of referral were calculated using Luc Anselin's *GeoDa* (freely available at <http://geodacenter.asu.edu/>). While the rate of referral can be interpreted as a rate, the EB rate of referral is best interpreted as the risk of referral. Relative EB rate indices by race were also computed in *GeoDa*, as ratios of EB rates. All analyses were conducted at the census tract level. Rates of referral were not computed in census tracts with no at-risk population. Results were both mapped and summarized in tables. It is important to emphasize that although our statistical techniques were different, our logic was identical (i.e., instead of examining raw rates of referrals, we examined EB rates of referral; and instead of examining relative rate indices, we examined relative EB rate indices).

To examine the presence of outliers (census tracts with unusually large relative EB rate indices), we searched for census tracts whose relative EB rate index was outside the inner fence (i.e., 1.5 times the interquartile range above the third quartile). The presence of outliers was also determined using *GeoDa*. These outliers represented census tracts with unusually large levels of disproportionate minority contact for a specific racial group. It is important to emphasize that outliers cannot be compared across racial groups. Outliers for a specific racial group were census tracts where the levels of disproportionate minority contact were unusually high *for that group* (but the levels may be lower than those for *other* groups). Simply stated, what is unusual for one group may be the norm for another group. Within each racial group, outliers reveal the geographic areas with the worse levels of disproportionate minority contact (but again, the worse levels of disproportionate minority contact for one racial group may be rather low when compared to another racial group). In the results below, we simply summarize our examination of disproportionate minority contact by census tract across racial groups. The primary objective is to highlight this different approach to examine disproportionate minority contact in small populations. Additional examinations of disproportionate minority contact by gender and type of referral were also conducted, and are available on the Justice Center website at <http://justice.uaa.alaska.edu>. Because our methodology was not hindered by the 'small sample size problem,' it was possible to conduct very detailed analyses (e.g., examining the disproportionate minority contact of Asian females for probation or conduct violations in census tracts with few Asian females at-risk).

C. Results

These EB rates of referral by census tract are shown in Figure 4. Because the results are not raw rates of referral, they are best interpreted as the risk of referral. EB rates of referral were only calculated in census tracts with an at-risk population. If a specific census tract had no at-risk population, it was excluded from the analyses. Areas in white are census tracts where the risk of referral was less than 41 referrals per 1,000 youth. Areas in light gray are census tracts where the risk of referral was between 41 and 71 referrals per 1,000 youth. Areas in dark gray are census tracts where the risk of referral was between 71 and 132 referrals per 1,000 youth. Finally, areas in black are

Figure 4. EB Rates of Referrals by Race



census tracts where the risk of referral was between 132 to 755 referrals per 1,000 youth. Results clearly showed tremendous variations in the risk of referral, both by racial group and by census tract. These variations are summarized in Table 7.

Table 7. EB Rates of Referral by Race

Row Percentages

Racial Group	EB Rates of Referral								Total
	0 to 41		41 to 71		71 to 132		132 to 755		
	N	%	N	%	N	%	N	%	
White	33	60.0 %	20	36.4 %	2	3.6 %	0	0.0 %	55
Black	4	7.7	8	15.4	20	38.5	20	38.5	52
Native	7	12.7	8	14.5	15	27.3	25	45.5	55
Asian	24	44.4	17	31.5	8	14.8	5	9.3	54
Pacific	0	0.0	1	2.3	10	22.7	33	75.0	44
Other minority	4	7.3	20	36.4	17	30.9	14	25.5	55
Multiracial	6	10.9	17	30.9	23	41.8	9	16.4	55

Source of data: Alaska Division of Juvenile Justice (FY05) & 2000 US Census (SF1)

Of the 55 census tracts within the Municipality of Anchorage, the risk of referral for White youth was below 71 referrals per 1,000 youth for all but two census tracts. Only two census tracts had a risk of referral for White youth greater than 71 referrals per 1,000 youth and none had a risk of referral greater than 132 referrals per 1,000 youth. The risk of referral for most minority youth was vastly different. The risk of referral for Black youth was substantially higher. Although the risk of referral for White youth was greater than 71 referrals per 1,000 youth in only two census tracts, the risk of referral for Black youth was greater than 71 referrals per 1,000 youth in 40 census tracts. Twenty of these census tracts had a risk of referral that exceeded 132 referrals per 1,000 youth. Similarly, only seven census tracts had a risk of referral below 71 referrals per 1,000 youth for Native youth (compared to 33 for White youth). In addition, for Native youth, 25 census tracts had a risk of referral greater than 132 referrals per 1,000 youth (compared to zero for White youth). Overall, the risk of referral for Native youth was greater than the risk of referral for White youth in all but two census tracts within the Municipality of Anchorage.

The risk of referral for Asian youth across census tracts was noticeably lower than those for Black and Native youth. Nonetheless, the risk of referral for Asian youth across census tracts was still noticeably greater than the risk of referral for White youth. More census tracts had a risk of referral between 71 and 132 referrals per 1,000 youth for Asian youth than White youth (15 versus two). Similarly, more census tracts had a risk of referral between 132 and 755 referrals per 1,000 youth for Asian youth than White youth (five versus zero). The risk of referral for Pacific youth was high in many census tracts. The most striking finding was that 33 census tracts (out of 44 census tracts where Pacific youth [age 10 to 17] lived) displayed a risk of referral greater than 132 referrals per 1,000 youth. Pacific youth clearly displayed the highest risk of referral across census tracts. In the 44 census tracts where Pacific youth (age 10 to 17) lived, the risk of referral was never lower than 71 referrals per 1,000 youth (compared to 60% for White youth).

Although the population of Pacific youth was relatively small (see Table 6), Pacific youth clearly had a high risk of referral. This was generally true in all census tracts. This was an important finding because traditional methods to measure disproportionate minority contact would have ignored this ‘small’ minority group.

The risk of referral was also high for other minority youth and was high in the vast majority of census tracts. The risk of referral for other minority youth was greater than 71 referrals per 1,000 youth in 51 of the 55 census tracts within the Municipality of Anchorage (compared to 22 of the 55 census tracts for White youth). Conversely, the risk of referral for other minority youth was lower than 71 referrals per 1,000 youth in only 4 census tracts (compared to 33 census tracts for White youth). Multiracial youth also had a high risk of referral in many census tracts, spread throughout the Municipality of Anchorage. Only six census tracts had a risk of referral lower than 41 referrals per 1,000 youth (compared to 33 for White youth). All other census tracts had a risk of referral greater than 41 referrals per 1,000 youth, with 17 census tracts having a risk of referral between 41 and 71 referrals per 1,000 youth, 23 having a risk of referral between 71 and 132 referrals per 1,000 youth, and nine having a risk of referral greater than 132 referrals per 1,000 youth.

Overall, vast differences were observed between the risk of referral for White youth and the risk of referral for minority youth. In particular, while the percent of census tracts with a risk of referral to DJJ greater than 71 referrals per 1,000 youth was only 4% for White youth, it was 77% for Black youth, 73% for Native youth, 24% for Asian youth, 98% for Pacific youth, 56% for other minority youth, and 58% for multiracial youth. The risk of referral across census tracts was substantially higher for Black youth, Native youth, Pacific youth, other minority youth, and multiracial youth. But even for Asian youth, some census tracts displayed a very high risk of referral.

We then compared the EB rates of referral for minority youth to the EB rate of referral for White youth, by computing the ratio of the minority rate to the White rate (just as the relative rate index is computed). The outcome was the relative EB rate index, showing how much greater the EB rate of referral for minority youth was relative to the EB rate of referral for White youth. We interpreted the relative EB rate index as differences in risks of referral. For example, a relative EB rate index of 2.0 indicated that the risk of referral for minority youth was two times higher than the risk of referral for White youth. Results are graphically displayed in Figure 5 and summarized in Tables 8 and 9. In Figure 5, areas in white represent census tracts that were unanalyzed (because there were no at-risk youth in the population) or areas where the risk of referral was lower for minority youth than for White youth. These areas were not differentiated in Figure 5 because our interest was in identifying areas with high levels of disproportionate minority contact (they were differentiated in Tables 8 and 9). Areas in light gray are census tracts where the risk of referral was one to two times higher than the risk of referral for White youth. Areas in dark gray are census tracts where the risk of referral was two to five times higher for minority youth than for White youth. Finally, areas in black are census tracts where the risk of referral was more than five times higher for minority youth than for White youth. Results again showed tremendous variations in the relative risk of referral, both by racial group and by census tract.

Figure 5. Relative EB Rate Indices by Race

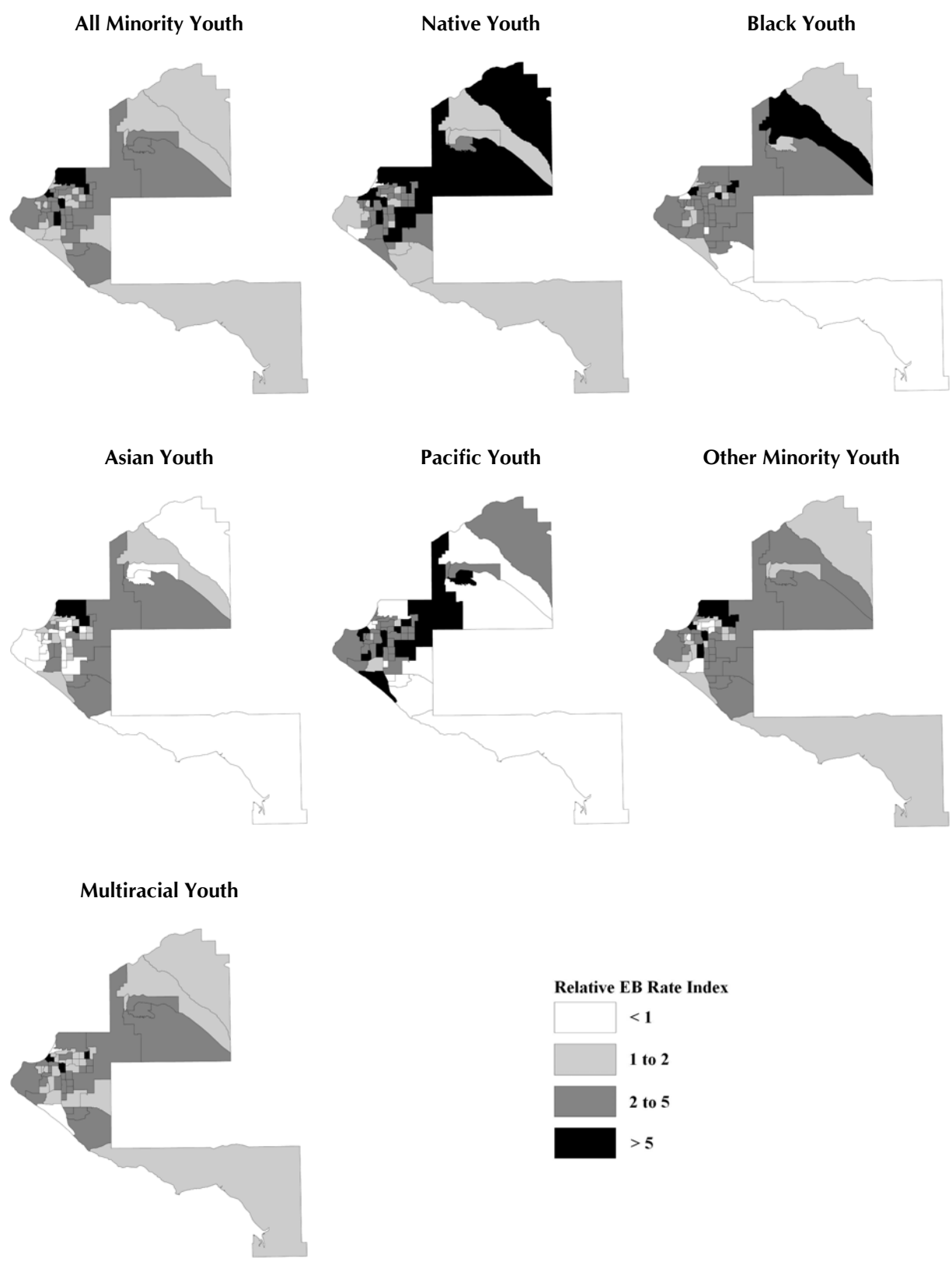


Table 8. Distribution of Relative EB Rate Indices by Race*Row Percentages*

Racial Group	Relative EB Rate Indices								Total
	Less than 1		1 to 2		2 to 5		Greater than 5		
	N	%	N	%	N	%	N	%	
Black	1	1.9	10	19.2	34	65.4	7	13.5	52
Native	2	3.6	13	23.6	27	49.1	13	23.6	55
Asian	19	35.2	17	31.5	14	25.9	4	7.4	54
Pacific	0	0.0	3	6.8	29	65.9	12	27.3	44
Other minority	5	9.1	18	32.7	25	45.5	7	12.7	55
Multiracial	2	3.6	24	43.6	26	47.3	3	5.5	55

Source of data: Alaska Division of Juvenile Justice (FY05) & 2000 US Census (SF1)

In Table 9, we provide descriptive statistics for the relative EB rate indices within each racial group. More specifically, we identify how many census tracts were included in the analysis (again, census tracts with no at-risk population were excluded). We also provide the minimum, maximum, and median relative EB rate index. Finally, we indicate how many census tracts were identified as outliers because of their unusually high level of disproportionate minority contact in each racial group.

There was only one census tract where the risk of referral for Black youth was lower than the risk of referral for White youth. In 19% of the census tracts, the risk of referral was one to two times higher than the risk or referral for White youth. The risk of referral for Black youth was two to five times higher than the risk of referral for White youth in 34 (65%) of the census tracts and was more than five times higher in seven (14%) of the census tracts. Overall, the median relative EB rate index for Black youth was 3.18. This indicates that in half of the census tracts, the risk of referral for Black youth was more than 3.18 times higher than the risk of referral for White youth. One of the census tracts was identified as an outlier because it had an unusually large relative EB rate index for Black youth. In that census tract, the risk of referral for Black youth was almost 10 times higher than the risk of referral for White youth.

Table 9. Descriptive Statistics for Relative EB Rate Indices by Race

Racial Group	Relative EB Rate Indices				
	# of Tracts	Minimum	Maximum	Median	# of Outliers
Black	52	0.67	9.93	3.18	1
Native	55	0.70	110.36	2.85	6
Asian	54	0.28	9.48	1.40	6
Pacific	44	1.33	13.21	3.93	4
Other	55	0.57	13.31	2.43	5
Multiracial	55	0.92	9.31	2.32	3

Source of data: Alaska Division of Juvenile Justice (FY05) & 2000 US Census (SF1)

The risk of referral for Native youth was lower than the risk of referral for White youth in two (4%) of census tracts, but was more than five times higher than the risk of referral for White youth in 13 (24%) of census tracts. In half of the census tracts, the risk

of referral for Native youth was more than 2.85 times higher than the risk of referral for White youth. Six census tracts were identified as having unusually large relative EB rate indices. In these census tracts, extremely high rates of disproportionate minority contact were found. In the census tract with the highest relative EB rate index, the risk of referral was 110 times higher for Native youth than for White youth. This very large and important difference was masked in the analyses presented in Section I. Clearly, using a smaller geographic unit (and overcoming the ‘small sample size’ problem) can identify areas where disproportionate minority contact levels are extraordinarily high. This analysis allows us to compare differential rates of referral in small geographic units.

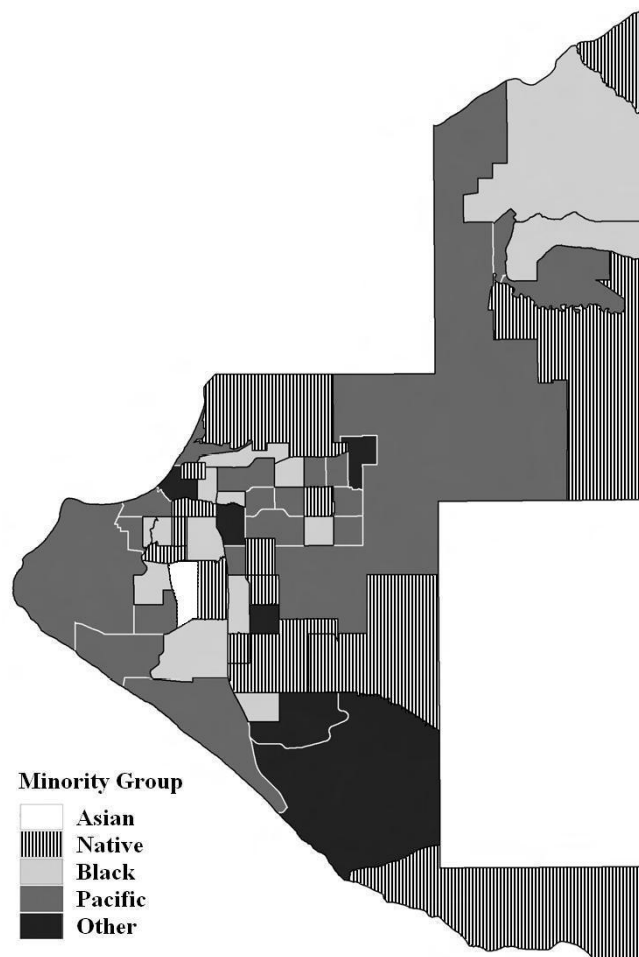
We uncovered similar evidence with Asian youth. Asian youth had the lowest relative rate index (1.76, see Section I). In addition, the risk of referral for Asian youth was lower than the risk of referral for White youth in 19 (35%) of the census tracts. In half of the census tracts, the risk of referral for Asian youth was less than 1.40 times higher than the risk of referral for White youth. Nonetheless, there were some census tracts where the risk of referral for Asian youth far surpassed the risk of referral for White youth. In four census tracts (7%), the risk of referral for Asian youth was more than five times higher than the risk of referral for White youth. In the census tract with the highest relative EB rate index, the risk of referral was 9.48 times higher for Asian youth than for White youth (the maximum relative EB rate index for Black youth was 9.93). Again, this analysis identified certain small geographical areas where disproportionate minority contact was extremely high, even among racial groups that had low levels of disproportionate minority contact overall.

There were no census tracts where the risk of referral was lower for Pacific youth than for White youth. In half of the census tracts, the risk of referral for Pacific youth was almost more than four times higher than the risk of referral for White youth. This is again an important finding because the population of Pacific youth at-risk was often very small. On average, there were 8.9 Pacific youth per census tract ($s = 12.7$, see Table 6). Not ignoring the disproportionate minority contact of Pacific youth was important because their risk of referral was more than five times higher than the risk of referral for White youth in 12 (27%) of census tracts. In the census tract with the highest relative EB rate index, the risk of referral for Pacific youth was 13 times higher than the risk of referral for White youth.

Other minority youth and multiracial youth also had high levels of disproportionate minority contact in certain census tracts. In half of the census tracts, the risk of referral was more than 2.43 times higher for other minority youth than for White youth and was more than 2.32 times higher for multiracial youth than for White youth. The highest relative EB rate index was 13.31 for other minority youth and 9.31 for multiracial youth. For both other minority youth and multiracial youth, however, there were (albeit few) census tracts where their risk of referral was lower than the risk of referral for White youth.

In Figure 5, there are clear geographical variations in relative EB rate indices across racial groups. Census tracts with high levels of disproportionate minority contact for one racial group may have lower levels of disproportionate minority contact for other racial groups. The minority group with the highest relative EB rate index in each census tract is shown in Figure 6.

Figure 6. Minority Group with Highest Relative EB Rate Index



D. Summary and Conclusions

Important characteristics of disproportionate minority contact were uncovered when utilizing EB rates of referral rather than raw rates of referral and utilizing relative EB rate indices rather than relative rate indices. Previous research on disproportionate minority contact has commonly ignored levels of disproportionate minority contact that may occur in small geographical areas, in small jurisdictions, and in small racial groups because of the ‘small sample size’ problem. Although we agree that raw rates should not be used with small samples, an effective solution from epidemiology is to rely on empirical Bayes (EB) rates. Although more technical, they allow researchers and practitioners to examine disproportionate minority contact in geographic areas, in jurisdictions, and in racial groups that were previously ignored. They also provide a significantly more nuanced understanding of disproportionate minority contact that can be useful for developing empirically-based solutions.

A good example occurred with Pacific youth. Statistics in Table 6 showed that the highest number of Pacific youth per census tract was 72. On average, there were 8.9 Pacific youth per census tract ($s = 12.7$). Rates of referral and relative rate indices should

not be computed for Pacific youth. Using EB rates of referral and relative EB rate indices, we were able to examine disproportionate minority contact for Pacific youth. When doing so, we found that Pacific youth had high levels of disproportionate minority contact in many of the census tracts. In particular, the risk of referral for Pacific youth was more than five times greater than the risk of referral for White youth in 12 census tracts. In half of the census tracts with Pacific youth, the risk of referral was more than 3.93 times greater than the risk of referral for White youth.

For Native youth, who had a lower level of disproportionate minority contact overall (see Section I), our methodology uncovered census tracts where disproportionate minority contact was extraordinarily high. The risk of referral for Native youth was more than five times higher than the risk of referral for White youth in almost a quarter of the census tracts, and in one census tract, it was 110 times higher. Even for Asian youth, who had low levels of disproportionate minority contact overall, we were able to uncover specific census tracts where their risk of referral was substantially higher than the risk of referral for White youth. Our use of relative EB rates uncovered characteristics of disproportionate minority contact that were previously unknown.

Explaining the patterning of referrals by race and geography was beyond the scope of this quantitative analysis. Instead, these results were presented to practitioners and policy makers for qualitative input. Strong community involvement (see Section II) was critical for these results to impact disproportionate minority contact. Understanding the geography of referrals provided a much more nuanced understanding of disproportionate minority contact than previously available. Examining differential rates of referral across small geographic units provided the necessary input for researchers and practitioners to come together to identify promising solutions to disproportionate minority contact (see Section II). The key result from this analysis was that disproportionate minority contact did vary substantially by geography, with some census tracts having lower levels of disproportionate minority contact than others. Understanding the geographical pattern of disproportionate minority contact can have important implications for theory and practice. Because disproportionate minority contact is clearly geographically concentrated, efforts to reduce disproportionate minority contact should also be geographically concentrated. Efforts to reduce disproportionate minority contact will be most successful when they target the geographic areas that have both a high number of minority youth referred and a high level of disproportionate minority contact.

A key methodological implication from this analysis is that an effective way to address the ‘small sample size’ problem was used. This technique allowed us to examine disproportionate minority contact in small geographical areas with very small at-risk populations. It allowed us to examine differential rates of referral across small geographical units. In previous research, these small geographical areas with very small at-risk populations were ignored. In our example, we found high levels of disproportionate minority contact for Pacific youth – a group that would have traditionally been ignored because of its ‘small population.’ As we had expected, it was in those small populations that we found the highest levels of disproportionate minority contact.

Section IV

Development of Disproportionate Minority Contact

In this section, we examine the development of disproportionate minority contact from age 10 to 17. Early longitudinal and birth cohort studies of delinquency discovered that not all delinquents are the same. Importantly, they identified a group of “chronic delinquents,” a small group of offenders who accounted for the majority of recorded offenses (Wolfgang et al., 1972). The existence of different groups, based on offending patterns, stimulated a great deal of research and debate. Unfortunately, the theoretical and practical implications of the chronic delinquent (also called the serious habitual offender or super-predator) could not be fully explored with the analytic methods of the time. Although powerful statistical techniques were available to focus on individual patterns of offending, it was not until recently that statistical techniques became available to aggregate individual patterns of offending into group-based patterns of offending. These group-based patterns of offending search for clusters or groups of individuals who share common histories of delinquent behavior. These common histories of delinquent behavior can then be displayed graphically with developmental trajectories, or lines of development, that show offending rates over time. These graphical displays have confirmed the existence of different groups of offenders, each with unique histories of delinquent behavior.

Analytically, these methods recognize that delinquent behavior does not begin and evolve in the same manner for all offenders (e.g., some start early, others start late). Simultaneously, these methods recognize that some similarities in delinquent development do exist (e.g., those who start early all tend to subsequently offend at a high rate). Using these methods, we can empirically categorize offenders into groups. Each group has its own history of delinquent behavior or developmental trajectory. Within each developmental trajectory are offenders who share a similar pattern of offending. As Jones and Nagin (2007:542-3) recently argued in *Sociological Methods & Research*, “charting and understanding developmental trajectories is among the most fundamental and empirically important research topics in the social and behavioral sciences.”

The importance of this research topic is confirmed by recent advances in theoretical criminology. In particular, recent developmental theories strongly support typologies of offending (e.g., Moffitt, 1993). Typological theories classify offenders into different groups (just as group-based modeling does) with each group having its own history of delinquent behavior. For example, some theories differentiate between life course persistent offenders who start offending early, offend at a high rate, and persist through the life course, and adolescent limited offenders who start offending late, offend at a low rate, and desist by the time they emerge into adulthood. Some theories further suggest that the causes of offending varies across groups. Peer pressure, for example, may be more relevant for adolescent limited offenders than for life course persistent offenders. Group-based modeling now provides the opportunity to fully explore these ideas and their implications on theory and practice.

As part of our research on disproportionate minority contact in Anchorage, we utilized group-based modeling to further examine how referral patterns from age 10 to 17 varied by race. To better understand variations by race, we developed group-based models for youth referred to the Division of Juvenile Justice (DJJ) in Anchorage. To do so, we examined the referral histories of a cohort that included any youth who had been referred to DJJ in Anchorage who was born in 1989. Because this is a longitudinal analysis, we utilized a different data source than the one used for the geographic analysis. In this section, we present descriptive information on this cohort, provide technical details on the analysis, present the distinct developmental trajectories within the cohort, and assess the extent to which the trajectories varied by race. In the conclusion, we show how understanding disproportionate minority contact from a developmental perspective can affect policy.

A. Sample and Data

The Anchorage cohort was built by selecting any youth who had ever been referred to DJJ in Anchorage and who was born in 1989. Again, law enforcement agencies make referrals to the Alaska Division of Juvenile Justice if there is probable cause that a youth committed an offense which would be criminal if committed by an adult, committed a felony traffic offense, or committed an alcohol offense after two prior convictions for minor consuming in District Court. The cohort of youth used for this analysis included 1,131 non-duplicated juveniles (41% were female and 59% were male). For each juvenile, we then measured the number of charges referred to DJJ at each age, from age 10 to 17. Although we selected the youth because they had been referred to DJJ in Anchorage at some point in their life, we captured all charges referred to DJJ throughout the State of Alaska. For example, if a youth was born in 1989, referred to DJJ in Anchorage at age 12, and referred to another DJJ office at age 15, both referrals were included in the data. The only referrals that were excluded from the data were referrals to other states (unless these referrals resulted in an Interstate Compact on Juveniles contract).

Table 10. Total Number of Charges for Anchorage Cohort, Age 10-17

Column Percentages

Number of Charges	Anchorage Cohort		
	N	%	cum %
One	578	51.1 %	51.1 %
Two	199	17.6	68.7
Three	70	6.2	74.9
Four	56	5.0	79.8
Five	39	3.4	83.3
Six	24	2.1	85.4
Seven	19	1.7	87.1
Eight	15	1.3	88.4
Nine	16	1.4	89.8
Ten or more	115	10.2	100.0
Total	1,131		

Source of data: Alaska Division of Juvenile Justice

The 1,131 youth in the Anchorage cohort produced a total of 4,074 charges, for an average of 3.6 charges per youth ($s = 5.1$). The number of charges for each youth ranged from one to 38. Additional details are shown in Table 10. It is important to note that 51% of the youth in the cohort had only one charge referred to DJJ from age 10 to 17. Only 10% of the youth in the Anchorage cohort were referred to DJJ for ten or more charges, but these youth accounted for 47% of the total number of charges.

Table 11 shows the age at which the first charge was referred to DJJ. Over half (56%) of the youth in the Anchorage cohort were referred to DJJ before age 15.

Table 11. Age at First Charge for Anchorage Cohort

Column Percentages

Age at First Charge	Anchorage Cohort		
	N	%	cum %
Ten	47	4.2 %	4.2 %
Eleven	56	5.0	9.1
Twelve	108	9.5	18.7
Thirteen	215	19.0	37.7
Fourteen	203	17.9	55.6
Fifteen	163	14.4	70.0
Sixteen	180	15.9	85.9
Seventeen	159	14.1	100.0
Total	1,131		

Source of data: Alaska Division of Juvenile Justice

The racial composition of the cohort is shown in Table 12. Almost half (49%) of the youth referred in Anchorage were White, 15% were Native, 10% were Black, 7% were Asian, 4% were Pacific Islander, and 9% were multiracial. For comparison, in the 2000 US Census, 66% of youth ages 10 to 17 in Anchorage were White, 8% were Native, 7% were Black, 6% were Asian, 1% were Pacific Islander, and 10% were multiracial.

Table 12. Racial Composition of Cohort and Population At-Risk

Column Percentages

Race	Anchorage Cohort		Census (age 10-17)	
	N	%	N	%
White	553	48.9 %	22,308	65.7 %
Native	174	15.4	2,808	8.3
Black	116	10.3	2,277	6.7
Asian	83	7.3	2,041	6.0
Pacific Islander	40	3.5	487	1.4
Multiracial	97	8.6	3,233	9.5
Other	37	3.3	817	2.4
Unknown	31	2.7	0	0.0
Total	1,131		33,971	

Source of data: Alaska Division of Juvenile Justice & 2000 US Census (SF1)

B. Analysis

We utilized group-based models to search for groups of individuals who shared common histories of delinquent behavior. Delinquent behavior was measured by the annual rate of charges referred to DJJ while controlling for periods of detentions and institutionalizations, when individuals were not at-risk of offending. As suggested by Nagin (2005:77), we first identified the optimal number of groups needed to model “the distinctive features of the data in as parsimonious a fashion as possible.” To do so, we estimated six potential models, specifying two to seven groups. We utilized quintic polynomials to model each trajectory, with quintic zero inflation⁴. Although this specification was likely overly complex, we erred on the side of caution, avoiding the possibility of making inaccurate assumptions about the forms of the trajectories. All trajectories were estimated as Poisson regression models with zero inflation (ZIP) and controls for periods of incarceration (detentions and institutionalizations). The optimal number of groups (the minimum required to satisfactorily model all distinctive features of the data) was examined with Bayesian Information Criterion (BIC) statistics. Following Nagin (2005:70), we calculated the probability of each model being the ‘true’ model.

Parameter estimates clearly indicated that models were over-parameterized. Given that our intent was merely to provide the best description of each trajectory and to obtain the most precise estimates of group membership, we did not systematically eliminate non-significant polynomial terms. We then calculated the predicted posterior probabilities of group membership for each youth. Using a maximum probability group assignment rule, youths were assigned to the group with the highest probability of group membership. Profiles of group membership were then estimated. Descriptive statistics of each group were computed and basic statistical tests (analyses of variance) were conducted to determine if significant variation existed across groups.

C. Results

Unfortunately, the Bayesian Information Criterion (BIC) statistics provided conflicting information about the optimal number of groups (three or five). The three-group model had the highest BIC for $N = 9,048$ and the second highest BIC for $N = 1,131$, while the five-group model had the highest BIC for $N = 1,131$ and the second highest BIC for $N = 9,048$.

Because observations are not totally independent, the BIC for $N = 9,048$ ($N = 1,131$ youth * 8 observations for each youth) is considered an upper bound for the true BIC. On the other hand, because observations are not totally dependent, the BIC for $N = 1,131$ is considered a lower bound for the true BIC. Given the uncertainty regarding which model best represented the data, we examined the predicted average referral rates for each trajectory in the three-, four-, and five-group models⁵. These results (showing the predicted average number of referred charges at each age) are shown in Table 14. Of

⁴ More parsimonious models were also specified (cubic polynomials for all trajectories, quadratic polynomial for the first trajectory and cubic polynomials for the remaining trajectories). These changes in model specification did not alter results.

⁵ Comparing the actual average referral rates provided identical results, because our use of quintic polynomials provided an excellent correspondence between observed and predicted values.

particular interest in this examination was whether the four- and five-group models uncovered features of the data that were unique enough to warrant their added complexity.

Table 13. Bayesian Information Criterion Statistics

No. of Groups	N = 9,048		N = 1,131	
	BIC	Probability correct model	BIC	Probability correct model
2	-7004.32	0.00	-6978.33	0.00
3	-6966.16	1.00	-6926.65	0.00
4	-6992.39	0.00	-6939.37	0.00
5	-6985.68	0.00	-6919.13	1.00
6	-7034.77	0.00	-6954.72	0.00
7	-7032.89	0.00	-6939.32	0.00

Source of data: Alaska Division of Juvenile Justice

Table 14. Predicted Average Referral Rates

Three-Group Model				
Age	Group 1	Group 2	Group 3	
10	0.31	0.04	0.04	
11	0.20	0.11	0.05	
12	0.58	0.19	0.11	
13	1.68	0.42	0.23	
14	2.80	0.51	0.27	
15	3.34	0.69	0.23	
16	4.08	1.31	0.24	
17	3.36	1.81	0.30	

Four-Group Model				
Age	Group 1	Group 2	Group 3	Group 4
10	0.28	0.05	0.04	0.06
11	0.20	0.10	0.04	0.07
12	0.60	0.27	0.09	0.16
13	1.74	0.41	0.09	0.61
14	2.95	0.52	0.18	0.56
15	3.49	0.83	0.28	0.08
16	4.14	1.51	0.36	0.01
17	3.45	2.13	0.42	0.00

Five-Group Model					
Age	Group 1	Group 2	Group 3	Group 4	Group 5
10	0.41	0.03	0.04	0.06	0.04
11	0.31	0.11	0.04	0.08	0.01
12	0.82	0.24	0.09	0.15	0.11
13	2.23	0.41	0.09	0.61	0.65
14	3.66	0.41	0.19	0.53	1.23
15	4.04	0.64	0.28	0.07	2.06
16	3.76	1.53	0.35	0.03	3.24
17	2.23	2.07	0.43	0.00	4.15

Source of data: Alaska Division of Juvenile Justice

In all three models, we found clear evidence of an early starter / desister group (Group 1). This group experienced a dramatic increase in referrals that began at age 13 and continued to age 16. Nonetheless, this group experienced a small decrease in referrals, at age 17. We also found clear evidence of a late starter / persister group (Group 2). The referral rate for this group was relatively stable until age 14, and began to increase at age 15. However, the referral rate for Group 2 remained below that of Group 1 at all times. Finally, we found clear evidence of a low delinquency group (Group 3). The predicted average referral rate for this group very slowly increased over time, never surpassing 1.0. These three trajectories did not appear to vary across the three models.

In the four-group model emerged a new group that is best characterized as a moderate delinquency group. This group experienced a small rise in referrals at age 13 and 14. By age 15, this group appeared to truly desist, as their predicted average referral rate from age 15 to 17 went to zero (below that of Group 3). Overall, the referral rate for this group remained low at all times. In some respects, the differences between Groups 3 and 4 (in the four-group model) therefore appeared negligible. However, there was one interesting feature of Group 4. Up to age 14, this group (4) was nearly indistinguishable from Group 2 (the late starter / persister group). Then, at age 15, the late starter / persister group (2) experienced an increase in referrals while the moderate delinquency group (4) experienced a decrease in referrals.

In the five-group model, the moderate delinquency group remained (Group 4). The new group (5) was also indistinguishable from Group 2 (the late starter / persister group) and Group 4 (the moderate delinquency group) up to age 13. However, this new group experienced a dramatic increase in referrals that started at age 14. Their referral rate far surpassed that of the late starter / persister group (Group 2). By age 17, this new group had the highest predicted average referral rate. Overall, the five-group model, although significantly less parsimonious than the three-group model, uncovered two important distinctive features of the data. First, it uncovered a trajectory that mimicked the late starter / persister group up to age 14, but then quickly decreased (while the late starter / persister group's trajectory increased). Second, it uncovered a trajectory that also mimicked the late starter / persister group up to age 13, but then very dramatically and persistently increased (at a significantly greater rate than the late starter / persister group's trajectory). The differences between these three groups (2, 4, and 5) were important enough to warrant the added complexity of the five-group model. While youth in these three trajectories were indistinguishable up to age 13, there existed substantial variability in their developmental pathways thereafter. More specifically, Group 4's referral rate decreased to zero, Group 2's increased to a moderate level, and Group 5's increased to a very high level. These characteristics of the data were distinctive and important. We therefore firmly concluded that the five-group model provided the best representation of the data⁶.

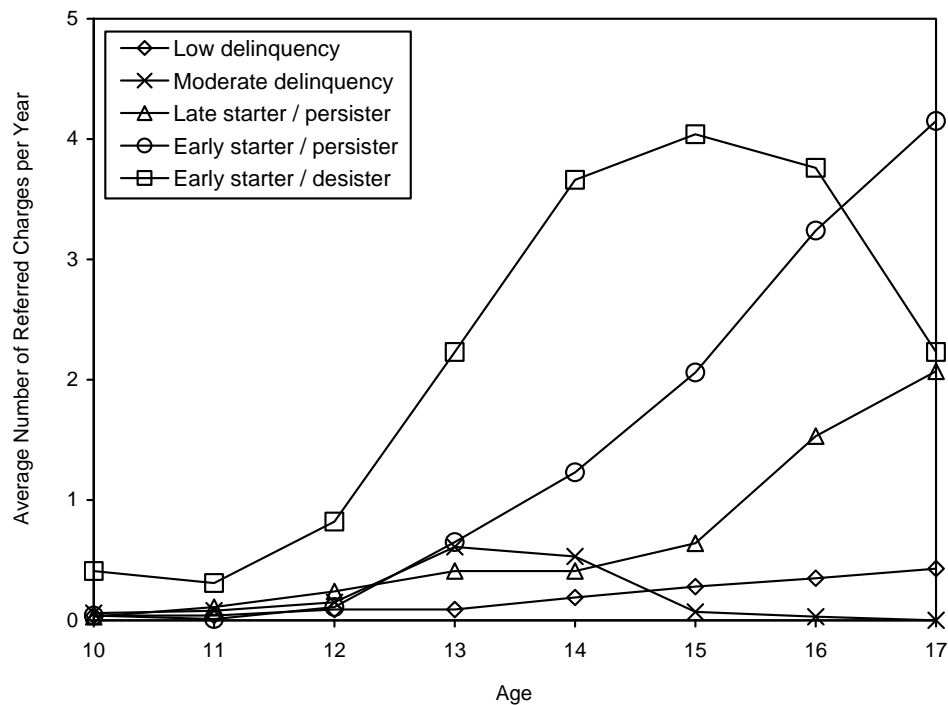
To summarize, the five-group model identified a low delinquency group, a moderate delinquency group, an early starter / persister group, a late starter / persister group, and an early starter / desister group. Predicted average referral rates by age for each group are summarized in Table 15 and plotted in the Figure 7.

⁶ The six-group model split the low delinquency group (Group 3) into two low delinquency groups, with no distinctive features.

Table 15. Characteristics of Developmental Trajectories

Trajectory	Characteristics	Percent of Youth
Low delinquency	Referral rate very slowly increased over time, but remained very low at all times	51%
Moderate delinquency	Referral rate remained low up to age 12, moderately increased at ages 13 and 14, decreased thereafter	17%
Late starter / persister	Referral rate remained low up to age 15, then steadily increased, peaked at a moderate level at age 17	17%
Early starter / persister	Referral rate remained very low up to age 12, then steadily increased from age 12 to 17, peaked at a high level at age 17	5%
Early starter / desister	Referral rate began to increase early, peaked at a high level at age 15, decreased thereafter	6%

Source of data: Alaska Division of Juvenile Justice

Figure 7. Predicted Average Referral Rates: Five-Group Model

Youth in the low delinquency group had a referral rate that very slowly increased over time, never surpassing one referred charge per year. Just over half (51%) of the youth were classified in the low delinquency group. Youth in the early starter / desister group had a referral rate that began to increase early (age 13), peaked at a high level at age 15, but then began to decrease. The increase in the average referral rate peaked at approximately four referred charges per year. The early starter / desister group included few youth (6%). It is important to emphasize that although these youth were referred to DJJ at an early age and were subsequently referred at a high rate, they also showed reductions in referrals by age 17. This is an important finding because starting to offend at an early age is considered a strong risk factor for a long criminal career. Although the

youth in this group entered the juvenile justice system early, they were able to reduce their referral rate prior to adulthood. In part, this may have occurred because of the formal and informal services that they received. Understanding what reduced the referral rate for these youth is an important topic for future research.

The moderate delinquency group included youth whose referral rate remained very low up to age 12, moderately increased at age 13 and 14, and then decreased. The average number of charges referred for youth in the moderate delinquency group was 0.61 at age 13 and 0.53 at age 14. By age 17, these youth appeared to completely desist, with an average of zero charges referred. For these youth, referrals to DJJ occurred primarily at age 13 and 14. Seventeen percent of the youth belonged to this moderate delinquency group. The other two groups both showed signs of persistence rather than desistance. The referral rate began to increase early for one group and began to increase later for the other group (but never decreased for either group). The referral rate for youth in the early starter / persister group steadily increased from age 12 to 17, peaking at age 17. At age 17, youth in the early starter / persister group were referred for an average of 4.2 charges. Five percent of the youth were classified as early starters / persisters. The referral rate for youth in the late starter / persister group began to increase later (age 16) and remained at a lower level. At age 17, youth in the late starter / persister group were referred for an average of 2.1 charges (rather than the 4.2 for youth in the early starter / persister group). Seventeen percent of the youth were late starters / persisters.

A limitation of these developmental trajectories is that they only provide a representation of the delinquent development that occurred for the youth in this cohort. Youth born today may have very different patterns of delinquent development. Nonetheless, these historical results are important because they allow us to now retrospectively assess the extent to which the delinquent development of these youth varied by race. In addition, all analyses are based on official data only. Offending or delinquent involvement is only measured by referrals to DJJ. Differences in developmental trajectories may be due to differences in offending and/or to differences in the referral process. All analyses reported here measure the number of charges referred to DJJ from age 10 to 17. This likely underestimates the true number of offenses committed from age 10 to 17, and the extent of underestimation may vary by race. Although these analyses provide additional detail on disproportionate minority contact, they do not explain why certain youth are disproportionately referred to DJJ. Additional analyses will be needed to provide these explanations. Finally, although we captured all referrals to the Alaska Division of Juvenile Justice (throughout the State of Alaska), we did not capture referrals to juvenile justice agencies in other states. Again, this may underestimate the true number of referrals and charges from age 10 to 17.

In Table 16, we examine the demographic composition of each group. Summary statistics for each group are provided showing their composition by race and gender. Statistical tests were performed to examine if the percentage of youth within each racial and gender group varied significantly across delinquency groups (i.e., to determine if the percentage of White youth was the same in each delinquency group or whether White youth were over-represented in some delinquency groups). Results are presented in Table 16. The percentage of Black, Asian, and Pacific Islander youth did not vary significantly across delinquency groups. Conversely, the percentage of White, Native, and multiracial youth did vary significantly across delinquency groups. Too few

multiracial youth were included to specifically locate the significant difference. For both White and Native youth, the differences occurred between the low delinquency group and the early starter / desister group and between the moderate delinquency group and the early starter / desister group. White youth were overrepresented in the low and moderate delinquency groups, but were less likely to be found in the early starter / desister group. The opposite result was true for Native youth. They were overrepresented in the early starter / desister group, and were less likely to be found in the low and moderate delinquency groups. Not surprisingly, males were overrepresented in the three high delinquency groups (early starter / desister, early starter / persister, and late starter / persister) while females were overrepresented in the two low delinquency groups (low delinquency and moderate delinquency).

Table 16. Demographic Composition of Developmental Trajectories

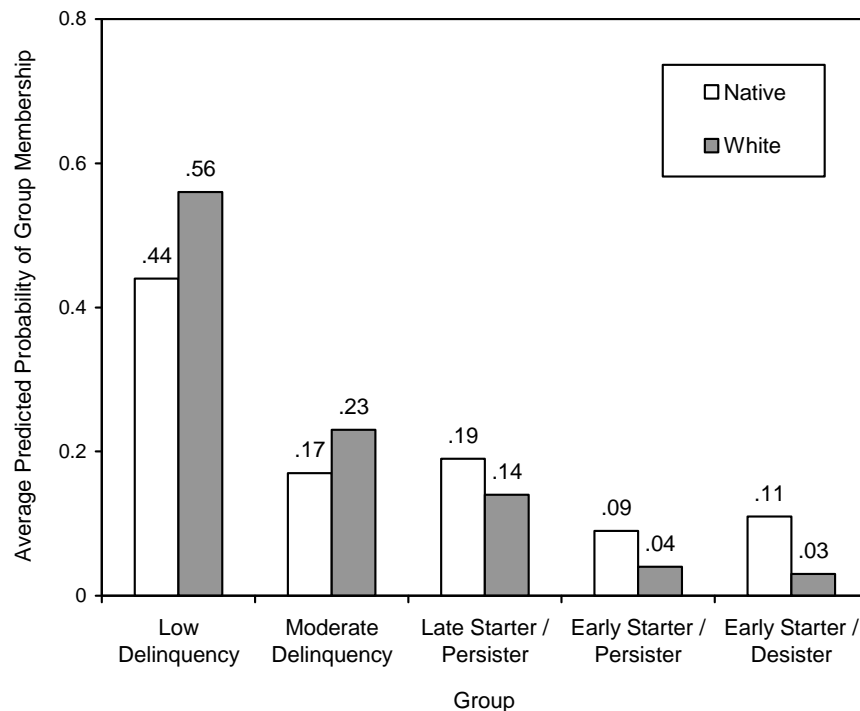
Column Percentages

Race	Group					% Equal Across Groups?
	Low delinquency	Moderate delinquency	Early starter / desister	Early starter / persister	Later starter / persister	
White	52.5 %	53.7 %	26.2 %	38.9 %	38.6 %	No
Native	13.1	13.2	30.8	25.9	17.9	No
Black	9.1	10.1	13.8	7.4	14.5	Yes
Asian	7.2	7.1	12.3	7.4	6.2	Yes
Pacific Islander	4.0	2.4	0.0	5.6	4.8	Yes
Multiracial	6.3	8.1	15.4	13.0	13.8	No
Other / Unknown	7.7	5.4	1.5	1.9	4.1	Yes
Total	99.9	100.0	100.0	100.1	99.9	
Gender						
Male	56.0	50.7	71.0	83.1	83.3	No
Female	44.0	49.3	29.0	16.9	16.7	No
Total	100.0	100.0	100.0	100.0	100.0	

Source of data: Alaska Division of Juvenile Justice

In Figure 8, we show the average predicted probabilities of delinquency group membership for White and Native youth. The average predicted probabilities of group membership were highest for the low delinquency group, for both White and Native youth. Nonetheless, the average predicted probability of belonging to the low delinquency group was 27% higher for White youth than for Native youth. For the moderate delinquency group, the average predicted probability of group membership was 35% higher for White youth than for Native youth. Conversely, the average predicted probability of belonging to the late starter / persister group was 36% higher for Native youth than for White youth. Finally, the average predicted probability of group membership was higher for Native youth than for White youth by 2.25 times for the early starter / persister group and by 3.67 times for the early starter / desister group.

Figure 8. Predicted Group Membership Probabilities by Race



D. Summary and Conclusions

Five groups of youth were found in this cohort. The first included youth with very few referred charges (low delinquency group). The moderate delinquency group showed low levels of referrals from age 10 to 12, moderate levels of referrals at age 13 and 14, and low levels of referrals thereafter. The third group included youth whose referral rate started to increase early, peaked at a high level, but began to decline by age 17 (early starters / desisters). The final two groups both showed signs of persistence, with one starting earlier (early starters / persister) than the other (late starter / persisters). The referral rate for the early starters / persisters began to increase at age 13 while the referral rate for the late starters / persisters began to increase at age 16. Neither group showed any signs of desistance by age 17 (as measured by the number of charges referred to DJJ).

White youth were overrepresented in low delinquency trajectories while Native youth were overrepresented in trajectories that showed higher rates of contact with DJJ. This result is important because it shows that disproportionate minority contact (as defined by the difference in rates of charges referred to DJJ) was evident by age 13. At that age, Native youth were already disproportionately referred to DJJ relative to White youth. Interventions designed to reduce the disproportionate contact of Native youth must therefore begin early. One advantage of this analytic technique is that it can show when efforts to reduce disproportionate minority contact should begin. To prevent disproportionate minority contact among Native youth, efforts should begin before age 13.

It is again important to emphasize that the majority of youth contacted by DJJ had very few referred charges from age 10 to 17. Descriptive statistics (Table 10) showed that 51% of the youth had only one charge referred to DJJ from age 10 to 17. The group-based models showed that the most common trajectory was one of low delinquency (for 51% of the youth), and this was particularly true for females. Unfortunately, Native youth were less likely to be found in the low delinquency trajectory. On a more positive note, Native youth were not disproportionately found in the two groups whose referral rate persisted. Instead, Native youth were disproportionately found in a group whose referral rate began to decrease at age 16. This again suggests that some youth received the necessary formal and informal services to reduce their contacts with DJJ.

Two groups showed no signs of desistance by age 17. The late starter / persister group is particularly problematic because it included 17% of youth and it was not identifiable until age 16. This leaves little time for successful interventions. Understanding what caused the changes in referral rates observed in Figure 7 is, as Jones and Nagin (2007) argued, one of the most fundamental and empirically important research topics. Understanding these developmental trajectories in more detail could have significant impacts on both policy and practice.

For now, the most important policy implication from these results is that evidence of disproportionate minority contact for Native youth emerged by age 13. By that age, the referral pattern for the early starter / desister group was clearly different than the referral pattern for other groups (at least based on official records). Results in Figure 8 showed that Native youth were 3.67 times more likely to belong to the early starter / desister group than White youth. From age 10 to 16, youth in the early starter / desister group were referred at a higher rate than others, and that was especially true from age 13 to 15. Although the early starter / desister group was small (6% of the cohort), it was responsible for 29% of the referred charges. Successful interventions will need to begin early enough to affect youth in the early starter / desister group.

Although this section did not include a discussion of community involvement (see Section II), it is important to again emphasize that all of the Study's analyses were informed by practitioners in the Anchorage DMC Initiative. As with the other analyses, researchers from the Study and practitioners from the Initiative joined forces to disseminate these results and to generate empirically-based solutions to disproportionate minority contact. Through strong community involvement and different types of analyses, we were able to obtain a much more nuanced understanding of disproportionate minority contact in Anchorage. We hope that our strategy will be a useful model for other jurisdictions that seek to reduce disproportionate minority contact.

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Appendix A

Technical Notes on Relative Empirical Bayes Rate Indices

Traditional research has examined disproportionate minority contact with relative rate indices. At the referral stage, these relative rate indices compare the rate of referral for minority youths to the rate of referral for White youths. More specifically, the relative rate index (RRI) is a ratio of two rates (per, for example, 1,000 minority and 1,000 White youth):

$$RRI = \frac{\text{Rate of Minority Youths Referred per 1,000 Minority Youths}}{\text{Rate of White Youths Referred per 1,000 White Youths}}$$

$$RRI = \frac{(\# \text{ Minority Youths Referred} / \# \text{ Minority Youths in the Population}) \times 1,000}{(\# \text{ White Youths Referred} / \# \text{ White Youths in the Population}) \times 1,000}$$

The relative rate index is simply a ratio of two (raw) rates. Similarly, the relative empirical Bayes rate index is simply the ratio of two empirical Bayes rates. More precisely, the relative empirical Bayes rate index (REBRI) is the empirical Bayes rate of referral for minority youths *relative* to the empirical Bayes rate of referral for White youths, as shown in the following formula:

$$REBRI = \frac{\text{Empirical Bayes Rate of Minority Youths Referred per 1,000 Minority Youths}}{\text{Empirical Bayes Rate of White Youths Referred per 1,000 White Youths}}$$

Utilizing empirical Bayes rates rather than raw rates has several key advantages. First and foremost, empirical Bayes rates are less susceptible to variance instability than raw rates. An empirical Bayes rate adjusts the raw rate by utilizing information from other neighboring geographical units. In a statistical sense, the raw rates are shrunk to some more global estimate. In this research, the more global estimate is always set to be the overall mean rate. The extent of shrinking depends on the size of the population at risk within each geographical unit. Rates from geographical units with small populations at risk will be shrunk to a much greater extent than others.

More technically, if one considers the raw rate of referral, for any demographic group, in geographical unit i to be:

$$R_i = \frac{n_i}{P_i},$$

where n_i is the number of youth referred and P_i is the number of youth at risk, the global estimate of the raw rate, for any demographic group, and for all geographical units ($i = 1$ to N) is then the simple average raw rate:

$$\bar{R} = \frac{\sum_{i=1}^N n_i}{\sum_{i=1}^N P_i}.$$

The empirical Bayes rate (EBR_i) is then a weighted average of R_i and the global estimate:

$$EBR_i = w_i R_i + (1 - w_i) \bar{R},$$

where w_i is the weight, calculated as:

$$w_i = \frac{s^2}{s^2 + (\bar{R}/P_i)},$$

where s^2 is the variance of the global estimate estimated as:

$$s^2 = \frac{\left[\sum_{i=1}^N P_i (R_i - \bar{R})^2 \right]}{\sum_{i=1}^N P_i} - \frac{\bar{R}}{\sum_{i=1}^N P_i / N}.$$

The weight, w_i , is assigned so that as the population at risk becomes large (i.e., as $P_i \rightarrow \infty$), little shrinkage will happen to R_i (i.e., $EBR_i \rightarrow R_i$). Conversely, as the population at risk becomes small (i.e., as $P_i \rightarrow 0$), significant shrinkage will happen to R_i (i.e., $EBR_i \rightarrow \bar{R}$).

The empirical Bayes rates of referral (EBR_i) were calculated for each racial group in each census tract in Anchorage using Luc Anselin's *GeoDa* (available at <http://geodacenter.asu.edu/>). The relative empirical Bayes rate indices were also calculated in *GeoDa* (as the simple ratio of relative empirical Bayes rates). The only data requirements are a polygon shape file, the number of youth in each racial group referred in each geographic area, and the total number of at-risk youth in each racial group in each geographic area.