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A Propensity Score Matching Analysis of Race on the Decision to Petition a Case in the Juvenile Court

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Disproportionate minority contact is an important issue in contemporary juvenile justice. Few studies directly examine the link between race and the decision by prosecutors to formally petition a delinquency case to juvenile court. Using official data from Pennsylvania (n=30,000), this study adds to the literature in two ways. First, the study uses Focal Concerns Theory that may be relevant to prosecutorial decision-making. Second, the study uses propensity score matching to obtain a purer estimate of the influence race has on the decision to petition a delinquency case to juvenile court. The results indicate that prosecutors use perceptual shorthand in making this decision that hinges on race. Specifically, Black youth in the study were 92.46 times more likely than White youth to have their delinquency cases petitioned to juvenile court.

Keywords: disproportionate minority contact, propensity score matching, race

Researchers have shown that minorities are disproportionately represented in several decision points in the juvenile justice system. Puzzanchera and Adams (2008) found that national minority youth arrest rates (via the Relative Rate Index) are between 40% and 100% higher than White youth arrest rates. Other researchers show that the detention of Black youths is greater than the detention of White youths from the 1970s through 2008 (Krisberg et al., 1987; McGarrell, 1993; Puzzanchera & Adams, 2011; Snyder & Sickmund, 1995). Leiber and Rodriguez (2010) argue Black youth delinquency cases are petitioned to court at higher rates than White youth cases. Freiburger and Jordan (2011) show that the Black youth cases are petitioned to court at a rate 10% to 30% higher than White youth cases.

The persistent racial differences in the juvenile justice system from the 1970s to the present led Congress to enact and amend landmark legislation designed to reduce the racial differences. The Juvenile Justice Delinquency and Prevention Act requires states that receive federal funding to address this issue. The original passage of the act was in 1988 [No. 1974], and its original focus was only on confinement. When evaluating impact of this statutory requirement, several researchers note (Bishop & Frazier, 1996; DeJong & Jackson, 1988; Pope & Feyerherm, 1990a, 199b) that racial disparities in the system are due to the cumulative effects of race and contact with the juvenile justice system at different decision points. The 1992

amendment expands the scope of the requirement to disproportionate minority contact (DMC) with the juvenile justice system.

One area in which contact takes place, and a substantial amount of discretion is present, is in the prosecutor's decision to petition a delinquency case to juvenile court. Leiber and Stairs (1999) argue that most protections that are in place to reduce instances of disproportionate minority contact (DMC) take place at the adjudication and disposition stages; accordingly, most research has focused on this stage of the juvenile justice process (Kempf-Leonard, 2007; Leiber & Rodriguez, 2010; Piquero, 2008; Pope & Feyerherm, 1990a, 1990b). This focus left gaps in our understanding of the decision-making process that takes place before adjudication and disposition. Because of this gap in our understanding, additional research is needed in these earlier stages of the decision-making process. Puzzanchera and Adams (2008) show that more Black youth than White youth have their cases petitioned to juvenile court by a prosecutor. With this, the question remains, does race result in a decision to petition a case in the juvenile court?

This study seeks to contribute to the literature by examining the link between race and the prosecutor's decision to petition a delinquency case to juvenile court. The present study is important for a couple of reasons. First, it fills a theoretical gap because we use focal concerns theory to contextualize these results. Second, this study fills a methodological gap because we use propensity score matching to address Kempf-Leonard's (2007) view that studies of DMC should have Black youth and White youth in similar situations to make valid comparisons.

To make this contribution, the literature review focuses on the decision to petition a delinquency case, and the methodological deficiencies of this literature are presented. We then

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move to a presentation of the focal concerns theory, our view of propensity score matching, and our methods, analysis plan, results, and discussion.

Race and the Decision to Petition a Delinquency Case to Court

A substantial body of literature examines the link between race and juvenile court decision making. Some research shows that race influences juvenile court decision making (Kempf-Leonard, 2007; Leiber & Rodriguez, 2010; Piquero, 2008; Pope & Feyerherm, 1990a, 1990b). Further, the literature shows that Black youth were more likely than White youth to receive referrals to court than to receive diversions from the system (Bishop & Frazier, 1996; Leiber & Mack, 2003), receive detention (Leiber & Fox, 2005; Harms, 2002), adjudication (Federle & Frazier, 1996; Leiber & Fox, 2005), and to receive a home disposition (Guevara, Spohn, & Herz, 2004; Secret & Johnson, 1997; Snyder, 2005). Other research shows that White youth are more likely to receive an adjudication than Black youth (Wu, 1997; Wu & Fuentes, 1998) or receive a pretrial detention (Fagan, Slaughter, & Hartstone, 1987). Overall, the literature on the link between race and juvenile justice decision-making is mixed, and merits further research attention.

An additional decision point of the juvenile justice system that merits further research attention is the decision to petition a case to the juvenile court. Bishop and Frazier (1996) show that race has an important influence on the prosecutor's decision about petitioning. Leiber and Fox (2005) use multiple variables—race, gender, age, family status, school attendance problems, drop out, number of referrals, court authority, severity of referral, number of charges, and crime severity—to show that race interacts with gender (i.e., that Black males are more likely to have their delinquency case petitioned to court than White males). Freiburger and Jordan (2011) use multiple variables—race, age, gender, school context, family structure, offense level, type of offense, prior record, prior referrals, and contextual measures (i.e., % poverty, % Black, population density, female-headed households)—to show that contextual measures (i.e., poverty) interact with race to understand how Black youth have more of their delinquency cases petitioned to court than White youth. These results provide two implications, one theoretical, and the other methodological. These researchers use different theories, but they seem to be pointing to the same result—prosecutors use some type of shorthand to make their decisions to petition a delinquency case to juvenile court, and the shorthand include both community status and racial status.

While the researchers make important contributions, they are unable to make causal conclusion about the use of the shorthand. Kempf-Leonard (2007) argues that to compare minority and non-minority youth, they must be the same or at least similarly situated. Because the methods and theories that researchers have traditionally used do not allow for this, experiments will be necessary to make these types of causal inferences. Researchers will have to randomly assign individuals to an experimental or control group. Given that race is the chief concern in these studies, researchers are unable to randomly assign someone to a particular race. The lack of random assign-

ment may create selection bias, which is at the epicenter of DMC. When researchers cannot randomly assign individuals to a biological racial group, the risk is that one group may be overrepresented and a bias unintentionally increases. Rosenbaum and Rubin (1983, 1985) developed propensity score matching techniques to address this problem. Their development was a quasi-experimental design that uses a statistical procedure to create treatment group and a matched comparison group based on balancing independent measures (Rosenbaum & Rubin, 1983, 1985; Rubin & Thomas, 1996).

Researchers in criminology use this methodology because of its important qualities. Becker and Ichino (2002) argue that the results that came from theory driven quasi-experimental designs using propensity score matching techniques are similar to random control trials. Haviland and Nagin (2005) argue that the ability to reduce selection bias made propensity score-matching popular in criminal justice and criminology. To take advantage of the reduction of selection bias so that results rival random control trials, Rosenbaum and Rubin (1983, 1985) argue that researchers should use theory to develop their models.

Focal Concerns Theory Applied to Juvenile Justice Decision-Making

Criminology is not devoid of theory that may explain the shorthand that previous researchers suggest may be taking place. For instance, Piquero (2008) argues the differential involvement and selection bias hypotheses remains a dominate theoretical premise to understanding juvenile justice decision making. Using Tittle and Curran's (1988) symbolic threat hypothesis, Freiburger and Jordan (2011) show that an interaction between percentage in poverty with race explains differences in prosecutor(s) decision to petition a delinquency case to juvenile court. These two perspectives suggest that prosecutors may use some type of shorthand to perform their work. We add to the literature on decisions to petition a delinquency case to the juvenile court by applying the focal concerns theory.

Steffensmeier's (1980) version of focal concerns theory assists in understanding the link between judges or other court actors and sentencing. The thrust of the theory is that rational judges or court actors base their sentencing decisions on three focal concerns—blameworthiness, protection of the community, and practical constraints. Steffensmeier (1980) writes that blameworthiness is consistent with the culpability of the individual where the punishment needed to fit the crime. Protection of the community is based on the goals of incapacitation and general deterrence, and on assessments about offenders' future behavior such as dangerousness or recidivism. Practical constraints focus on the constraints and consequences about the organizational costs incurred by the criminal justice system. These three focal concerns are the most important; however, prior criminal record or current offense (Steffensmeier, Ulmer, & Kramer, 1998) and community context (Johnson, 2006) are also important.

Focal concerns theory also takes uncertainty into account. Albonetti (1991) argues that ambiguity and uncertainty are important factors in arriving at some decisions. The uncertainty in

the focal concerns theory comes from the disjuncture in sentencing goals and the prediction of risk for recidivism. To overcome uncertainty, judges tend to rely to an abundance of information that would overburden them. The overburden of information problem, in turn, forces judges to rely on perceptual shorthand. The use of perceptual shorthand is built on characteristics and attributes of the individual before them. This allows judges to make decisions about each defendant's character and expected future and move quickly through large case loads and information.

Steffensmeier (1980) argues that disparities in sentencing come from the application of these focal concerns. The perfect world scenario shows that the focal concerns are applied equally and justly regardless of race. The real world, however, has driven judges to make decisions through the perceived individual's social structure (i.e., race and location of life). A real world scenario shows that Blacks and Hispanics are much more likely to receive harsher punishments because they are more likely to recidivate. A non-exhaustive review of the literature shows that this is indeed the case (Demuth & Steffensmeier, 2004; Spohn & Beichner, 2000; Steffensmeier & Demuth, 2001, 2006; Johnson, Ulmer, & Kramer, 2008).

Steffensmeier's (1980) theory helps to understand judicial decision-making, but the premise may apply to prosecutors, especially in the context of petitioning a delinquency case to juvenile court. The field decisions that prosecutor(s) make are complex, repetitive, and under constraints (i.e., time, space, resources, and information). Prosecutors make decisions whether to prosecute a case taking limited time, resources, and information about a case. This continuum makes the prosecutor's job difficult because not enough information may be present, or because too much information may be present, making their digestion of the information difficult. To adapt to this continuum, prosecutors may develop and use a form of shorthand to make the digestion of the information manageable. The shorthand could just focus on race, creating the source of disparity to petition delinquency cases to juvenile court. Prosecutor(s) using this shorthand not once but multiple times may be successful at securing petitions of delinquent cases to juvenile court for Black and White youth. The success reinforces the use of the shorthand. For instance, a prosecutor who uses their racial shorthand to petition delinquency cases to juvenile court will continue to do so because the shorthand is successful. This view is consistent with other researchers who used the theory to understand prosecutor decision making.

From a non-exhaustive literature review, researchers conclude that prosecutors do seem to follow Steffensmeier's (1980) focal concerns theory. Researchers show that sexual assault case decisions are influenced by prosecutorial focal concerns (Beichner & Spohn, 2005; Spohn, Beichner, & Davis-Frenzel, 2001). Ulmer, Kurlycheck, and Kramer (2007) show that this theory is viable in prosecutor decisions to try a case using an application of mandatory minimum sentences. This literature showed that it is possible for prosecutors to make decisions using shorthand that can result in racial disparities.

Overall, the evidence of DMC may be present in other decision points in the juvenile justice system; we posit that it is likely to be identified in the decision to petition a delinquency

case to juvenile court. The focal concerns theory provided some context as to why prosecutors decided to petition more cases of Black youth to juvenile court than White youth. We do not believe that this theory would account for all differences in petitioning a case to juvenile court, but it will provide the context that will allow for the understanding of prosecutors' potential use of shorthand in decision making. To date, no evidence exists that this may be the case.

The Present Study

This study seeks to examine the role of race in the decision to petition a delinquency case to juvenile court. The current literature is thin in this area and does not use an adequate methodology. This study advances the literature in two ways. First, it addresses whether evidence is present that prosecutors focus on race when making a decision to petition a case in juvenile court. Second, it asks whether propensity score matching helps to better understand the connection between races and petitioning a delinquency case to juvenile court. This leads to our expectation that Black youth will have their delinquency cases petitioned to juvenile court more than White youth.

Methods

Data for this study come from all misdemeanor and felony youth in the juvenile court system in Pennsylvania in 2009. The data are obtained from the Pennsylvania Juvenile Court Management System and contain over 30,000 cases. The data contain Black youth, White youth, Hispanic youth, Asian youth, and American Indian youth. The data using other ethnicities (Hispanic youth, Asian youth, and American Indian youth) is sparse and contains a substantial amount of missing data. This means that the amount of data to use in the study only contains Black and White youth. This decision reduced the amount of data to a final sample size of 22,103.

Measures

A number of measures are used in this study. Our main dependent measure for this study is whether a petition is sought (1=yes and 0=no).

We measure several extralegal factors (i.e., school attendance, family status, living arrangements, biological sex, and race), contextual factors (i.e., concentrated disadvantage, % Black, and % residential mobility), and several legal factors (i.e., judicial hearing, public attorney, and type of offense) as independent measures. School attendance is captured as 1 for yes and 0 for no. Married family status is captured as 1 for yes and 0 for no. Living arrangements is captured using 1 for both parents and 0 for other arrangement. Gender is captured as 1 for male and 0 for female. Age at the time of referral is captured as an open-ended measure. Race is coded as 1 for Black and 0 for White.

To capture societal context, we use a measure of concentrated disadvantage, an index that contain the following measures for each county from the 2000 census: percentage of single female headed household, unemployment, poverty, lack of a high

school diploma, the percent Black individuals (adult and juvenile) in the county, and the percent of residential mobility from the 2000 census.

We also measure legal factors that include: judicial hearing, public attorney, type of offense (i.e., person offense, property offense, drug offense, and other offense). Each of these items were coded (1 = yes and 0 = no). It is not likely that everyone will make it through the system to a hearing. This creates a homogeneous sample, and a correction is necessary for this issue. In this study, we calculate the hazard rate in order to account for the possibility that some youth may not make it to a hearing.

Analysis Plan

In this study, we use the propensity score matching technique to explore the racial differences in receiving a petition. A number of independent measures are used to develop the propensity score. Heckman, Ichimura, and Todd (1997) argue that the average treatment effect of the treated is a better measure of effect than other multivariate techniques alone (e.g., logistic regression, tobit regression, or ordinary least squares). The propensity score matching technique takes place in several steps. The first step is the calculation of a logistic regression model to generate the odds ratios that determine the propensity for experiencing a treatment. For this study, the treatment is race. We recognize that it is impossible to experimentally impose race on a person; therefore, the propensity score matching technique balances the independent measures for a particular race.

We are not the first to use propensity score matching in this way. Ridgeway (2006) uses the technique to explore racial profiling in traffic stops and shows that Blacks are searched more often than Whites. Higgins, Jennings, Jordan and Gabbidon (2011) use propensity score matching in this way to explore public perceptions of racial profiling and show that Blacks are searched more than Whites. For the present study, we believe that our use of propensity score matching satisfies Kempf-Leonard's (2007) call for explanations of DMC when minority and majority youth are similarly situated. We also believe that our use of this technique, in this manner, satisfies Tracy's (2005) call for better methods to tease apart causal mechanisms that may result in DMC.

Within the propensity score matching process, the algebra helps to understand how the propensity score is calculated, and it is as follows (Rosenbaum & Rubin, 1983):

$$p(T) = \Pr\{T = 1|S\} = E\{T|S\} \quad (1)$$

Here, $p(T)$ is the propensity of being Black or White, T indicates that an individual is Black or White, and S is a column that contains the independent measures that go with being

Black or White, Pr stands for probability, and E represents error. This formula for the propensity score is operationalized using PSMATCH2 via STATA 12.¹

The second step of the propensity score matching technique is the matching of individuals. We perform this matching using 1-to-1 nearest neighbor propensity score matching. Following Austin (2000), we use a caliper (i.e., standard deviation of the propensity score) of 0.20. This allows us to match Black youth with White youth who have similar exposure to the juvenile court system. Within the second step, we assess the quality of the matching process. Specifically, we use three tests to determine the quality of our matches: (a) standardized bias, (b) t-tests, and (c) Rosenbaum bounds. For standardized bias, Rosenbaum and Rubin (1985) argue that standardized biases above -10 and below 10 were acceptable (see Appendix A for more information). Further, t-tests that are not statistically significant are an additional check that no difference exists between the measures (Higgins et al., 2011; Ridgeway, 2006). Mhbounds (2002) assesses the robust nature of the logistic regression analysis that generated the propensity score. To clarify, Mhbounds allows us to determine how large an effect size a measure that was missing from our analysis would have to have to change our results. We follow Cohen's (1988) suggestions to determine the size of the effect. At this point, the data are essentially paired, and are now consider quasi-experimental data.

Following this examination, in the third step, we use McNemar's chi-square to determine the differences between the two groups via STATA 12 because of the paired nature of the data. That is, after we match the data, the observations are no longer independent. Further, this is chosen because of dichotomous nature of race and petition. McNemar's chi-square also provides the desirable quality of an odds ratio.

Results

Table 1 shows the descriptive statistics for the sample that is stratified by race (i.e., Black and White) of the juveniles. The table shows that before to propensity score matching the standardized bias ranges from -50.7 to 119.8. In other words, before matching, the standardized biases indicate that Black youth and White youth are not similarly situated based on the independent measures. The t-test results support this interpretation because they all are statistically significant at least at the 0.05 level. Overall, these results suggest that propensity score matching is necessary.

¹It is important to note in studies using propensity score matching the logistic regression model is not presented. This model is available from the last author on request.

Table 1.
Descriptive Statistics and Matching of Blacks and Whites.

Covariates	Before Propensity Score Matching				After Propensity Score Matching			
	Blacks	Whites	SB(%)	t-test	Blacks	Whites	SB(%)	t-test
Country	33.41	30.55	14.0	10.40**	28.29	26.93	6.7	1.39
Age	15.27	15.62	-20.2	-14.91**	15.46	15.42	2.2	1.13
Person	0.42	0.28	29.2	21.63**	0.34	0.36	-4.1	-1.01
Property	0.22	0.35	-29.2	-21.80**	0.30	0.29	2.5	1.21
Drug	0.14	0.21	-16.7	-12.44**	0.16	0.15	2.7	1.42
Other	0.22	0.16	14.4	10.66**	0.20	0.20	-0.6	-0.28
Concentrated	34.47	26.22	78.4	57.26**	26.35	26.19	1.5	0.91
	0.92	0.90	6.4	4.79*	0.89	0.90	-4.9	-1.32
Disadvantaged School								
Family	0.09	0.28	-50.7	-38.10**	0.16	0.15	1.9	0.97
Judge Hearing	0.80	0.74	14.2	10.57**	0.70	0.73	-7.3	-1.37
Public Attorney	0.92	0.83	28.3	21.23**	0.87	0.88	-3.7	-1.84
Male	0.22	0.19	6.2	4.62**	0.24	0.22	5.8	1.77
% Black	23.20	6.82	119.8	87.45**	10.66	10.68	-0.1	-0.08
% Residential Mobility	37.36	36.27	31.6	23.81**	37.15	37.04	3.2	1.66
Hazard Rate	0.88	0.81	7.5	5.56*	0.82	0.82	-0.1	-0.03

Note: SB = Standardized Bias, ** $p < 0.00$, * $p < 0.05$

Table 1 shows the results after propensity score matching the standardized bias ranges from -7.3 to 6.7. For each race, these results suggest that propensity score matching balances the covariates. After propensity score matching, Black youth and White youth are in similar situations as Kempf-Leonard (2007) and Tracy (2005) calls for in the literature. After propensity score matching, the t-tests are not statistically significant in supporting the idea that Black and White youth are in similar situations based on the independent measures (i.e., covariates). Further, the analysis of the Mhbounds indicates that it would take a variable that has an effect size of 3.5 to change these results. According to Cohen (1988), an effect size of 3.5 is a large effect. In these data, the matches that come from this process are robust. Overall, these results show that propensity score matching is a proper methodology to gain matched groups to understand prosecutors' decisions to petition a case in juvenile court.

Table 2 shows the final analysis of the matched groups. The table addresses the hypothesis that Black youth are more likely to have their delinquency case formally petitioned to court than White youth. The McNemar's chi-square shows that Black youth have a statistically significant higher percentage (99%) for a petition than White youth percentage (97.1%). Importantly, Black youth are 92.46 times more likely than White youth to have their case petitioned to juvenile court. This does not mean that the prosecutors do not have legitimate reasons to petition some of these cases, but it seems to suggest that prosecutors are focusing on Black youth more so than White youth when doing so.

Table 2.
McNemar's Chi-Square.

	Black	White	Total
Petition Yes	11618 (99.1%)	10078 (97.1%)	21696 (98.2%)
Petition No	109 (0.0%)	298 (2.9%)	407 (1.8%)
Total	11727 (100.0%)	10376 (100.0%)	22103 (100.0%)

McNemar's Chi-Square = 9755.67

Probability of McNemar's Chi-Square = 0.000

Odds Ratio: 92.46

Discussion and Conclusion

The purpose of this study is to examine the role of race in the decision to petition a delinquency case to juvenile court. The findings from the present study are consistent with the previous research that Blacks are more likely than Whites to have their delinquency cases petitioned to juvenile court (Bishop & Frazier, 1996; Freiburger & Jordan, 2011; Leiber & Fox, 2005). One contribution of this study is that it uses Steffensmeier's (1980) focal concerns theory. This theory relies on three main concepts to arrive at the perceptual shorthand that prosecutors use in making decisions. Within this theoretical lens, Black youth are more likely to have their delinquency

cases petitioned to juvenile court than White youth even after equating the two groups on a number of relevant independent measures. This has a number of implications. First, it appears that disproportionate minority contact does exist in Pennsylvania. At the time of these data, prosecutors have the discretion to petition delinquency cases to the juvenile court. The data suggest that prosecutors rely on negative stereotypes of Black youth, which may increase the likelihood of their delinquency cases being petitioned to juvenile court. In other words, the prosecutors are using perceptual shorthand in making their charging decisions. This could also be a product of the race of the juveniles who are present at this stage of the system. In other words, more Blacks could be in the system at this point, thereby contributing to this problem. As Leiber and Rodriguez (2010) point out, more education and training are necessary for persons that work within the court system. At this point, education and training are minimal and sometimes ineffective; thus, the development of sound training materials and processes is important to reducing the instances of DMC in this point of the court process.

The second implication is for the use of propensity score matching. This technique's clear results indicate that race is a factor in the decision to petition a delinquency case in the juvenile court. This technique allows us to work with a sample of similarly situated Black and White youth that are balanced on the independent measures that represent the focal concerns theory. In other words, we are able to develop a quasi-experimental design to test the connection between race and the decision to petition a delinquency case in the juvenile court. We believe from the outset that other researchers need to incorporate propensity score matching in their research on disproportionate minority contact.

No study is devoid of limits, and our study had numerous limits. First, our measurement of focal concerns theory measures is not extensive. These measures did, however, provide enough information for balancing during the propensity score matching process. Second, probing prosecutors about their depictions of the alleged acts is not possible with these data. While this will shed light on how stereotypes are used, the present study provides a foundation for the probing. Third, some may criticize the propensity score matching technique because all of the necessary measures may not be present. We examine this issue and determined that missing measure would have to have a large effect to change our results.

Despite the limits, the present study shows that race influences the decision whether to petition. In particular, Black youth more than White youth are likely to have their delinquency cases petitioned to court. This indicates that prosecutors are using perpetual shorthand to make these decisions. Future studies that probe prosecutors about their depictions of different acts and potential actors will extend our understanding of how focal concerns are used in the decision to petition process. For now, the present study shows that Black youth more than White youth were likely to have their delinquency cases petitioned to juvenile court.

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Appendix A: Factor-Weighted Attitude Scales

We believe that our use of propensity score matching is successful. Our belief comes from our use of two pieces of information. We use the t-test to provide an indication of statistical significance to assess the bias between the two groups. In general, this use is a supplementary piece of information because it may have biases. The reason for the biases occurs because the t-test uses sample size (Flury & Riedwyl, 1986), and the propensity score matching literature is unclear whether the t-test in this part of the analysis is a paired t-test or an independent samples t-test. Mason (1989) argues that researchers should use paired sample t-tests when dealing with matched groups. While the t-test provides supplementary piece of information, this is the one piece of information. The second piece of information comes from our use of standardized bias. Because the need is present to accurately determine if the propensity score matching process has worked properly, the t-test may not be the only information necessary because of the reliance on the sample. The standardized bias provides a means to calculate the standard distance between two means with the confounding the comes from the sample size (Flury & Riedwyl, 1986). Guo and Fraser (2009) concur with Austin (2009) that standardized biases that are above -10 and below 10 indicate satisfactory balancing in the propensity score matching process.