

Proposal Details

Personal Information

Name	Mr. Matthew N Gaertner
Informal Name	Matt
Institution / Affiliation	University of Colorado at Boulder
Unit / Department	Education; Research and Evaluation Methodology
Title	Doctoral Candidate
Preferred Mailing Address	14094 Blue River Trail
City	Broomfield
Country	United States
State	CO
Zip/Postal Code	80023
Email	matthew.gaertner@colorado.edu
Phone	650-823-4320
Fax	

Faculty Advisor

Name	Dr. Edward W Wiley
Informal Name	Ed
Institution / Affiliation	University of Colorado at Boulder
Unit / Department	Education; Research and Evaluation Methodology
Title	Assistant Professor
Preferred Mailing Address	UCB 249
City	Boulder
Country	United States
State	CO
Zip/Postal Code	80301
Email	ed.wiley@colorado.edu
Phone	303-492-5204
Fax	

Financial Representative

Name	Ms. Pat McDonald
Informal Name	Patty
Institution / Affiliation	University of Colorado at Boulder
Unit / Department	School of Education
Title	Executive Assistant to the Dean

Preferred Mailing Address	UCB 249
City	Boulder
Country	United States
State	CO
Zip/Postal Code	80301
Email	pat.mcdonald@colorado.edu
Phone	303-492-6939
Fax	

Project Description I

Title:

Assessing a New Approach to Class-Based Affirmative Action

Statement of the research problem and national importance:

In November, 2008, Colorado and Nebraska voted on amendments seeking to eliminate consideration of race, gender, and national origin in the operation of public education. Passage of these amendments would have ended race-based affirmative action at public universities in those states. In anticipation of the vote, Colorado's flagship public institution – The University of Colorado at Boulder (CU) – explored new statistical approaches to support class-based affirmative action. This study details the development, implementation, and evaluation of this method of identifying disadvantaged applicants in undergraduate admissions.

Few debates in higher education are as charged and divisive as affirmative action. In the last decade, court cases and ballot initiatives have reshaped and profoundly limited the practice of race-based affirmative action (Long, 2007). The increased popularity of class-based affirmative action is partially attributable to the apparent vulnerability of race-based policies to court rulings and ballot initiatives. That vulnerability shows little sign of waning; the Supreme Court has suggested that in 25 years, race-based admissions policies will no longer be necessary (*Grutter*, 2003), and ballot initiatives intended to ban race-based affirmative action will likely continue to surface (Moses, Yun, & Marin, 2009). It is critical, then, that we carefully examine class-based policies that arise as the political viability of race-based affirmative action begins to erode.

Implementing class-based policies is methodologically complex, and I argue much of the trouble owes to disagreement over what class-based policies should actually accomplish. Deborah Malamud (1997) observes that supporters of class-based affirmative action are divided into two camps: "race-neutral" supporters, who favor class-conscious admissions solely as a remedy for economic hardship, and

“race-conscious” supporters, who believe class-based considerations can maintain or augment racial diversity. Ostensibly, class-based admissions policies place a “thumb on the scale” for applicants who have faced obstacles to upward mobility (Kahlenberg, 1997). We further expect class-based approaches to admit a group of students more socioeconomically diverse than groups admitted in the absence of such a policy. Ideally, class-based approaches would be evaluated according to their success achieving these goals. However, because race and class are highly correlated, class-based approaches often take hold in the wake of a ban on race-based affirmative action. As such, these policies are usually evaluated in terms of their success maintaining levels of racial diversity in the absence of race-based policies (e.g., Hinrichs, 2009; Long & Tienda, 2008).

Even under this narrow definition of outcomes, most of the debate surrounding class-based affirmative action has taken place in an empirical vacuum (Sander, 1997). Published analyses tend to focus on a particular flavor of class-based affirmative action – “Top X%” plans, where a sufficiently high class rank in high school would guarantee admission to a state university. The failure of Top X% plans to maintain rates of minority representation has been widely documented (e.g., Long, 2004; Long, 2007; Long & Tienda, 2008). Supporters of class-based approaches emphasize the need to account for the obstacles unique to *individual* applicants, but for the most part, more sophisticated class-based programs using applicant-level information have been evaluated only hypothetically, via simulation studies (e.g., Carnevale & Rose, 2004). To date, no studies have empirically investigated the effects of class-based policies on undergraduate admissions decisions.

The approach toward class-based affirmative action I am in the process of developing at CU aims to address some of the shortcomings I outline above. Using a nationally representative dataset (ELS:2002; U.S. Department of Education, 2006), I have developed operational definitions of disadvantage that can be readily applied in admissions decisions. I am conducting randomized experiments to estimate the effects of implementing CU’s class-based approach on both the racial and socioeconomic diversity of accepted classes. Further, I am using historical student records at CU to explore the likelihood of college success for the beneficiaries of a class-based approach.

I argue that CU represents a certain class of institutions – large, moderately selective public universities – that has up to this point been underrepresented in affirmative action scholarship. Moreover, research suggests that unlike highly selective schools, these moderately selective institutions field applications from disadvantaged students for whom the stakes are much higher: Many low-income and minority applicants may not have the opportunity to attend a four-year college if they are refused admission to a school like CU (Hurtado, Inkelas, Briggs, & Rhee, 1997). When race-based policies are overturned, these institutions may struggle to develop new race-blind metrics to identify applicants who have faced adversity. The approach I describe in the sections that follow may provide a method to help quantify the barriers these students encounter.

Review the literature and establish a theoretical grounding for the research:

Over the past 30 years, race-based affirmative action has sustained numerous challenges. In the courts, *Regents of the University of California v. Bakke* (1978) prohibited reserving admissions spots for minorities. *Bakke* has since been revisited (e.g., *Hopwood v. Texas*, 1996) and essentially affirmed (*Gratz v. Bollinger*, 2003; *Grutter v. Bollinger*, 2003). Beginning in the mid-1990s, affirmative action was challenged at the ballot box. California, Washington, Michigan, Colorado, and Nebraska voted on variants of the "Civil Rights Initiative," intended to ban race-conscious admissions. The measure passed in every state except Colorado (Moses, Yun, & Marin, 2009).

Several institutions implemented class-based affirmative action in response to these bans (Long, 2004; Long, 2007; Laird, 2005). Class-sensitive admissions policies seemed well suited to replace race-based affirmative action; the strong relationship between race, social class, and "life chances" (cf., Weber, 1946) has been widely documented (Kahlenberg, 1997). Many early class-based programs took the general form of Top X% plans (Long, 2004; Long, 2007). Although relatively simple to implement, these plans were met with some skepticism (e.g., Tienda & Niu, 2006), and subsequent empirical research has underscored their deficiencies (Long, 2004; Long, 2007; Long & Tienda, 2008; Hinrichs, 2009).

In his 1997 book, *The Remedy*, Richard Kahlenberg stressed the inadequacy of class-based approaches – such as Top X% plans – where applicant-level considerations are implicitly absent (Kahlenberg, 1997). Rather, he argued that successful class-based policies would rely on applicant-level characteristics (e.g., family income) as well as neighborhood- or high-school-level data (e.g., concentration of poverty). Sociological literature aligns nicely with Kahlenberg's suggestions. In the context of college admissions, socioeconomic status (SES) has been shown to exert a powerful influence on one's likelihood of attending a four-year college (Kinzie et al., 2004; Baker & Velez, 1996; Orfield, 1990; Hearn, 1984; McDill & Coleman, 1965). Moreover, SES has been shown to significantly impact the academic measures admissions officers use to gauge applicants' college readiness (Cameron & Heckman, 2001; Hu & St. John, 2001; Perna, 2000; U.S. Department of Education, 1999; Astin, 1997; Hurtado et. al., 1997; Manski & Wise, 1983). Still, scant research exists examining the impact of implementing the sort of system Kahlenberg proposes. The most thorough treatment available describes a class-based system developed for UCLA's School of Law. This approach increased socioeconomic diversity, but minority representation fell substantially (Sander, 1997).

These documented failings served to vindicate conclusions of prominent affirmative action researchers. In *The Shape of the River*, William Bowen and Derek Bok addressed the question of whether or not class-based policies could adequately replace race-conscious admissions (Bowen & Bok, 1998). Their conclusions are

clear and intuitive: Racial diversity should plummet under class-based affirmative action, because minority status and poverty are not perfectly correlated. As economist Thomas Kane notes, “No race-blind substitute can substantially cushion the effect of ending racial preferences. The problem is one of demographics” (Kane, 1998, p.448). Subsequent research has generally echoed these conclusions (Espenshade & Radford, 2009; Bowen, Kurzweil, & Tobin, 2005; Espenshade & Chung, 2005; Sander 2004; Carnevale & Rose, 2004; Studley, 2003).

The University of Colorado’s approach, implemented in Fall 2009, differs meaningfully from those elaborated above. Following from Kahlenberg’s work, I seek to measure the obstacles to life chances each applicant has faced, and the extent to which that applicant has overcome those obstacles. Obstacles to life chances are quantified as the increase or reduction, owing to socioeconomic circumstance, in an applicant’s likelihood of attending a four-year college. I term this measure “Metric 1.” Overcoming obstacles is quantified as the extent to which an applicant’s high school academic credentials exceed what is expected, conditional on socioeconomic factors. This is “Metric 2.” Below I elaborate on the statistical methods that underlie each Metric.

Metric 1

I first specified the following binary logistic regression model:

$$P(Y_i = 1) = e^{(a + \beta X_i + \xi Z_i)} / (1 + e^{(a + \beta X_i + \xi Z_i)})$$

In the model above, Y_i is a dichotomous variable taking a value of 1 if applicant i enrolls in a four-year college, and 0 otherwise. Let \mathbf{X} be a vector of academic credentials and \mathbf{Z} be a vector of circumstance measures. Let β and ξ represent the two vectors of parameters associated with \mathbf{X} and \mathbf{Z} , respectively.

I compute two probabilities for each applicant. The first represents the probability that the applicant will enroll in college given his or her academic credentials (\mathbf{X}_i) and circumstance measures (\mathbf{Z}_i). The second is identical to the first, with one important distinction: The values for circumstance variables are fixed at those of the modal applicant. Metric 1 represents the difference between these two probabilities:

$$P(Y_i = 1 | a, \beta \mathbf{X}_i, \xi \mathbf{Z}_i) - P(Y_i = 1 | a, \beta \mathbf{X}_i, \xi \mathbf{Z}_{\text{mode}})$$

I estimated this model using the Education Longitudinal Study (ELS:2002) dataset. I present the variables included in Metric 1, along with parameter estimates, in Appendix A. Applicants with Metric 1 values one standard deviation below the mean are flagged as experiencing a “moderate decrease” in their likelihood of attending college; two standard deviations below the mean constitutes a “severe decrease.”

Metric 2

I calculate two to three values for each applicant, deriving from that applicant’s (1) high school GPA, (2) ACT composite, and (3) SAT combined scores.

These measures rely on multiple regression models estimated from ELS:2002. For any given academic credential Y , Metric 2 is based on e_i , the residual from the linear model specified below:

$$e_i = Y_i - \alpha + \theta \mathbf{K}_i$$

In this model, \mathbf{K} is a vector of socioeconomic measures and θ is a vector of parameters associated with \mathbf{K} .

I present the variables used in Metric 2, along with parameter estimates, in Appendix B. Applicants with residual e_i one standard deviation above the mean are flagged as exhibiting "high achievement;" two standard deviations above the mean constitutes "extraordinary achievement."

Identification under either Metric can serve as a primary or secondary factor for admission. Secondary factors (e.g., extra-curricular activities) are generally less significant, but primary factors (e.g., SAT scores) are quite influential. Table 1 in Appendix C presents the nine mutually exclusive and exhaustive categories of identification under Metrics 1 and 2. The statistical models I present above, coupled with the implementation procedures detailed in Appendix C, form the conceptual grounding for CU's system of class-based affirmative action.

Describe the research method that will be used:

Research Question 1: What measures can be crafted from the data available on college applicants to quantify socioeconomic disadvantage?

The Metrics I describe in the background section are candidate measures of disadvantage for use in college admissions. Still, the thresholds I established for identification under the Metrics (i.e., one and two standard deviations from the mean) are by no means sacrosanct. These cut-points were set such that the Office of Admissions would identify a manageable number of applicants for additional consideration. I am proposing latent class analysis (LCA) to further investigate the reasonableness of this approach (Lazarsfeld & Henry, 1968). This technique enables classification of applicants into unobserved categories using a battery of observed variables. In fact, CU implements the Metrics in admissions decisions via conceptually similar means – by assigning applicants to one of the nine categories elaborated in Appendix C.

I will estimate latent class models using ELS:2002, and I will include each variable that contributes to the Metrics. The group of observed variables I employ comprises both categorical and continuous measures. The concomitant-variable latent class model – proposed by Dayton and Macready (1980) – is capable of handling such data. For each applicant, I will estimate the probability of membership in each latent class. I will compare classifications using LCA to the classifications made using the Metrics. Additionally, LCA offers goodness-of-fit statistics that are unavailable under the Metrics. Specifically, I will use AIC, BIC, and χ^2 statistics to diagnose the fit of each latent class model I specify (Hagenaars & McCutcheon, 2002). These analyses should provide insight regarding the extent

to which classification under the Metrics is reproduced using wholly alternate techniques.

Research Question 2: To what extent does the implementation of class-based affirmative action change the likelihood of acceptance for low-SES and minority students?

In this section I will briefly review preliminary findings to help introduce further proposed research. Because Colorado's Civil Rights Initiative was defeated in 2008, CU continues to use race in its affirmative action system. To further "beta test" CU's experimental class-based approach during the Fall 2009 application cycle, I randomly sampled 478 applications. Each was reviewed once using the official race-based policy, and again using Metrics – with all race identifiers removed. Results from this experiment are summarized in Table 2 (Appendix D). Somewhat surprisingly, underrepresented minority (URM) applicants saw an increased likelihood of acceptance under the class-based approach, compared to race-based affirmative action. I argue these findings highlight the importance of the size of the boost conferred by identification under a class-based approach. Under Metrics 1 and 2, identification can be considered a primary factor. Under race-based affirmative action at CU, minority status is a secondary factor. The conclusion here seems relatively straightforward: Like any class-based methodology, Metrics 1 and 2 are somewhat inefficient identifiers of minority applicants. Still, minorities that this approach does identify are usually conferred a larger boost than they would have been granted under race-based affirmative action.

For the Fall 2010 admissions cycle, CU moved to a hybrid "race-plus-class" affirmative action framework. To assess the impact of this change, I am proposing to conduct a new randomized controlled experiment. As a starting point, I will randomly sample 1,000 "borderline" applications. This group will be composed of applications the Office of Admissions has determined are neither clear refusals nor clear admits. Prior research on college admissions suggests that identification by a class-based affirmative action system will likely carry the most weight for applicants of this sort (Willingham & Breland, 1982). I will randomly assign half the sample to application review using both race and the Metrics (i.e., a race-plus-class approach), and the other half to review using race-based affirmative action only. I consider those who undergo race-plus-class review the treatment group; those reviewed under the race-based approach comprise the control group. As with the experiment detailed in the paragraph above, outcomes of interest will include comparative acceptance rates for poor and minority students, as well as acceptance rates for those identified by the Metrics.

Research Question 3: What is the likelihood of college success for students admitted under a class-based policy?

In Table 5 (Appendix E), I present academic credentials for all applicants in the first experiment. As we might expect, class-based admits (i.e., those accepted under Metrics 1 and 2 who were *not* accepted under the official race-based policy) exhibit both low SES and marginal academic credentials. Admitting students of this sort may introduce "academic mismatch" (Sander, 2004; Espenshade & Radford,

2009; Bowen & Bok, 1998; Bowen, Chingos, & McPherson, 2009). These students were rejected under the official race-based policy at CU, so it is not possible to follow their progress in college. To investigate the issue empirically, I have instead collected high school and college data from 21,100 students who first enrolled at CU between 2000 and 2003. I propose creating a matched set of students from this historical dataset to serve as proxies for the class-based admits described in Appendix E. The literature on propensity score matching (PSM) offers techniques that will be helpful in this regard (Rosenbaum & Rubin, 1983).

Specifically, I will utilize greedy (a.k.a. "nearest neighbor") and full matching to accomplish this task (e.g., Hansen, 2004). To predict membership in the historical group of class-based admits, matching algorithms will use all the socioeconomic measures and high school academic credentials available in the historical dataset. The outcomes of primary importance for this matched group include four- and six-year graduation rates, cumulative CU GPA, and credit hours earned. Preliminary analyses of historical data indicate CU has been willing to accept lower college outcomes in order to admit marginally qualified but underrepresented students. For example, 55% of race-based admits in the historical dataset graduated from CU in six years; that figure was 66% for all other students. If that disparity is comparable to what we see contrasting the matched class-based admits with all other students, we might conclude that CU is not making any worse a tradeoff with class-conscious admissions than it has admitting underrepresented students in the past.

Project Description II

Will you use NCES target dataset? Yes

Please check all NCES datasets that apply
- Educational Longitudinal Study of 2002 (ELS: 2002)

Explain why each dataset best serves this research. Include a variable list for each dataset used.

ELS:2002 was an essential resource for the development of CU's class-based affirmative action system. The reasons are both procedural and theoretical. From a procedural standpoint, ELS:2002 is by far the most complete resource I could find for estimating the impact of socioeconomic status on both four-year college enrollment and high school academic credentials. Historically, CU has not collected detailed socioeconomic data from its applicants, nor has it investigated whether applicants who did not come to CU eventually enrolled in another four-year institution. Because ELS:2002 collected an abundance of socioeconomic and academic data from respondents in high school, and tracked students' progress beyond high school, it is uniquely ideal for the estimation of Metrics 1 and 2.

From a theoretical standpoint, ELS:2002 allowed me to avoid a feature of other class-based approaches I deemed unsuitable for CU – the weighting of socioeconomic factors according to simulated enrollment outcomes. Estimation via ELS:2002 provided straightforward methods (i.e., ordinary least squares and

maximum likelihood estimation) of assigning weights to the various socioeconomic factors that influence both college enrollment and high school academic performance. Moreover, I have proposed estimating latent class models using ELS:2002 to examine the robustness of CU's approach to other plausible model specifications.

In Appendix F of the Project Description, I provide a list of ELS:2002 variables I used. Not all of these variables are employed in the models underlying the Metrics, but each was useful for the investigation.

Will you use NSF target dataset? No

Explain why each dataset best serves this research. Include a variable list for each dataset used.

Will you address the NPEC focus topic? Yes

If yes, please briefly describe:

The research I propose covers CU's system of class-based affirmative action; this line of inquiry fits nicely within the 2010 NPEC focus topic. In addition, I believe my work should provide useful information for future IPEDS data collection efforts. Firstly, the parameters I have estimated to calculate Metrics 1 and 2 are instructive in and of themselves (available in Appendixes A and B of the Project Description). For example, these models suggest parental education, family income, family size, and neighborhood poverty substantially influence college enrollment and academic achievement. The latent class models I have proposed should yield an additional set of estimates that will help us measure these relationships. Secondly, I have proposed a matching study using historical CU data that will devote particular attention to the influence of socioeconomic status and high school attainment on college success. Results in this regard should prove useful to future IPEDS data collections. At present, IPEDS is generally focused on institutional characteristics, demographic descriptors of student populations (e.g., race and gender), and summaries of financial aid systems. Researchers currently use this dataset to assess the impact of affirmative action bans (e.g., Hinrichs, 2009). I argue class-based affirmative action will gain momentum in coming years. It will be critical that IPEDS be populated with the sort of measures (e.g., family income and parental education) researchers use to determine the impact of implementing these programs on campuses' economic diversity.

Project Description III

Provide a timeline of key project activities:

April 30 - May 4, 2010:	Present preliminary findings at Division D invited session: "Exemplary Work from Promising Researchers" at AERA annual meeting in Denver, CO
May 5 - May 31, 2010:	Complete oral defense of research proposal for dissertation committee; conduct randomized controlled experiment to investigate "race-plus-class" approach
June 1 - June 30, 2010:	Specify latent class models for alternate classification analysis; run matching algorithms for analysis of historical CU data
July 1 - August 31, 2010:	Investigate estimates from latent class analysis, race-plus-class experiment, and matched historical student data
July 15, 2010:	Submit AERA proposal covering assessment of class-based affirmative action
August 1, 2010:	Submit NCME proposal focusing specifically on latent class analysis
September 1 - November 30, 2010:	Finalize analysis of latent class models, race-plus-class experiment, and matched historical student data; write up results for these three sections.
November 1, 2010:	Renew IRB protocol with CU Human Research Committee
December 1, 2010 - March 31, 2011:	Combine report on latent class analysis, race-plus-class experiment, and matched historical student data with introduction, literature review, and preliminary findings for full report
December 18, 2010:	Submit mid-year progress report to AIR
April 1 - April 30, 2011:	Finalize full report, prepare presentations for AIR forum, AERA, and NCME
April 8 - April 12, 2011:	Present research at AERA and NCME in New Orleans, LA
May 21 - May 25, 2011:	Present research at AIR forum in Toronto, Canada
June 30, 2011:	Submit final report to AIR

List deliverables such as research reports, books, and presentations that will be developed from this research initiative:

First and foremost, I will submit my final research report to AIR in June, 2011 and will present findings at the 2011 AIR Forum in Toronto, Canada. I will also be discussing preliminary findings at an invited AERA Division D session, detailed further in the dissemination section. In addition, I will submit proposals for the 2011 meetings of AERA and NCME. The AERA presentation will more broadly cover this research and its implications for college admissions, while the NCME presentation will focus specifically on the latent class analysis I have proposed. I will also seek to share this research with the National Association of College Admissions Counselors (NACAC). Internally, I will produce a report summarizing preliminary findings from the first year of implementation to the CU Office of Admissions in June, 2010. As noted in the dissemination section, I expect this work will generate scholarly manuscripts, which I plan to submit to the *Journal of Higher Education*, *Research in Higher Education*, the *Review of Higher Education*, and *Educational Evaluation and Policy Analysis*.

Describe how you will disseminate the results of this research:

In April, 2009, I presented this research in proposal form at the Division D In-progress Research Gala at the annual meeting of the American Educational Research Association (AERA). The presentation won second place at the Gala, and I have been selected to present preliminary findings at an invited Division D session ("Exemplary Work from Promising Researchers") at AERA 2010. I also presented the statistical models underlying Metrics 1 and 2 at the annual meeting of the National Council on Measurement in Education (NCME) in April, 2009.

I expect my full dissertation will generate additional conference presentations and scholarly publications. Firstly, I plan to present this research at the 2011 AIR Forum in Toronto, Canada. In addition, I will submit proposals stemming from this research for the annual meetings of both AERA and NCME, to be held in April 2011 in New Orleans, LA. I will also share the results of this study with the National Association of College Admissions Counselors (NACAC). Finally, I will discuss the results of this study through formal and informal presentations with students and faculty at the University of Colorado. I plan to submit manuscripts covering this work to the *Journal of Higher Education*, *Research in Higher Education*, the *Review of Higher Education*, and *Educational Evaluation and Policy Analysis*.

Provide a reference list of sources cited:

-
- Astin, A. W. (1993). *What Matters in College? Four Critical Years Revisited*. San Francisco, CA: Jossey-Bass.
- Baker, T., & Velez, W. (1996). Access to and Opportunity in Postsecondary Education in the United States: A Review. *Sociology of Education*. 69 (Extra Issue: Special Issue on Sociology and Educational Policy: Bringing Scholarship and Practice Together), 82-101.
- Bowen, W. G., & Bok, D. (1998). *The Shape of the River: Long-Term Consequences of Considering Race in College and University Admission*. Princeton, NJ: Princeton University Press.
- Bowen, W. G., Chingos, M. M., & McPherson, M. S. (2009). *Crossing the Finish Line: Completing College at America's Public Universities*. Princeton, NJ: Princeton University Press.
- Bowen, W. G., Kurzweil, M. A., & Tobin, E. M. (2005). *Equity and Excellence in American Higher Education*. Charlottesville, VA: University of Virginia Press.
- Cameron, S. V., & Heckman, J. J. (2001). The Dynamics of Educational Attainment for Black, Hispanic, and White Males. *Journal of Political Economy*. 109(3), 455-499.
- Carnevale, A., & Rose, S. (2004). *Socioeconomic Status, Race/Ethnicity, and Selective College Admissions*. New York, NY: The Century Foundation.
- Dayton, C. M., & MacReady, G. B. (1988). Concomitant Variable Latent Class Models. *Journal of the American Statistical Association*. 83, 173-178.
- Espenshade, T. J., & Chung, C. Y. (2005). The Opportunity Cost of Admission Preferences at Elite Universities. *Social Science Quarterly*. 86, 293-305.
- Espenshade, T. J., & Radford, A. (2009). *No Longer Separate, Not Yet Equal: Race and Class in Elite College Admissions and Campus Life*. Princeton, NJ: Princeton University Press.
- Ferguson, G. A. (1981). *Statistical Analysis in Psychology and Education*. (5th ed.). Auckland: McGraw-Hill.
- Gratz v. Bollinger*, 539 U.S. 244 (2003).
- Grutter v. Bollinger*, 539 U.S. 306 (2003).
- Hagenaars, J. A., & McCutcheon, A. (2002). *Applied Latent Class Analysis*. Cambridge: Cambridge University Press.
- Hansen, B. B. (2004). Full Matching in an Observational Study of Coaching for the

- SAT. *Journal of the American Statistical Association*. 99, 609-618.
- Hearn, J. C. (1984). The Relative Roles of Academic, Ascribed, and Socioeconomic Characteristics in College Destinations. *Sociology of Education*. 57(1), 22-30.
- Hinrichs, P. (2009). *The Effects of Affirmative Action Bans on College Enrollment, Educational Attainment, and the Demographic Composition of Universities*. Washington, DC: Georgetown Public Policy Institute.
- Hopwood v. Texas*, 78 F.3d 932 (5th Cir. 1996), cert. denied, 518 U.S. 1033 (1996).
- Hu, S., & St. John, E. P. (2001). Student Persistence in a Public Higher Education System: Understanding Racial and Ethnic Differences. *The Journal of Higher Education*. 72(3), 265-286.
- Hurtado, S., Inkelas, K. K., Briggs, C., & Rhee, B. (1997). Differences in College Access and Choice Among Racial/Ethnic Groups: Identifying Continuing Barriers. *Research in Higher Education*. 38(1), 43-75.
- Kahlenberg, R. D. (1997). *The Remedy: Class, Race, and Affirmative Action*. New York: Basic Books.
- Kane, T. J. (1998). *Misconceptions in the Debate Over Affirmative Action in College Admissions*. Cambridge, MA: Harvard Education Publishing Group.
- Kinzie, J., Palmer, M., Hayek, J., Hossler, D., Jacob, S., & Cummings, H. (2004). *Fifty Years of College Choice: Social Political and Institutional Influences on the Decision-making Process*. Indianapolis, IN: Lumina Foundation for Education: New Agenda Series.
- Laird, B. (2005). *The Case for Affirmative Action in University Admissions*. Berkeley, CA: Bay Tree Publishing.
- Lazarsfeld, P. R., & Henry N. W. (1968). *Latent Structure Analysis*. Boston, MA: Houghton-Mifflin.
- Long, M. C. (2004). Race and College Admission: An Alternative to Affirmative Action? *Review of Economics and Statistics*. 86(4), 1020-1033.
- Long, M. C. (2007). Affirmative Action and its Alternatives in Public Universities: What Do We Know? *Public Administration Review*. 67(1), 311-325.
- Long, M. C., & Tienda, M. (2008). Winners and Losers: Changes in Texas University Admissions Post-Hopwood. *Educational Evaluation and Policy Analysis*. 30(3), 255-280.
- Malamud, D. C. (1997). Assessing Class-Based Affirmative Action. *Journal of Legal*

Education. 47, 452.

Manski, C. F., & Wise, D. A. (1983). *College Choice in America*. Cambridge, MA: Harvard University Press.

McDill, E. L., & Coleman, J. (1965). Family and Peer Influences in College Plans of High School Students. *Sociology of Education*. 38(2), 112-126.

Moses, M. S., Yun, J. T., & Marin, P. (2009). Affirmative Action's Fate: Are 20 More Years Enough? *Education Policy Analysis Archives*, 17(17). Retrieved 9/20/2009 from <http://epaa.asu.edu/epaa/v17n17/>.

Orfield, G. (1990). Public Policy and College Opportunity. *American Journal of Education*. 98(4), 317-350.

Perna, L. W. (2000). Differences in the Decision to Attend College among African Americans, Hispanics, and Whites. *The Journal of Higher Education*. 71(2), 117-141.

Regents of the University of California v. Bakke, 438 U.S. 265 (1978).

Rosenbaum, P., & Rubin, D. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika* 70(1), 41-55.

Sander, R. H. (1997). Experimenting With Class-Based Affirmative Action. *Journal of Legal Education*. 47, 472-503.

Sander, R. H. (2004). A Systemic Analysis of Affirmative Action in American Law Schools. *Stanford Law Review*. 57, 367-483.

Studley, R. (2003). Inequality, Student Achievement, and College Admissions: A Remedy for Underrepresentation. *Center for Studies in Higher Education*. Paper CSHE1-03. <http://repositories.cdlib.org/cshe/CSHE1-03>

Tienda, M. & Niu, S. (2006). Flagships, Feeders, and the Texas Top 10% Plan. *Journal of Higher Education*. 77(4), 712-739.

U.S. Department of Education, National Center for Education Statistics (1999). *Projected Postsecondary Outcomes of 1992 High School Graduates*. Working Paper No. 1999-15, by Phillip Kaufman and Xianglei Chen. Project Officer, C. Dennis Carroll. Washington, D.C.

U.S. Department of Education, National Center for Education Statistics (2006). *Education Longitudinal Study (ELS), 2002/06*. Washington, D.C.

Weber, M. (1946). Class, Status, and Party. In *From Max Weber: Essays in Sociology*, eds. H. H. Gerth and C. W. Mills. 180-195. New York: Oxford University Press.

Willingham, W. W. & Breland, H. B. (1982). *Personal Qualities and College Admissions*. New York: College Entrance Examination Board.

IRB Statement

Statement of Institutional Review Board approval or exemption:

This research project was reviewed and granted exempt status by the University of Colorado's Human Research Committee (i.e., IRB panel) as of December 9, 2009. The review cycle for all projects approved by this panel is 12 months; prior to December 9, 2010, I will renew this protocol to obtain an additional 12-month exempt approval. The notice of approval is available upon request.

Statement of Use of Restricted Datasets

This research requires analysis of the ELS:2002 restricted-use dataset. I currently have the license that permits me to access those data.

Biographical Sketch

I am a doctoral candidate in the Research and Evaluation (REM) program in the School of Education at the University of Colorado at Boulder (CU). I hold a B.A. in Psychology and English from Georgetown University. My methodological concentration in REM is applied statistics and psychometrics; substantively, my research focuses on disadvantaged populations in K-12 and post-secondary education. In my time at CU, I have taken doctoral-level courses in mathematical statistics, regression analysis, structural equation modeling, multilevel modeling, Rasch measurement, advanced psychometrics, and econometrics. For the past year, I have been funded through a research assistantship at CU's Office of Admissions. In this role, I provide statistical expertise for modeling student application and matriculation patterns. I also assist the office in targeted recruitment of minority applicants and first-generation college students. For the most part, however, my work at the Office of Admissions has focused on the development of the class-based affirmative action system that is the focus of this proposal. Work on this system began in the summer of 2008, and since then has generated conference presentations at the annual meetings of the American Educational Research Association (AERA) and the National Council on Measurement in Education (NCME). Notably, my preliminary research was awarded second place at the AERA Division D In-Progress Research Gala, and I have been selected to give

an invited presentation at AERA 2010, in the Division D session "Exemplary Work from Promising Researchers."

Outside my work for the Office of Admissions, I have participated in a variety of other research projects at CU. I recently concluded a study of school closure in Denver, CO. Using a large, district-wide dataset, I applied hierarchical linear models to estimate the impact of a closure on affected students. This research was presented at AERA in 2009, and was recently submitted to *Educational Evaluation and Policy Analysis*, where it is under review. I am also currently working on a study of the voter attitudes and voting behavior that led to the defeat of Amendment 46 – the Colorado Civil Rights Initiative – in November, 2008. I will present findings from this research at AERA 2010. Other recent work at CU has taken on a decidedly psychometric focus, including a working paper – "Detecting and Addressing Item Parameter Drift in IRT Test Equating Contexts" – I co-authored with Professor Derek Briggs for the Center for Assessment. Additionally, I authored a report for the testing agency Measured Progress based on cognitive interviews I conducted for the Montana Office of Public Instruction. The aim of that study was to refine Montana's assessments for students with disabilities.

In addition to the work outlined above, I conducted statistical analyses and developed survey weighting procedures for an evaluation of an alternative teacher compensation program (Denver ProComp). I also participated in an effort to aid the Charter School Growth Fund in identifying charter schools producing exemplary growth in student achievement. Both of these projects involved management and analysis of large student-level datasets. At AERA 2008, I presented findings from a qualitative research project examining the impact of new playground structures at inner-city schools. I am a graduate student reviewer for the NCME journal *Educational Measurement: Issues and Practice*, and I review measurement- and statistics-related proposals for AERA. I am a current member of AERA, NCME, and The Psychometric Society.

Prior to coming to CU, I held the position of Research Scientist at American Institutes for Research (AIR) in Palo Alto, CA. I worked at AIR for seven years; my research there involved both quantitative and qualitative analyses of educational and health policy reforms. As an analyst with the Gates Small High Schools Evaluation, I conducted site visits to Gates-funded schools and headed the analysis of teacher assignments and student work using Many-Facet Rasch Measurement techniques. I presented findings from this research at AERA 2006. For the First 5 California Initiative, I managed efforts to aggregate and weight population-based data for 23 key indicators of wellbeing for children aged 0-5. Both the Gates and First 5 projects required analysis of large-scale datasets with complex sampling designs and weighting procedures. Through my work at CU and AIR I have become proficient in a variety of statistical software packages, including SAS, R, Stata,

GAUSS, Mathematica, Latent GOLD, and SPSS. Each of these applications has been useful in my research on class-based affirmative action. I anticipate that this skill set, along with my considerable experience in policy analysis, will be tremendously helpful as I carry out my dissertation.

Budget Requirements

Salary/Stipend: \$15500.00
Tuition and fees: \$2000.00
Travel: \$1000.00
Other travel related expenses: \$0.00
Other research expenses: \$500.00
Total Request: \$19000.00

Funding History

Research assistantships and a doctoral fellowship through the School of Education have thus far covered the costs of my tuition and provided a monthly stipend. My research on class-based affirmative action has been funded by my appointment at the Office of Admissions. That funding will end in May, 2010. At that point, I will have dissertation credit hours (although no formal courses) remaining as a requirement for completion of the Ph.D. I have set aside a portion of the proposed budget to pay for those credit hours. I have not submitted the proposed research for funding from any other organization.