

2007 AIR/NPEC RESEARCH GRANT PROPOSAL

**The *Matthew Effect* in Postsecondary Remediation:
Testing the Efficacy of Remediation across Varying Depths and Breadths of Under-Preparation**

Data Set:
Population Cohort of 67,079 Students Enrolled in 107 Community Colleges in California

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PROJECT SUMMARY

Postsecondary remediation is a controversial topic on educational policy agendas. On one hand, it fills an important niche in U.S. higher education, simultaneously providing opportunities to develop the minimum skills deemed necessary for participation in the economy and the democracy, to acquire the prerequisite competencies crucial for negotiating college-level coursework successfully, and to rectify disparities in educational opportunities generated in primary and secondary schooling. Moreover, the level of need for postsecondary remediation is startling. Nationwide, more than 40% of college students enroll in remedial coursework, resulting in an estimated direct cost to taxpayers of one to two billion dollars annually. On the other hand, critics argue that taxpayers should not be required to pay twice for the same educational opportunities, that remediation in colleges and universities diminishes academic standards and devalues postsecondary credentials, and that the large number of under-prepared students entering colleges and universities demoralizes faculty. Following from this, some critics have recommended major restructuring of remediation and even the elimination of remedial programs altogether.

In spite of this longstanding and growing debate concerning postsecondary remediation, only very recently have several comprehensive, large-scale, multi-institutional evaluations of postsecondary remedial programs been put forward. Prior to this, most evaluations of postsecondary remedial programs were small-scale or evidenced significant weaknesses, producing findings of questionable value. In other words, only recently has solid evidence begun to accumulate indicating that postsecondary remediation is efficacious with regard to resolving skill deficiencies and advancing academic attainment among under-prepared students.

Yet, despite the recent progress, several important questions concerning the efficacy of postsecondary remediation remain. In particular, it is not yet clear whether remediation is equally successful, or efficacious, for students who have more severe skill deficiencies (the least prepared students), as compared with students who have less severe skill deficiencies (the better prepared remedial students). Similarly, it is not yet clear whether remediation is equally efficacious for students who have multiple skill deficiencies (multiple areas of under-preparation), as compared with students who have only a single skill deficiency. At a minimum, it *is* clear that students who have more severe skill deficiencies, and students who have multiple skill deficiencies, are much less likely to remediate successfully than their singly-deficient and minimally-deficient counterparts. Thus, there is reason to suspect that remediation may not be as beneficial for students who face the most serious obstacles in terms of postsecondary preparation and skill acquisition.

The research I propose here seeks to answer two questions concerning the efficacy of remediation. First, to what extent does *depth* of under-preparation at college entry moderate the effect of successful (vs. unsuccessful) remediation on academic attainment? Second, to what extent does *breadth* of under-preparation at college entry moderate the effect of successful (vs. unsuccessful) remediation on academic attainment? *Depth* of under-preparation refers to the degree of deficiency in a given subject area, while *breadth* of under-preparation refers to the number of basic skill areas in which a given student requires remedial assistance. To answer these questions, I will employ hierarchical multinomial logistic regression to analyze data (already “in hand”) addressing the long-term academic outcomes (credential attainment and transfer) of the entire population (not a sample) of first-time college freshmen who commenced college attendance in the Fall term of 1995 at any of the 107 semester-system community colleges in California. These data track the course-taking progress of this population cohort for a period of six years, and the academic attainment of this cohort for eight years.

The results of this study have profound implications for educational policy. Given the prominence of postsecondary remediation in U.S. higher education, and given the ongoing controversy surrounding remedial programs, which in some sense threatens the existence of remediation in its present form, determining if, and under what conditions, remediation is effective is a matter of first-order importance in shaping higher education in the coming decades. Moreover, the effectiveness of remediation in resolving the effects of under-preparation on academic attainment has critical consequences for many students, and all the more so for students of historically disadvantaged racial/ethnic groups and disadvantaged socioeconomic backgrounds, who are disproportionately represented among remedial students. As a result, the findings of this study will be of interest to all stakeholders in higher education, including policy makers, administrators, researchers, and instructors, as well as their counterparts in secondary education. This study also fits closely with NPEC's focus this year on *preparation for postsecondary education*, as the questions addressed in this project concern the degree to which postsecondary remedial programs effectively resolve the academic consequences of under-preparation for college-level coursework.

Among the innovative aspects of the research proposed here, it is the first study to address questions concerning the moderating effects of skill deficiencies on the effectiveness of remediation. Additionally, it is one of the few large-scale studies of postsecondary remediation involving data addressing a complete and sizeable population ($N_{\text{student}} = 67,079$) enrolled in multiple institutions ($N_{\text{college}} = 107$). Finally, the proposed study employs an expansive time horizon, tracking the academic outcomes of students for eight years following initial enrollment.

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PROJECT DESCRIPTION

Statement of Problem

Postsecondary remediation, variously referred to as “developmental,” “basic skills,” “compensatory,” or “preparatory” education (Tomlinson, 1989), has been described as “the most important educational problem in America today” (Astin, 1998, p. 12). This declaration is not without merit (Immerwahr, 1999), as postsecondary remediation is as remarkable for its sheer scale as it is for its unique function. For example, Parsad, Lewis, and Greene (2003) estimate that, nationwide, nearly three in ten (28%) first-time college freshmen enrolled in remedial coursework (reading, writing, and/or math) during the Fall term of 2000. Adelman (2004a), employing a larger window of observation, estimates that four in ten (41%) college students enroll in remedial coursework at some point during postsecondary attendance. Estimates place the national *direct* cost of public postsecondary remediation at one to two billion dollars annually and the total *direct* and *indirect* public and private costs at nearly seventeen billion dollars annually (Breneman & Haarlow, 1998; Greene, 2000; Phipps, 1998; Saxon & Boylan, 2001).

In addition to the sheer scale of the problem, postsecondary remediation fills a critical niche in U.S. higher education (McCabe, 2003). In a democratic society and a free economy, functional participation depends upon minimum levels of reading, writing, and mathematics skill. Postsecondary remediation embodies a collective societal endeavor to provide individuals with these minimum skills (McCabe, 2003; Day & McCabe, 1997; Phipps, 1998; Roueche, Roueche & Ely, 2001).

Equally important, in a society in which educational attainment constitutes a principal determinant of socioeconomic outcomes (Kerckhoff, Raudenbush & Glennie, 2001), postsecondary remediation is a crucial lifeline in the ascent to economic stability for individuals who lack minimum competencies in fundamental subjects (Day & McCabe, 1997). Postsecondary remediation opens the door to further educational and economic progress by ameliorating deficiencies that obstruct success in acquiring (or, in some cases, even access to) postsecondary credentials (Brothen & Wambach, 2004; McCusker, 1999; Tomlinson, 1989). Given the impracticality of sending adults back to primary or secondary school to acquire necessary skills, remediation is an indispensable bridge to postsecondary credentials over the chasm of inadequate preparation (McCabe, 2000; Roberts, 1986).

Finally, postsecondary remediation is unique relative to other aspects of the educational system in that it is *not* designed to sort individuals into strata of attainment (Spring, 1976). Rather, it is intended ostensibly to equalize attainment, reducing disparities between disadvantaged and advantaged groups (Mills, 1998; Roueche, Roueche &

Ely, 2001). This is a particularly important function given that the funding structure of public primary and secondary education in the U.S., which is based in part on local taxes, guarantees substantial inequities in the quality of education offered to students (Cohen & Johnson, 2004; Condrón & Roscigno, 2003; Walters, 2001). Thus, remediation is, by definition, a "remedy" intended to restore opportunity to those who otherwise may be relegated to meager wages, poor working conditions, and other consequences of socioeconomic marginalization (Boylan & Saxon, 1999; Day & McCabe, 1997; Oudenhoven, 2002; Phipps, 1998; Roueche & Roueche, 1999).

However, despite (or, perhaps, because of) its fundamental importance and sheer scale, postsecondary remediation is a controversial topic (Mazzeo, 2002; McMillan, Parke & Lanning, 1997; Mills, 1998; Oudenhoven, 2002; Saxon & Boylan, 2001). Critics contend that taxpayers should not be required to pay twice for the same learning opportunities, first in high school and then again in public colleges and universities (Boylan, 1999; Grimes & David, 1999; Ignash, 1997; Kozeracki, 2002; McCabe, 2000; Oudenhoven, 2002; Reising, 1997; Roueche & Roueche, 1999; Roueche, Roueche & Ely, 2001; Saxon & Boylan, 2001; Seybert & Soltz, 1992). Some argue that providing secondary-level coursework in postsecondary institutions diminishes academic standards and devalues postsecondary credentials (Brothen & Wambach, 2004; Costrell, 1998; Hadden, 2000; Ignash, 1997; Immerwahr, 1999; Kozeracki, 2002; Oudenhoven, 2002; Mazzeo, 2002; Pitts, White & Harrison, 1999; Roueche & Roueche, 1999; Steinberg, 1998).¹ Others have suggested that the large number of under-prepared students entering the postsecondary environment demoralizes faculty (Hadden, 2000; Pitts, White & Harrison, 1999; Trombley, 1998). In light of these critiques, some states are shifting the burden of postsecondary remediation solely to community colleges, and even more drastic proposals have been put forward, including requiring high schools to pay for remediation or the elimination of postsecondary remediation altogether (Bastedo & Gumport, 2003; Bettinger & Long, 2005; Boylan, Saxon & Boylan, 1999; Breneman & Haarlow, 1998; Brothen & Wambach, 2004; Day & McCabe, 1997; Ignash, 1997; Jenkins & Boswell, 2002; Kozeracki, 2002; Mazzeo, 2002; Phipps, 1998; Reising, 1997; Roueche & Roueche, 1999; Roueche, Roueche & Ely, 2001; Trombley, Doyle & Davis, 1998).

Given the scale of postsecondary remediation, its core function in U.S. higher education, and the longstanding (and mounting) controversy surrounding it, empirical evaluations of the relative success or failure of remediation would appear to be a matter of first-order importance. Yet, it is only in the last few years that large-scale, comprehensive, multi-institutional evaluations of postsecondary remediation have been put forward. Prior to

¹ In the face of the "open door" admissions policies of many community colleges, some argue that remediation protects academic standards by allowing college-level courses to address college-level material (McCabe, 2000).

this, Phipps observes, "[r]esearch regarding the effectiveness of remedial education programs has been sporadic, typically underfunded, and often inconclusive...the fact remains that there is a dearth of information regarding how well remedial education students perform" (1998, p. 10). This critique is echoed by Roueche and Roueche who note that, "[p]rogram evaluation has been and remains the weakest component of the remedial effort" (1999, p. 26), and by Koski and Levin who write that, "...there is little or no comprehensive and reliable research regarding the efficacy of remedial education..." (1998, p. 3). Stronger still, Grubb and Gardner argue that, "...there have been relatively few evaluations of remedial programs, and many existing evaluations are quite useless..." (2001, p. 4).

In part, this problem arises from a lack of agreement concerning the "yard stick" by which the success or failure of remediation should be determined (Bahr, n.d.a; Bers, 1987; Boylan, 1997). However, leaving aside the issue of measurement, the numerous small-scale (or otherwise limited) evaluations of postsecondary remediation published over the last several decades paint a varied picture regarding the efficacy of postsecondary remediation (Koski & Levin, 1998). Some of these studies indicate that remedial students exhibit academic performance, and experience academic outcomes, that are comparable to students who do not require remediation (Boylan & Saxon, 1999; Southard & Clay, 2004; Crews & Aragon, 2004; Kulik, Kulik & Shwalb, 1983; Overby, 2003; Purvis & Watkins, 1987; Waycaster, 2001). Other studies suggest the opposite conclusion: that remedial students exhibit academic performance, and experience academic outcomes, that are less favorable than their college-prepared counterparts (Bettinger and Long, 2005; Bickley, Davis & Anderson, 2001; Curtis, 2002; Grimes & David, 1999; Illich, Hagan & McCallister, 2004; Tennessee Higher Education Commission, 2001; Weissman, Silk & Bulakowski, 1997; Worley, 2003). Still other studies present mixed, or inconclusive, findings regarding the efficacy of postsecondary remediation (Gray-Barnett, 2001; Seybert & Soltz, 1992).

Unfortunately, nearly all of these prior studies have been plagued with methodological problems resulting in questionable internal validity, external validity, or both (Boylan & Saxon, 1999; Koski & Levin, 1998). Among the most common methodological problems evident in prior evaluative work are: reliance on simple bivariate analyses or other analytical methods involving minimal statistical controls (Bettinger & Long, 2005; Bickley, Davis & Anderson, 2001; Crews & Aragon, 2004; Curtis, 2002; Gray-Barnett, 2001; Grimes & David, 1999; Illich, Hagan & McCallister, 2004; Kolajo, 2004; McCabe, 2000; Overby, 2003; Purvis & Watkins, 1987; Seybert & Soltz, 1992; Southard & Clay, 2004; Tennessee Higher Education Commission, 2001; Weissman, Silk & Bulakowski, 1997; Waycaster, 2001; Worley, 2003), reliance on data drawn from a single college (Bickley, Davis & Anderson, 2001;

Crews & Aragon, 2004; Curtis, 2002; Grimes & David, 1999; Illich, Hagan & McCallister, 2004; Kolajo, 2004; Overby, 2003; Purvis & Watkins, 1987; Southard & Clay, 2004; Seybert & Soltz, 1992; Weissman, Silk & Bulakowski, 1997; Worley, 2003), small sample size (Bickley, Davis & Anderson, 2001; Crews & Aragon, 2004; Curtis, 2002; Grimes & David, 1999; Kolajo, 2004; Purvis & Watkins, 1987; Southard & Clay, 2004; Weissman, Silk & Bulakowski, 1997), failure to distinguish between remedial students who successfully complete their remedial coursework and those who do not (Bettinger & Long, 2005; Curtis, 2002; Grimes & David, 1999; Kolajo, 2004; Seybert & Soltz, 1992; Tennessee Higher Education Commission, 2001; Waycaster, 2001), failure to address long-term academic outcomes in a *comprehensive* fashion (Gray-Barnett, 2001; Grimes & David, 1999; Kolajo, 2004; Overby, 2003; Seybert & Soltz, 1992; Tennessee Higher Education Commission, 2001; Waycaster, 2001), short observation periods (Illich, Hagan & McCallister, 2004; Seybert & Soltz, 1992), and selection on the dependent variable (Kolajo, 2004; Waycaster, 2001). Put simply, these studies cannot speak conclusively on the matter of whether postsecondary remediation is effective.

However, three recent, large-scale studies do offer clear evidence concerning the efficacy of postsecondary remediation. Specifically, Bahr (n.d.a) examined a population of first-time college freshmen enrolled in community colleges in California and found that remedial math students who achieve college-level math skill (remediate successfully) exhibit long-term academic outcomes that are comparable to those of students who achieve college-level math skill without remedial assistance. Bettinger and Long (2004) found that remedial math students in public four-year colleges in Ohio who remediate successfully are only slightly less likely, on average, to complete a four-year degree than are college-prepared students. Finally, Attewell, et al. (2006), using data from the National Educational Longitudinal Study, found that students in community colleges who remediate successfully in English experience an increased likelihood of graduation compared with students who do not require remediation. Attewell and his colleagues otherwise found no differences in the likelihood of graduation between under-prepared students who remediate successfully and college-prepared students, in either community or four-year colleges. Collectively, the findings of these three studies indicate that remediation is efficacious with respect to academic attainment.

Yet, despite the strengths of these studies, a number of questions remain concerning the efficacy of postsecondary remediation. To elaborate, recent evidence draws attention to the significance of *depth* and *breadth* of remedial need in predicting successful remediation in core skill areas. Depth of remedial need refers to the degree of deficiency in a given subject area, while breadth of remedial need refers to the number of basic skill areas

in which a given student requires remedial assistance (Bahr, 2007). Both depth and breadth of remedial need have been found to be negatively correlated with the likelihood of successful remediation (Bahr, 2007; Bahr, n.d.b; Easterling, Patten & Krile, 1998; McCabe, 2000; Weissman, Silk & Bulakowski, 1997).

The phrase “Matthew Effect,” coined by Merton (1968), has been extended to describe this finding among remedial students (Bahr, 2007; Bahr, n.d.b), just as it has been used to describe similar stratification processes in other aspects of the U.S. educational system (Kerckhoff & Glennie, 1999; Stanovich, 1986). “Matthew Effect” refers to the biblical passage, “to everyone who has, more shall be given, and he will have an abundance; but from the one who does not have, even what he does have shall be taken away” (*New American Standard Bible*, Matthew 25:29). As it relates to remediation, the phrase highlights the fact that, although intended to reduce disparities between advantaged and disadvantaged groups, in the end those who *most need* remediation are the *least likely* to remediate successfully, while those who require the least remediation are the most likely to remediate successfully.

One of the remaining unanswered questions regarding the efficacy of postsecondary remediation concerns the extent to which remediating successfully in a given subject area resolves this disadvantage of the least-skilled remedial students. It remains to be determined if the students who have the most severe skill deficiencies at college entry benefit as much from remediating successfully as do students who have less severe skill deficiencies. In other words, one might ask, to what extent does *depth* of remedial need (under-preparation) at college entry moderate the effect of successful (vs. unsuccessful) remediation on academic attainment? Stated another way, does remediating successfully in a given subject benefit students equally across the varying levels of initial skill deficiency in that subject? Is postsecondary remediation equally efficacious at every level of under-preparation?

If remediation is efficacious in this regard, one would expect to find that the effect on academic outcomes of remediating successfully (vs. not) in a given skill area is comparable across levels of (greater or lesser) initial deficiency. In other words, one would expect to find that, *regardless of the initial level of skill deficiency in a given subject*, students who remediate successfully in that subject experience academic outcomes that are comparable to those of students who began postsecondary attendance already prepared for college-level coursework.

A second unanswered question regarding the efficacy of postsecondary remediation concerns the extent to which multiple subject deficiencies interact in predicting academic attainment. The few prior, large-scale studies discussed earlier all have analyzed the effect of successful (vs. unsuccessful) remediation in particular subject areas in isolation from other core subjects. Yet, it is clear that students’ actual deficiencies seldom follow this pattern.

Instead, the students who have the poorest math skills tend also to have poor English skills (Bahr, 2007). It follows that efforts to evaluate fully the efficacy of remediation should account for differences between students who need only remediate in one subject and students who have multiple skill deficiencies. Thus, the question posed here is, how does remediating, or failing to remediate, successfully in English moderate the effect on academic attainment of successful remediation in math? Conversely, how does remediating, or failing to remediate, successfully in math moderate the effect on academic attainment of successful remediation in English? From a slightly different perspective, one might ask, do students who have multiple skill deficiencies gain the same benefit from remediating successfully as students who have only a single deficiency? If remediation is efficacious across the varying breadths of remedial need (under-preparation), one would expect to find that students who remediate successfully in both math and English experience long-term academic outcomes that are comparable to those of students who require remediation in only math *or* English and who remediate successfully in that area, and, likewise, comparable to those of students who do not require remediation.

Proposal of Work

Clearly, important questions concerning the efficacy of postsecondary remediation for resolving under-preparation remain to be addressed, and further study of the relationship between depth and breadth of under-preparation and academic attainment is needed. In this study, I propose to address the following two questions:

1. To what extent does *depth* of remedial need at college entry moderate the effect of successful (vs. unsuccessful) remediation on academic attainment?
2. To what extent does *breadth* of remedial need at college entry moderate the effect of successful (vs. unsuccessful) remediation on academic attainment?

Operating under the assumption that remediation is equally efficacious across the various depths and breadths of under-preparation, I propose the following four hypotheses, which correspond to the questions noted above:

- 1A. At each level of level of *math* deficiency, students who remediate successfully in math experience academic outcomes that are comparable to those of students who do not require remedial math assistance.
- 1B. At each level of *English* deficiency, students who remediate successfully in English experience academic outcomes that are comparable to those of students who do not require remedial English assistance.
- 2A. Students who remediate successfully in both math *and* English experience academic outcomes that are comparable to those of students who require remediation in only math *or* English and who remediate

successfully in that area.

- 2B. Students who remediate successfully in both math *and* English experience academic outcomes that are comparable to those of students who do not require remedial assistance.

Data

To test these hypotheses, I will use a previously assembled and unique data set drawn from the database maintained by the Chancellor's Office of California Community Colleges. The Chancellor's Office, under mandate by the California Legislature, collects data each term via electronic submission from the 112 community colleges and affiliated adult education centers in California. The data maintained by the Chancellor's Office represent a census of community college students in California and include transcripts, demographics, financial aid awards, matriculation records, degree/certificate awards, etc. Furthermore, the database is periodically cross-referenced against the enrollment records of all California public four-year postsecondary institutions and the National Student Clearinghouse database in order to identify students who transferred to public and private four-year institutions, both in-state and out-of-state (Bahr, Hom & Perry, 2005).²

I selected for the proposed analysis the Fall 1995 cohort of first-time college freshmen enrolled in any of California's 107 semester-based community colleges ($N = 202,484$). Valid course enrollment records were available for 93.9% ($N = 190,177$) of these students. I observed the course enrollments of these students across all of the semester-system colleges (without regard to a given student's first institution of attendance) for six years, through the Spring term of 2001, and then retained only those students who enrolled in at least one substantive English course *and* at least one substantive math course ($N = 76,961$). I then further reduced this cohort by dropping all students whose first English course was English-as-a-Second-Language (ESL),³ and all students who enrolled exclusively in vocational math coursework (to the exclusion of remedial or college-level math).⁴ The resulting

² While some degree of remediation does occur in four-year colleges, the primary venue of postsecondary remediation is community colleges (Adelman, 2004b; Day & McCabe, 1997; Parsad, Lewis & Greene, 2003).

³ I do not include ESL students in the category of remedial English because ESL students face substantively different challenges in skill acquisition compared with students requiring remedial reading or writing assistance. As Kurzet (1997, p. 60) explains, "the assumption that the ESL students are illiterate or marginally literate adult education students...fails to recognize that the prior education of ESL students ranges from primary schooling through university and professional school." While there is some debate about the inclusion of ESL under the "remedial" label (Martinez, Snider & Day, 2003), the distinction I make here is consistent with the bulk of the literature (Boylan & Saxon, 1999).

⁴ I do not exclude students whose first math course was vocational because preliminary analyses of the data suggest that a sizeable percentage (approximately one-third) of students whose first math course was vocational went on to initiate the remedial math sequence or enroll in college-level math coursework. Also, whereas a first math enrollment in a remedial or college-level math course has value as an indicator of math competency at college entry

cohort ($N = 67,991$), represents all of California's community college freshmen whose first term of college attendance was the Fall term of 1995, who first enrolled in a semester-based community college, who enrolled in at least one substantive English course *and* at least one substantive, nonvocational math course prior to the Summer term of 2001, and whose first English enrollment was not an ESL course. Finally, from this cohort I dropped 912 students who were missing data on sex, age, or the ID variable used to track student records *across* colleges. The resulting analytical cohort is composed of 67,079 students.

Outcome Variable

The primary outcome of interest in this study is a given student's long-term level of academic attainment in the community college system. Within the context of the community college, essentially two expressions of attainment are readily measurable: the award of a credential and transfer to a four-year institution. Two basic categories of credentials are possible within California's community college system: Associate degrees and certificates of completion. Associate degrees typically require the completion of a major program of study, general education requirements, and a minimum number of credits (typically 60 credits). In contrast, the certificate of completion typically requires only the completion of a major program of study. Thus, the Associate's degree generally is considered a higher-level credential than is the certificate, although not all degree programs and certificate programs overlap. When these credentialing possibilities are combined with the possibility of transfer to a four-year institution, five mutually exclusive attainment outcomes can be derived based upon a given student's highest credential earned and whether the student transferred to a four-year institution. These five include:

1. *none* – student completed neither a certificate nor a degree, and did not transfer to a four-year institution;
2. *certificate only* – student completed at least one certificate, but did not complete an Associate's degree and did not transfer to a four-year institution;
3. *degree with or without certificate* – student completed at least one Associate's degree, with or without a certificate, but did not transfer to a four-year institution;
4. *transfer without credential* – student transferred to a four-year institution, but did not complete an Associate's degree or certificate prior to transfer; and
5. *transfer with credential* – student completed at least one Associate's degree or certificate and then transferred to a four-year institution.

(discussed later in this proposal), a first math enrollment in vocational math is not indicative of math competency.

To categorize students on this outcome measure, I observed all credential awards for all students in the cohort across all of the 107 semester-system colleges through the Spring term of 2003 (eight years). In a separate process, I matched all students in the cohort against a database assembled by the Chancellor's Office addressing student transfers to four-year institutions through the Spring term of 2003. The database includes data collected from the California State University (CSU) system, the University of California (UC) system, and the National Student Clearinghouse (Boughan, 2001). The database constitutes a term-by-term list of enrolled students at each four-year institution represented in the database, which includes all of the CSU and UC campuses, as well as many private four-year institutions within California and many private and public four-year institutions in other states. Once students who transferred were identified, I combined the data addressing credential awards with the data addressing transfers and thereby classified each student into one of the five categories of the outcome measure.

Explanatory Variables

The primary explanatory variables of interest for the research proposed here address a student's entry to, and exit from, mathematics coursework and entry to, and exit from, English coursework. Ideally, entry to math and English coursework would be operationalized using placement exams given at the commencement of college attendance. Unfortunately, matriculation processes at the 107 colleges included in this analysis are quite varied, and the only consistent means of categorizing students in terms of entry to math and English coursework is the skill-level of a given student's first math and English course enrollments. Likewise, exit from math and English is categorized using the skill-level of a given student's highest skill, successfully completed math and English courses.

To categorize math courses, I used course catalogs and course characteristics in the data to determine the skill-level of each math course in which any member of the total first-time freshmen cohort ($N = 190,177$) enrolled at any point during the six-year observation period. Through a painstakingly detailed process, I collapsed 2,750 substantive math course listings into five categories: basic arithmetic, pre-algebra, beginning algebra, intermediate algebra/geometry, and college-level math. Basic arithmetic represents the lowest level of math skill, followed in order by pre-algebra, beginning algebra, and intermediate algebra and geometry (the latter two are parallel courses in the institutionalized math progression). The category of college-level math encompasses all math courses of a skill equal to, or greater than, college algebra (e.g., college algebra, pre-calculus, calculus, trigonometry, finite mathematics, statistics). I ignored nonsubstantive math courses (e.g., math "labs," math tutoring). Likewise, as noted earlier, I ignored vocational math courses (e.g., basic math for medical applications), except when a given

vocational math course was part of a larger remedial math sequence or otherwise categorized as college-level math.

I categorized English courses in a similar manner to that of math courses. However, compared with the math sequence, the English sequence exhibits greater inter-school variability and, as a consequence, requires a simpler classification scheme. In total, I collapsed 6,625 substantive English course listings into four categories: remedial reading (e.g., reading, phonics, vocabulary, spelling), remedial writing (e.g., basic writing, grammar, sentence structure, punctuation), ESL, and college-level English (including courses in composition, literature, creative writing, and other English coursework that is transferable with degree credit to either the CSU or UC systems). As noted earlier, I excluded from the analytical cohort all students whose first English course was ESL.

The process of categorizing students' *exit* from the math and English sequences was somewhat simpler than the process of categorizing students' *entry* to the math and English sequences. Concerning the hypotheses proposed here, only the condition of whether or not a student remediated successfully in a given subject matter (math or English) is of interest. For the purposes of these analyses, I define successful remediation in a given subject matter as a passing grade in a college-level course in that subject. A "passing grade" is defined as a grade of A, B, C, D, or Credit, while grades of F, No Credit, and Withdrawal are treated as nonpassing grades. Math enrollments for which final grades could not be determined (Missing, Report Delayed, or In Progress) were dropped.

To test the hypotheses proposed here requires a set of interaction terms composed of various combinations of math skill at college entry, English skill at college entry, and whether or not a student attained college-level skill in math and English. Hypothesis 1A and 2A suggest that, regardless of the initial level of skill deficiency, students who remediate successfully in a given subject matter experience academic outcomes that are, on average, comparable to those of students who do not require remediation. This hypothesis requires a set of interaction terms for math skill at college entry and whether or not the student remediated successfully in math, and a separate set of interaction terms for English skill college entry and whether or not a student remediated successfully in English. In the case of math, this requirement suggests eight interaction terms: four levels of remedial math skill multiplied by two outcome conditions (successful completion of a college-level math course versus not). In fact, however, ten interaction terms are required to account for the additional category of students who do not require remediation in math (college-level math students) multiplied by the two possible conditions of successfully completing a college-level math course or not. The result for math is the following sets of interactions terms:

Row	Category	Description
1	<i>College Math "Completer"</i>	student enrolled initially in a college-level math course and ultimately completed a college-level math course successfully
2	<i>College Math "Noncompleter"</i>	student enrolled initially in a college-level math course but ultimately did <i>not</i> complete a college-level math course successfully
3	<i>Interm Alg / Geom "Completer"</i>	student enrolled initially in intermediate algebra or geometry and ultimately completed a college-level math course successfully
4	<i>Interm Alg / Geom "Noncompleter"</i>	student enrolled initially in intermediate algebra or geometry but ultimately did <i>not</i> complete a college-level math course successfully
5	<i>Beginning Algebra "Completer"</i>	student enrolled initially in beginning algebra and ultimately completed a college-level math course successfully
6	<i>Beginning Algebra "Noncompleter"</i>	student enrolled initially in beginning algebra but ultimately did <i>not</i> complete a college-level math course successfully
7	<i>Pre-Algebra "Completer"</i>	student enrolled initially in pre-algebra and ultimately completed a college-level math course successfully
8	<i>Pre-Algebra "Noncompleter"</i>	student enrolled initially in pre-algebra but ultimately did <i>not</i> complete a college-level math course successfully
9	<i>Basic Arithmetic "Completer"</i>	student enrolled initially in basic arithmetic and ultimately completed a college-level math course successfully
10	<i>Basic Arithmetic "Noncompleter"</i>	student enrolled initially in basic arithmetic but ultimately did <i>not</i> complete a college-level math course successfully

English, as a subject matter, is treated in the same fashion as math. The result is the following six interaction terms:

Row	Category	Description
1	<i>College English "Completer"</i>	student enrolled initially in a college-level English course and ultimately completed a college-level English course successfully
2	<i>College English "Noncompleter"</i>	student enrolled initially in a college-level English course but ultimately did <i>not</i> complete a college-level English course successfully
3	<i>Remed. Writing "Completer"</i>	student enrolled initially in a remedial writing course and ultimately completed a college-level English course successfully
4	<i>Remed. Writing "Noncompleter"</i>	student enrolled initially in a remedial writing course but ultimately did <i>not</i> complete a college-level English course successfully
5	<i>Remed. Reading "Completer"</i>	student enrolled initially in a remedial reading course and ultimately completed a college-level English course successfully
6	<i>Remed. Reading "Noncompleter"</i>	student enrolled initially in a remedial reading course but ultimately did <i>not</i> complete a college-level English course successfully

The primary effects of comparative interest for Hypotheses 1A and 1B are those associated with the various “completing” groups for math and, separately, those associated with the various “completing” groups for English. For example, Hypothesis 1A predicts that the net (combined) main and interaction effects for math groups 1, 3, 5, 7, and 9 are equal. Likewise, Hypothesis 1B predicts that the net (combined) main and interaction effects for English groups 1, 3, and 5 are equal. In effect, Hypotheses 1A and 1B predict that degree of skill deficiency in a given subject does *not* moderate the effect of successful remediation in a given subject on academic attainment.

Hypotheses 2A and 2B suggest that, on average, students who have skill deficiencies in both math and English, but who remediate successfully in both subjects, exhibit academic attainment that is comparable to that of

students who have only a single deficiency that is remedied and, likewise, comparable to that of students who do not require remediation. Testing these hypotheses requires a four-way interaction of skill deficiency in math, skill deficiency in English, successful completion of college-level coursework in math, and successful completion of college-level coursework in English. Because a four-way interaction generates an inordinate number of variables, I propose to collapse math competency at college entry from five categories into two categories: remedial math and college-level math. Likewise, I propose to collapse English competency at college entry from three categories into two categories: remedial English (reading or writing) and college-level English. The net result is the following sixteen interaction terms, illustrated below in tabular form. Hypotheses 2A and 2B predict that the net (combined) main and interaction effects of rows 1, 3, 9, and 11 are equal. In effect, hypotheses 2A and 2B predict that breadth of skill deficiency does *not* moderate the effect of successful remediation on academic attainment.

Row	Math Competency	Achieved College-Level Math?	English Competency	Achieved College-Level English?
1	College-Level	yes	College-Level	yes
2	College-Level	yes	College-Level	no
3	College-Level	yes	Remedial	yes
4	College-Level	yes	Remedial	no
5	College-Level	no	College-Level	yes
6	College-Level	no	College-Level	no
7	College-Level	no	Remedial	yes
8	College-Level	no	Remedial	no
9	Remedial	yes	College-Level	yes
10	Remedial	yes	College-Level	no
11	Remedial	yes	Remedial	yes
12	Remedial	yes	Remedial	no
13	Remedial	no	College-Level	yes
14	Remedial	no	College-Level	no
15	Remedial	no	Remedial	yes
16	Remedial	no	Remedial	no

Control Variables

I propose to include a comprehensive set of student-level and college-level controls found in prior research to be predictors of academic outcomes among postsecondary remedial students (Bahr, 2007; Bahr, n.d.a; Bahr, n.d.b; Burley, Butner & Cejda, 2001; Hagedorn, et al., 1999; Hoyt, 1999). Among the student-level control variables to be included are: sex, race/ethnicity, age, three proxies of socioeconomic status, four measures of enrollment patterns, student's academic goal, grade in first math course, grade in first English course, and interaction with academic advising services. Details concerning the operationalization of these variables follow.

Sex is treated as a dichotomous variable. Race/ethnicity includes nine nominal attributes: White, Black, Hispanic, Asian, Pacific Islander, Filipino, Native American, Other, and unreported. Age was collected at the time

of application for attendance and is treated as continuous. The three proxies of socioeconomic status include a dichotomous variable indicating receipt of a fee waiver during the first year of attendance, a dichotomous variable indicating receipt of any grants during the first year of attendance, and a continuous variable indicating the total monetary value of any grants received during the first year of attendance. Students who did not receive any grants during the first year of attendance are assigned a value of zero for the latter variable.⁵ The four measures of enrollment patterns include persistence, enrollment inconsistency, delay of first math course enrollment, and delay of first English course enrollment. Persistence is operationalized as the number of terms (including summer terms, but excluding winter intersessions) in which a given student enrolled in courses from Fall 1995 through Spring 2001. Enrollment inconsistency is operationalized as the percentage of terms in which a given student did not enroll in courses from Fall 1995 through the last term (within the six-year observation window) that the student was observed in the system. Delay of first math and first English are operationalized as the term numbers (sequentially ordered) of first math enrollment and first English enrollment, respectively, with the Fall term of 1995 assigned a value of one and the Spring term of 2001 assigned a value of seventeen. Academic goal is a self-reported measure of a student's primary academic objective, collected at the time of application, which I collapsed into ten nominal categories: transfer to a four-year institution as an exclusive objective; transfer to a four-year institution with an allied objective of a nonvocational Associate's degree; nonvocational Associate's degree as an exclusive objective; vocational Associate's degree as an exclusive objective; vocational certificate as an exclusive objective; other job-related goals (e.g., acquiring or advancing job skills, maintenance of a professional license); abstract educational goals (e.g., discovering educational interests, personal development); remediation in fundamental academic subjects (including students seeking credit for a high school diploma or GED); undecided; and unreported. Grade in first math course and grade in first English course each include nine nominal categories: A, B, C, D, F, Withdrawal, Credit, No Credit, and Ungraded. Interaction with academic advising services is measured using two dichotomous indicators of a given student's experience of being referred to, and/or receiving, academic advising.

In addition to the student-level controls, I propose to control for several variables measured at the level of the college, including the size of each college and the fundamental goal orientation of each college. Size is

⁵ While the data do not contain direct measures of socioeconomic status, the variables measuring receipt of financial aid serve as indirect measures. DesJardins, Ahlburg, and McCall (2002) offer a compelling argument for using *offered* (rather than *received*) financial aid awards as indicators of socioeconomic status. Unfortunately, data addressing financial aid *offers* were not available. However, financial aid *received* is not without precedent as an indicator of socioeconomic status in research on remediation (Koski & Levin, 1998).

operationalized as the number of first-time freshmen enrolled in the college in the Fall 1995 term. The goal orientation of each college is measured as the percentage of the Fall 1995 first-time freshmen cohort indicating each of three goals: transfer (with or without an intermediate Associate's degree), Associate's degree (either vocational or nonvocational and with or without transfer), and job-related goals (e.g., vocational degree or certificate as an exclusive objective, acquiring or advancing job skills, maintenance of a professional license).

Method of Analysis

A two-level hierarchical multinomial logistic regression specification (Raudenbush & Bryk, 2002) will be employed to model natural variation in the probability of each of the five mutually exclusive outcomes of academic attainment. Two separate models will be estimated, corresponding to the two research questions detailed previously. The first model will address hypotheses 1A and 1B, while the second model will address hypotheses 2A and 2B. The models will be estimated with the software package *HLM 6.03*. The hierarchical multinomial logistic regression model, as employed here, is specified according to equations I, II, and III below, in which $\log[P(y_{ij} = m) / P(y_{ij} = 1)]$ represents the logged odds of the probability of individual i , who is enrolled in school j , experiencing academic outcome 2, 3, 4, or 5, versus academic outcome 1. A set of independent variables for individual i in school j is represented by X_{ij} . A set of k estimated student-level coefficients for school j is represented β_{kj} , while β_{0j} represents the intercept for school j . This intercept is allowed to vary from the school-level constant (γ_{00}), conditional on a set of independent variables (Z) for school j , a set of q college-level coefficients (W), and a random school-level error term (ϵ_{0j}). The student-level coefficients are fixed across schools. Students are assigned to the school in which they are observed to be enrolled in the Fall of 1995, or, in the case of multiple institutions, to the school in which a given student enrolled in the greatest number of courses in that term.⁶

$$\log \frac{P(y_{ij} = m)}{P(y_{ij} = 1)} = \beta_{0j} + \beta_{kj} X_{ij}$$

$$\beta_{0j} = \gamma_{00} + W_{0j} Z_{0j} + \epsilon_{0j}$$

$$\beta_{kj} = \gamma_{k0}$$

Policy Relevance and Target Audience

The results of this study have profound implications for educational policy. Given the prominence of

⁶ This model can account only for college-level effects associated with one college, which, in this case, is the first college of enrollment. Although movement from one college to another is not uncommon among community college students (Bach, et al., 2000), the model employed here cannot capture these changes. An alternative specification using a cross-classified data structure (Raudenbush & Bryk, 2002) would allow the school in which a given student is enrolled to vary, but would treat a student enrolled in multiple schools as different students.

postsecondary remediation in U.S. higher education, and given the ongoing controversy surrounding remedial programs, which in some sense threatens the existence of remediation in its present form, determining if, and under what conditions, remediation is effective is a matter of first-order importance in shaping higher education in the coming decades. Moreover, the effectiveness of remediation in resolving the effects of under-preparation on academic attainment has critical consequences for many students, and all the more so for students of historically disadvantaged racial/ethnic groups and disadvantaged socioeconomic backgrounds, who are disproportionately represented among remedial students. As a result, the findings of this study will be of interest to all stakeholders in higher education, including policy makers, administrators, researchers, and instructors, as well as their counterparts in secondary education. This study also fits closely with NPEC's focus this year on *preparation for postsecondary education*, as the questions addressed in this project concern the degree to which postsecondary remedial programs effectively resolve the academic consequences of under-preparation for college-level coursework.

Innovative Aspects of Project

Among the innovative aspects of the research proposed here, it is the first study to address questions concerning the moderating effects of skill deficiencies on the effectiveness of remediation. Additionally, it is one of the few large-scale studies of postsecondary remediation involving data addressing a complete and sizeable population ($N_{\text{student}} = 67,079$) enrolled in multiple institutions ($N_{\text{college}} = 107$). Finally, the proposed study employs an expansive time horizon, tracking the academic outcomes of students for eight years following initial enrollment.

Connection to Principal Investigator's Long-Term Research Agenda

The project proposed here represents the continued evolution of my research on postsecondary remediation and the implications of under-preparation for academic attainment, and it employs a unique, complex, and multifaceted data set that I spent four years assembling while completing my doctoral dissertation (2004). A number of research projects have arisen from my work on these data including one forthcoming manuscript (*Research in Higher Education*), two manuscripts currently under review (by *Sociology of Education* and the *American Educational Research Journal*, respectively) and four manuscripts currently in development.

Dissemination Plan

In addition to submitting the work for presentation at the 2008 Annual Forum of the Association for Institutional Research, I will seek publication of the findings in *Research in Higher Education*.

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BIOGRAPHICAL SKETCH

Autobiographical Statement

Dr. Peter Riley Bahr, Ph.D., is an Assistant Professor of Sociology at Wayne State University (Detroit, Michigan). His primary area of research is postsecondary remediation in community colleges. His prior work on the topic includes his 2004 doctoral dissertation entitled "The Rough and Rocky Road of Remediation: Racial Inequalities in Postsecondary Remedial Mathematics," his forthcoming manuscript entitled "Double Jeopardy: Testing for Interaction Effects of Multiple Basic Skills Deficiencies on Successful Remediation" (*Research in Higher Education* 48), his manuscript entitled "Preparing the Underprepared: An Analysis of Racial Disparities in Postsecondary Remedial Mathematics" (under review by *Sociology of Education*), and his manuscript entitled "Does Mathematics Remediation Work?: Academic Attainment across Four Categories of Community College Student" (under review by the *American Educational Research Journal*). Additionally, Dr. Bahr was the recipient of two competitive grants in the past two years for his work on postsecondary remediation: the first for \$10,000 from Wayne State University, and the second for \$29,999 from the Association for Institutional Research and the National Postsecondary Education Cooperative.

Prior to his appointment as Assistant Professor at Wayne State University in 2004, Dr. Bahr was employed for two years as a high-level quantitative researcher with the Chancellor's Office of California Community Colleges, under the direct supervision of the Director of Research and Planning (Willard Hom) and the Vice Chancellor of Technology, Research, and Information Services (Patrick Perry). During his employment with the Chancellor's Office, Dr. Bahr completed a number of major research projects of statewide significance addressing methodological problems in research on community colleges. He since has published two peer-reviewed articles in the *Journal of Applied Research in the Community College* that document segments of his work with the Chancellor's Office, including the measurement of student transfer rates and the measurement of student academic preparation.

During his doctoral work, Dr. Bahr specialized and trained specifically in quantitative methodology, working under such notable methodologists as Dr. Diane Felmlee (University of California – Davis) and Dr. Xiaoling Shu (University of California – Davis). Also of note, among his dissertation committee members was Dr. Linda Serra Hagedorn, Chair of the Department of Educational Administration and Policy at the University of Florida and Director of the Transfer and Retention of Urban Community College Students (TRUCCS) Research

Center. Dr. Bahr is well versed in the application of hierarchical nonlinear models (the analytical technique proposed for this study), having completed graduate coursework on the topic and having employed such models in his dissertation, in one forthcoming manuscript, and in two manuscripts currently under review. Additionally, he regularly teaches a graduate course in statistics and an undergraduate course in research methods at Wayne State University.

Abbreviated Curriculum Vitae

Education

- 2004** **Ph.D.**, Sociology, University of California – Davis
Dissertation Title: *The Rough and Rocky Road of Remediation: Racial Inequalities in Postsecondary Remedial Mathematics*
- 2000** **M.A.**, Sociology, University of California – Davis
- 1997** **B.S.**, Criminology, California State University – Sacramento
- 1995** **A.S.**, Chemistry, Solano Community College
- 1995** **A.A.**, General Science, Solano Community College
- 1994** **A.A.**, Liberal Arts, Solano Community College
- 1993** **A.S.**, Water and Wastewater Technology, Solano Community College

Relevant Academic and Research Appointments

- 2004 – present** **Assistant Professor**
Department of Sociology, Wayne State University
- 2001 – 2003** **Educational Researcher**
Research & Planning Unit, Chancellor's Office of the California Community Colleges
- 2000 – 2001** **Research Program Specialist**
Child, Youth and Family Services Branch, California Department of Education

Refereed Publications

- Bahr, Peter Riley.** 2007. "Double Jeopardy: Testing the Effects of Multiple Basic Skill Deficiencies on Successful Remediation." Forthcoming in *Research in Higher Education* 48(6).
- Bahr, Peter Riley.** 2007. "Race and Nutrition: An Investigation of Black-White Differences in Health-Related Nutritional Behaviors." Forthcoming in *Sociology of Health & Illness* 29(6).
- Bahr, Peter Riley.** 2007. "Race and Nutrition: An Investigation of Black-White Differences in Health-Related Nutritional Behaviors." Forthcoming in *Ethnicity, Health and Health Care: Understanding Diversity, Tackling Disadvantage*, edited by Waqar Ahmed and Hannah Bradby. Malden, Massachusetts: Blackwell.
- Bahr, Peter Riley,** Willard Hom, and Patrick Perry. 2005. "College Transfer Performance: A Methodology for Equitable Measurement and Comparison." *Journal of Applied Research in the Community College* 13(1):73-87.

Refereed Publications (*continued*)

Bahr, Peter Riley, Willard Hom, and Patrick Perry. 2004. "Student Readiness for Postsecondary Coursework: Developing a College-Level Measure of Student Average Academic Preparation." *Journal of Applied Research in the Community College* 12(1):7-16.

Manuscripts under Review by Refereed Journals

Bahr, Peter Riley. "Does Mathematics Remediation Work?: Academic Attainment across Four Categories of Community College Students." Under review by the *American Educational Research Journal*.

Bahr, Peter Riley. "Preparing the Underprepared: An Analysis of Racial Disparities in Postsecondary Mathematics Remediation." Under review by *Sociology of Education*.

Bahr, Peter Riley, and Jeffrey Sweat. "Who Am I?: Testing the Effect of Unstable Identity Standards on Well-Being." Under review by *Sociological Perspectives*.

Felmlee, Diane, Heather Kohler Flynn, and **Peter Riley Bahr**. "Too Much of a Good Thing: Disenchantment in Marriages and Intimate Relationships." Under review by the *Journal of Social and Personal Relationships*.

Selected Works in Progress

Bahr, Peter Riley. "*Cooling-Out* as Institutional Racism: Does Academic Advising Discourage the Educational Attainment of Underprepared Students of Historically Disadvantaged Racial Groups?" In preparation for submission to *Social Problems*.

Bahr, Peter Riley. "Educational Attainment as Process: Using Discrete-Time Event History Models to Measure Rate of Progress (with Illustrations from Postsecondary Remediation)." In preparation for submission to the *Journal of Educational and Behavioral Statistics*.

Bahr, Peter Riley. "The Four Rs: Reading, 'Riting, Race, and Remediation." In preparation for submission to *Social Problems*.

Bahr, Peter Riley. "The Devil is in the Details: Notes on One Man's Adventure with Coding Remedial Coursework across 107 Colleges." In preparation for submission to *Community College Review*.

Grants & Fellowships

2007 No pending support

2006 **Research Grant (33% of work time committed thru May 31, 2007)** **\$29,999**

"*Cooling-Out* as Institutional Racism: Does Academic Advising Discourage the Educational Attainment of Underprepared Students of Historically Disadvantaged Racial Groups?"

Association for Institutional Research & National Postsecondary Education Cooperative

2005 **Research Grant** **\$10,000**

"Does Mathematics Remediation Work?: Academic Attainment across Four Categories of Community College Students."

Wayne State University

Grants & Fellowships *(continued)*

2005	Research Grant	\$300
	"Instability or Flexibility?: Testing Competing Theories of the Effect of Identity Fluidity on Well-Being."	
	Humanities Center, Wayne State University	
2004	Dissertation Grant	\$4,715
	Department of Sociology, University of California – Davis	
2003	Research/Travel Grant	\$800
	Department of Sociology, University of California – Davis	
2000	Research Fellowship	\$8,800
	"Race and Nutrition: An Investigation of Black-White Differences in Health-Related Nutritional Behaviors"	
	Center for Advanced Studies in Nutrition & Social Marketing, University of California – Davis	

Selected Presentations

Bahr, Peter Riley. "Cooling-Out as Institutional Racism: Does Academic Advising Discourage the Educational Attainment of Underprepared Students of Historically Disadvantaged Racial Groups?"
Annual Forum of the Association for Institutional Research
June 6, 2007 (*accepted for presentation*)

Bahr, Peter Riley. "Double Jeopardy: Testing the Effects of Multiple Basic Skills Deficiencies on Successful Remediation."
Annual Meeting of the American Sociological Association
August 14, 2006

Bahr, Peter Riley, and Jeffrey Sweat. "Instability or Flexibility?: Testing Competing Theories of the Effect of Identity Fluidity on Well-Being."
Annual Meeting of the American Sociological Association
August 12, 2006

Bahr, Peter Riley. "Postsecondary Remedial Mathematics: What Is It, What Do We Know, and What Do We Need to Know?"
Colloquium Series of the Humanities Center of Wayne State University
April 5, 2006

VanBrocklin-Fischer, Porsche and **Peter Riley Bahr.** "Online Survey Research: Expedience at the Cost of Validity?"
Colloquium Series of the Humanities Center of Wayne State University
March 8, 2006

Felmlee, Diane, Heather Kohler Flynn, and **Peter Riley Bahr.** "Too Much of a Good Thing: Fatal Attraction in Adult Intimate Relationships."
Annual Meeting of the American Sociological Association
August 14, 2004

Selected Presentations *(continued)*

- Bahr, Peter Riley.** "Data Integrity and Exploratory Modeling"
Workshop sponsored by the Research and Planning Group for Calif. Comm. Colleges
September 20, 2002
- Bahr, Peter Riley.** "Race, Nutrition, and Health: An Investigation of Black-White Differences in Nutritional Behaviors with Established Links to the Incidence of Chronic Disease and Premature Morbidity"
Annual Meeting of the American Sociological Association
August 17, 2002
- Bahr, Peter Riley.** "Student Average Academic Preparation: The Development of a College-Level Summary Measure of Student Preparedness for Academic Coursework"
Annual Meeting of the Research and Planning Group for Calif. Community Colleges
May 3, 2002
- Bahr, Peter Riley.** "Statistics In 'Pill' Form: An Abridged Review of Some of Common Statistical Methods with examples from the Chancellor's Office Database"
Annual Meeting of the Research and Planning Group for Calif. Community Colleges
May 2, 2002
- Perry, Patrick, Willard Hom, and **Peter Riley Bahr.** "Analyzing the 2002 'Persistently Low Transfer Colleges' Report"
Annual Meeting of the Research and Planning Group for Calif. Community Colleges
May 2, 2002
- Bahr, Peter Riley.** "Preparing the Underprepared: An Exploratory Event History Analysis of the Basic Skills Mathematics Course Completion Patterns of the California Community College 1997 Cohort of First-Time-Freshman"
Annual Meeting of the California Association of Institutional Researchers
November 15, 2001
- Bahr, Peter Riley.** "The Partnership for Excellence Program and Leveling the Playing Field with Statistical Adjustments"
Annual Meeting of the Research and Planning Group for Calif. Community Colleges
May 3, 2001
- Bahr, Peter Riley.** "Self-Commodification: Exploring the Intersection of Socioeconomic Stratification and Identity Theory"
Annual Meeting of the Pacific Sociological Association
March 31, 2001
- Bahr, Peter Riley.** "Regression Analysis of Daily Fruit & Vegetable Consumption on Selected Demographic Variables Using the California Dietary Practices Survey Data."
Center for Advanced Studies in Nutrition and Social Marketing, UC Davis
September 10, 2000

BUDGET

PROJECT TITLE: **The *Matthew Effect* in Postsecondary Remediation: Testing the Efficacy of Remediation across Varying Depths and Breadths of Under-Preparation**

Peter Riley Bahr	1.717 FTE summer months @ \$6352.55 per month	\$10,907.33
	2.250 FTE academic year months @ \$6352.55 per month	\$14,293.24
Total Salaries and Wages		\$25,200.57
Summer Fringe Benefits @ 12.4%		\$ 1,352.51
Academic Year Fringe Benefits @ 24.1%		\$ 3,444.67
Total Fringe Benefits		\$ 4,797.18
TOTAL AMOUNT REQUESTED		\$29,997.75

As the sole investigator on the project proposed here, I am requesting partial summer salary (1.717 FTE months) and 50% teaching release (one-quarter of nine-month salary) so that I can devote an extended, uninterrupted period of time to data processing, data analysis, writing, and the publication of findings. In accord with the amount of time that this grant will make available to me, I will devote 33% of my total work time during the period of the grant to the successful completion of the goals of the project and the dissemination of findings. Funds for travel to the 2008 AIR Forum in Seattle, Washington, will be provided by preexisting sources within my university.

CURRENT AND PENDING SUPPORT

Current Support

I currently am pursuing comparative research on the effect of academic advising on the educational outcomes of under-prepared students of historically disadvantaged racial/ethnic groups, which is funded through May 31, 2007, by a research grant from the Association for Institutional Research and the National Postsecondary Education Cooperative.

Pending Support

I have no pending support for the research project proposed here or for any other research project scheduled for the period of June 1, 2007, through May 31, 2008. However, I have submitted this research proposal for consideration for funding to the Institute for Education Sciences (IES). As of this writing, no decisions have been announced by IES concerning the funding of specific proposals.

FACILITIES, EQUIPMENT AND OTHER RESOURCES

All facilities, equipment, resources (including software), and data necessary to bring this project to fruition have been acquired. Existing resources already at my disposal that will be utilized in the proposed project include the software STATA SE 8.2, the software HLM 6.03, and a dedicated Dell Precision 370 computer workstation. No further resources are needed to complete the work other than the time necessary to realize the goals of the project.