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Welcome from the Executive Editor

The College of Education at Kansas State University is dedicated to developing future educators who are practitioner-scholars at all levels of the educational endeavor. The research conducted by our faculty and our graduate and undergraduate students is a critical and vital aspect of this goal. In 2014, Dean Debbie Mercer created the position of Associate Dean for Research; I was honored to be selected for this position. As Associate Dean, one of my tasks is to promote the recognition of the research of our College of Education students. We decided to create a journal as a special venue dedicated to showcasing student-led research in the college. Haley Downing and Paul Maxfield, graduate students in the college, were recruited to be the first managing editors. They consulted with faculty and students to develop a name and platform, and the *Prairie Journal of Educational Research* (PJER) was born.

Haley and Paul worked with the publisher, New Prairie Press, to design PJER as a peer-reviewed online open-access journal. After months of developing policies and processes, as well as the actual online platform for the journal, PJER was officially launched in April, 2014. Haley and Paul also recruited editorial board and reviewers, which included faculty and students from all departments in the college, demonstrating their commitment to including students at every stage of the process, so that they can gain experience in all facets of the academic publication process.

Manuscripts arrived and were reviewed, editorial board meetings were held, and when Haley graduated, Meaghan Cochrane took over her editorial role. And here we are, offering to you the first volume of the *Prairie Journal of Educational Research*. The papers selected for the first edition demonstrate the knowledge-building research conducted by our students. The studies represent both the depth and variation in topics our students approach as well as the diverse methodologies they study with our faculty.

I offer my congratulations to the editorial board, the reviewers, and the authors. I am especially cognizant of the ongoing hard work and dedication of the managing editors, Haley, Paul, and Meaghan, as well as that of our faculty, who provide excellent coursework, advising, and mentoring to develop our students as future researchers in their fields. Those students will go on to conduct research and utilize evidence-based practices to maximize the potential of all learners.

Linda P. Thurston, Ph.D.
Executive Editor of PJER
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Welcome From the Managing Editors

Hello, and welcome to the inaugural issue of the *Prairie Journal of Educational Research* (PJER). About two years from the conceptualization of PJER, we are pleased to present the first issues of the journal. The Editors and the Editorial Board have selected four articles for publication in this vanguard issue: *Foy & Hodge* examine sexual prejudices of K-12 teachers in Kansas as they relate to political, religious, and personal affiliations; *Balluch* investigates the connection between demographic variables and rates of seclusion in elementary and high schools in Kansas; and *Urban* studies the impact of Neoliberal philosophies on the assessment of student learning. These articles demonstrate the quality of research being done by students in the College of Education. Finally, *Bean, Gnadt, Maupin, White, & Andersen* use a large data set from a study of US high school students to explore issues related to STEM interest and preparation.

We'd like to thank those who contributed to the creation of this issue. Firstly, thanks to all the authors who submitted manuscripts, without whom, there would be nothing here to read. Secondly, we would like to thank our reviewers who volunteered their time and energy to provide detailed feedback for authors, not only in order to ensure the quality of PJER as a journal, but also to help authors - students in the College of Education - develop their craft as writers and researchers. Furthermore, we wish to thank those who have served on the editorial board for PJER for providing their guidance and wisdom, as well as New Prairie Press for their invaluable help in creating the journal.

We would finally like to give a special thanks to Haley Downing, who has served as a co-managing editor for PJER since nearly its inception, and has been integral to its success. Haley graduated this December and is beginning a new phase of her career. We wish her all the best. Following Haley's graduation, doctoral student Meaghan Cochrane joined our staff as Co-Managing Editor.

The call for manuscripts for the next issue is open until June 1. Manuscripts can be submitted using the link on the left side of the screen. PJER is also soliciting reviewers for the next issue. If you are interested in reviewing for PJER, please e-mail us at pjer@ksu.edu.

Sincerely,

PJER Managing Editors;
Meaghan Cochrane and Paul Maxfield

Preparing Educators for a Diverse World: Understanding Sexual Prejudice among Pre-Service Teachers

Joelyn Katherine Foy & Sheryl Hodge

An important role of schooling in the U.S. is to prepare students for engagement in the diverse world. This means that education personnel must be aware of, acknowledge, and respect all dimensions of diversity, including gender and sexual diversity. Relatedly is the teacher's role in managing a safe and inclusive classroom climate for all students. Since school bullies frequently target gender and sexually diverse (GSD) students, K-12 teachers are required to manage their classroom culture so that bullying behavior toward all students, including GSD students, is stopped. GSD students who are bullied frequently miss school, earn lower grades, and may decide not to complete post-secondary education. The effects of bullying based upon actual or perceived gender or sexual difference can last a lifetime. Sexual prejudice of educational personnel may inhibit the development of safe learning environments for all students and the preparation of students for a future in diverse environments. This research investigates sexual prejudice among pre-service teachers in one teacher preparation program and relates sexual prejudice to teacher demographic characteristics.

Introduction

An important role of schooling in the U.S. is to prepare students to participate in global interactions, suggesting that students be sensitive to all dimensions of diversity (e.g., ability and disability, ethnic identity, gender [biological sex as well as gender identity and gender expression], geographic region, language, racial group, religion, sexual orientation, and socio-economic class) within nations (Banks, Banks, Cortés, Hahn, Merryfield, Moodley, Murphy-Shigematsu, Osler, Park, & Parker, 2005; Meyer, 2010). Teacher education programs, however, traditionally avoid discussion of sexual diversity (Lamb, 2013). The historical and social climate within teacher preparation programs appears to inhibit the inclusion of gender and sexual diversity education (Rasmussen, 2006). Evidence suggests that schools maintain a heteronormative perspective (Dean, 2011; Foucault, 1990; Himmelstein & Bruckner, 2011; Kumashiro, 2002) that impedes the development of sensitivity to these dimensions of diversity. To promote the development of diversity awareness, school personnel must, themselves, acknowledge and respect gender and sexual diversity.

Acknowledging gender diversity means understanding that the gender binary—that is, male versus female—is too limiting (Wilchins, 2004). Similarly, sexual diversity refers to the complexities of sexual orientation, sexual behavior, and sexual identity (Meyer, 2010). Sexual prejudice relates to an individual's attitudes and beliefs about sexuality (Herek & McLemore, 2013). Previous educational research indicated a relationship between the beliefs and attitudes of classroom teachers toward gender or sexually diverse students and teacher behavior in K-12 classrooms (Clark, 2010; Dowling, Rodger and Cummings, 2007; Riggs, Rosenthal, & Smith-Bonahue, 2011). Our assumption was that positive beliefs and attitudes among K-12 teachers would lead to positive actions on behalf of GSD students.

The purpose of this research was to discover the degree of sexual prejudice among pre-service teachers affiliated with one college of education and to question whether levels of sexual prejudice differed by demographic (gender, race/ethnicity, age, geography), educational (license, previous multicultural education, content area), or personal (political affiliation, religious affiliation, non-heterosexual friends/coworkers/family members, participant sexual orientation) characteristics. The discussions and conclusions presented in this paper suggest implications for professional teacher education programs and for educational researchers, as well as pre-service teachers, in-service teachers, administrators, other university faculty, parents, and citizens in a multicultural democracy.

Review of Literature

To understand sexual prejudice within school environments, we have to look first at the problem and the impact. The Gay, Lesbian, and Straight Education Network (GLSEN) 2009 National School Climate Survey found that 90% of survey respondents heard “gay” used negatively, and 72% heard other homophobic remarks frequently or often. Verbal harassment and physical assault were commonly reported among survey respondents, but school staff did not respond appropriately. Of those who were harassed or assaulted, 62% did not report the incident for fear that the harassment would worsen or that school staff would not take the report seriously. Of the 34% who reported being harassed or assaulted and who did report the incident, the school staff did nothing (GLSEN, 2010).

By singling out GSD students, the climate of the entire school environment is never questioned (Payne & Smith, 2013). Even bullying programs operate under the assumptions of individual bullies and individual victims, rather than questioning the school infrastructures that produce bullies and victims (Payne & Smith, 2012a). When teachers, staff, and administrators cannot stop homophobic bullying in their hallways, sexual minority youth lose their sense of belonging, skip school, make lower grades, and may consider suicide (Grant, Mottet, Tanis, Harrison, Herman, & Keisling, 2011; Kosciw, Greytak, Diaz, & Bartkiewicz, 2010; Robinson & Espelage, 2011). When parents put their children out on the street (Ray, 2006, p. 16), sexual minority youth may turn to prostitution, drop out of school, and not graduate (Grant et al., 2011). Students who are bullied because of their actual or perceived sexual identity are less likely to attend post-secondary institutions (GLSEN, 2010), thereby lowering their lifetime income (Day & Newberger, 2002; Julian & Kominski, 2011). Students who are bullied often suffer physical, emotional, and psychological effects of bullying throughout their lives (Maza & Krehely, 2010; Meyer, 2003; Toomey, Ryan, Diaz, Card & Russell, 2010). Lowered lifetime incomes and rising mental health costs affect families and communities.

Teachers and administrators need strategies and approaches that effectively end bullying based upon actual or perceived sexual orientation. If teacher education programs are not able to provide these strategies and approaches, teachers and administrators will continue to ignore or respond inappropriately (GLSEN, 2010). There are some promising approaches to multicultural teacher education that tackle these questions.

Kumashiro suggests four approaches within multicultural teacher education: education about the other, education for the other, education that critiques privileging and othering, and education that transforms individuals and society (Kumashiro, 2002). The fourth approach, education that transforms individuals and society, is most similar to Banks’ social action approach (2006, p. 61), Sleeter and Grant’s social reconstructionist approach (Sleeter and Grant, 2007), and Kincheloe and Steinberg’s critical multiculturalism (1997, p. 23). A critical approach

activates the “foundational principles of multicultural education and extends them to the area of greatest possible impact: critically reexamining power structures in society in order to positively transform students and society and challenge oppression and discrimination in all its forms through education” (Meyer, 2010, p. 16). Keeping in mind Kumashiro’s warnings against blaming the teacher instead of building a broader movement for educational reform (2012), it seems appropriate to start with understanding pre-service teachers’ beliefs and attitudes since teacher education programs traditionally avoid discussion of sexual diversity (Lamb, 2013).

The essential question driving the research reported in this paper was How can pre-service teachers’ preparation be improved to provide equal and equitable experiences for sexual minority youth in a multicultural society? The research question addressed in this paper was What are the beliefs and attitudes of K-12 pre-service teachers regarding sexual minorities? Sexual prejudice was operationalized as beliefs and attitudes toward lesbians and gay men.

Methodology

Participants and Setting

Undergraduate and graduate students in one teacher education program participated in this study where pre-service teachers could have been undergraduate or graduate students. Participants represented elementary (7%) and secondary levels (Social Studies, 7%; English, 14%; Biology, Chemistry, or Math, 12%; Music, 8%; FACS, 11%, and Agricultural Education, 9%). Approximately two-thirds of participants were female (69%). Participants were White, non-Hispanic (85%) and People of Color (14%). Participants’ gender and race characteristics mirrored the College of Education where 85% of students report being White, non-Hispanic and 70% being female (Office of Planning and Analysis, 2013). Participant ages ranged from less than 25 years old (69%) to 56 years old or greater (2%) with 17% being 26-35 years old, 4% being 36-45 years old, and 8% being 46-55 years old. Approximately half (51%) were earning a secondary license, while 33% were earning an elementary license and 16% earning some other type of credential. More than half (59%) identified as pre-service, 22% as in-service, and 19% as some other teacher status.

Instrumentation and Data Collection

A 40-item survey captured beliefs and attitudes as well as demographic, educational, and personal characteristics of participants. The purpose of the survey was to investigate sexual prejudice, operationalized as beliefs and attitudes toward sexual minorities, and to clarify the relationship of demographic, educational, and personal characteristics to levels of sexual prejudice among K-12 pre-service teachers. The dependent variable, sexual prejudice, was operationalized in the survey as beliefs and attitudes toward lesbians and gay men. To estimate levels of sexual prejudice among pre-service and in-service teachers enrolled in professional teacher education programs at the institution, the PREJUDICE scale was calculated from twenty-four Likert items taken from previously validated scales that measured beliefs and attitudes toward gay men and lesbians (Modern Homophobia Scale; Aosved et al., 2009; Raja & Stokes, 1998) and covert and explicit homophobia (Subtle and Overt Sexual Prejudice Scales, Pérez-Testor et al., 2010; Quilles del Castillo et al., 2003). The PREJUDICE scores were calculated as the mean value of the twenty-four items for each survey participant. Cronbach’s alpha coefficient for the PREJUDICE scale was greater than 0.700 as recommended by Field (2009) indicating that the items were measuring consistent constructs. Survey questions regarding demographic, education, and personal characteristics integrated previous research on sexual

prejudice among pre-service and in-service teachers (Mudrey & Medina-Adams, 2006; Pérez-Testor et al., 2010; Raja and Stokes, 1998; Riggs et al., 2011; Sprott, 2007). Testing one independent variable (demographic, education, or personal characteristic) at a time against the PREJUDICE scores clarified how participants' beliefs and attitudes were associated with other characteristics.

The electronic survey was piloted with faculty both inside and outside teacher education and with graduate students outside teacher education to make sure that all facets of the electronic survey system were functioning properly. All aspects of Institutional Review Board approval were followed throughout this study.

Undergraduate and graduate students in teacher preparation programs received an e-mail invitation to participate in the electronic survey. Participant e-mail addresses were collected from the institution's print directory and entered into an electronic survey system. Out of 948 emails sent, 86 surveys were completed and six were partially completed ($n = 92$; 9.7% response rate).

Research Design and Data Analysis

The research design was cross-sectional, ex post facto (similar to Campbell and Stanley's pseudo-experimental Static-Group Comparison, 1963, Design 3, p. 8). Cohen and Manion (1994) explained that ex post facto research is appropriate in cases where "the independent variable or variables lie outside the researcher's control" (p. 150).

Data were analyzed for differences related to gender, race, age, educational license sought, college credit courses completed with multicultural education content, college credit courses completed with sexual orientation content, political viewpoint toward multiculturalism, religious affiliation, affiliation with homosexuals (friends, coworkers, family members), participant sexual orientation, teacher education content area, and finishing the survey.

Rather than interpreting individual survey items, the PREJUDICE scale was calculated as the mean of twenty-four items for each survey respondent. The PREJUDICE scores were then tested against the independent variable that represented the number of completed college credit courses with multicultural education content. Since the frequency of in-service teachers was too low for an analysis of in-service teachers only, this analysis was restricted to pre-service teacher participants. We hypothesized that levels of sexual prejudice would be lower for those who had completed more courses with multicultural education content. An independent-samples t-test was conducted to compare PREJUDICE scores by the number of college credit courses completed with multicultural content. In addition, independent-samples t-tests were conducted to compare PREJUDICE scores among pre-service teachers by political affiliation, religious affiliation, participant sexual orientation, and by the number of sexual minority friends, family members, and coworkers.

Results

The following research question guided the analysis: What is the relationship between sexual prejudice and demographic, educational, and personal characteristics among pre-service teachers? There were no significant differences in sexual prejudice as estimated by PREJUDICE scores for any demographic characteristic. Only one educational characteristic resulted in significant differences in sexual prejudice as estimated by PREJUDICE scores: the number of college credit courses completed with multicultural content. Pre-service participants who completed no courses were found to have statistically significantly lower PREJUDICE scores (M

= 1.52, SD = .47, n = 5) than pre-service participants who completed three courses (M = 2.23, SD = .77, n = 13), $t(16) = -1.90$, $p = .04$, eta squared = .09 (medium). No other significant differences were identified for pre-service teachers completing one (M = 1.99, SD = .68, n = 8), two (M = 1.62, SD = .65, n = 9), or four or more (M = 1.93, SD = .92, n = 14) courses with multicultural content. In general, more completed courses were associated with higher PREJUDICE scores for pre-service teachers. However, personal characteristics were statistically significantly associated with the variance in PREJUDICE scores. Statistically significantly higher levels of sexual prejudice as estimated by PREJUDICE scores were associated with pre-service participants who reported being politically conservative and with being heterosexual. These are not surprising results considering the current cultural climate of the U.S. In addition, statistically significantly lower levels of sexual prejudice as estimated by PREJUDICE scores were associated with pre-service participants who reported having friends, coworkers or family members who were non-heterosexual (see Table 1).

Table 1

Relationship between personal characteristics and PREJUDICE scores for pre-service teachers

Personal Characteristic	Levels			Sig.
Political viewpoint toward multiculturalism	Conservative	Higher than	Moderate	$p = .00$
	Conservative	Higher than	Somewhat liberal	$p = .00$
	Conservative	Higher than	Liberal	$p = .00$
Religious affiliation	Non-Christian	Lower than	Catholic	n.s.
	Non-Christian	Lower than	Other Christian	n.s.
Friends	<=Two	Higher than	Three	$p = .01$
	<=Two	Higher than	4-5	$p = .00$
	<=Two	Higher than	6-25	$p = .00$
Coworkers	None	Higher than	One	$p = .03$
	None	Higher than	Two	$p = .00$
	None	Higher than	3-10	$p = .01$
Family members	None	Higher than	1-4	$p = .00$
Participant sexual orientation	Heterosexual	Higher than	Non-Heterosexual	$p = .00$

Note: this table is adapted from Foy (2014), Table Q.3., p. 403

Discussion

Limitations

Statistical analysis of survey items from pre-service and in-service teachers in one teacher education program provided some clarity with regard to improving gender and sexual diversity education within teacher preparation. Caution, however, should be applied in generalizing these findings beyond the current sample. The limitations to useful interpretation of these findings center around three primary barriers: (1) how the question of completed college-credit coursework with multicultural content was asked, (2) the identity state or stage of survey participants, and (3) personal characteristics of survey participants. Each of these three barriers will be discussed below.

Although caution should be exercised in generalizing these results beyond this sample, specific implications suggested by these results are that further research is needed toward teacher education experiences that will raise awareness of pre-service and in-service teachers' heteronormativity and how their students may be affected by their sexual prejudice. Teacher preparation that questions heteronormative beliefs and attitudes extends multicultural teacher education beyond the protection of individual homosexual youth, enculturating pre-service and

in-service teachers toward practices that advance social justice (Payne & Smith, 2012a, 2012b, 2013).

This study contributes to the literature on sexual prejudice among K-12 teachers despite the small sample size ($n = 92$) and the low response rate (10%; 92 out of 948) because of the implications for improving teacher preparation. Reasons for small sample size and low response rate may have included participants placing less value on educational research or being uncomfortable sharing beliefs and attitudes toward sexual minorities. However, participants in this study could have experienced cognitive dissonance around the subject of sexual diversity as a result of completed coursework and may not have resolved their discomfort at the time of participation. Discomfort with the topic of sexual diversity and cognitive dissonance provide clues to addressing the development of K-12 classroom teachers as social justice allies. These features of the ally development process require the guidance and facilitation of multicultural teacher educators.

Implications

Students are admitted into teacher preparation with a suite of characteristics (age, political and religious affiliations, non-heterosexual friends, coworkers, and family members) that shape their beliefs and attitudes toward sexual minorities. Even when the teacher educator challenges the pre-professional to reflect upon the source and meaning of their personal and demographic characteristics, only the educational content is directly in the hands of the teacher educator. The finding that completed college credit courses in multicultural education was associated with higher levels of sexual prejudice is contradictory with previous research (Riggs et al., 2011; Sprott, 2007) and suggests that more research is needed into the kinds of experiences with sexual minorities that will raise awareness among pre-service teachers of how heteronormativity affects teacher performance and practice in the classroom.

Overall, these findings raise more questions than provide answers. Under what conditions is sexual prejudice not changed by external influences (such as education or required experiences)? How will changes in levels of sexual prejudice promote improved teaching practices? How will changes in levels of sexual prejudice motivate changes in educational policy for the benefit of all students?

These questions are important because of the automatic preferences (Banaji & Greenwald, 2013) that we acquire in the United States regarding gender, race/ethnicity, and age through socialization processes (Harro, 2008). When a student walks into a classroom, automatic preferences go to work inside the classroom teacher and inside the student to categorize every other person in the room based on these preferences unless reflective practices are in place to counter stereotypes. Perhaps the strongest example of automatic preferences in the U.S. is racial prejudice. Banaji and Greenwald (2013) suggest that racial prejudice exists among Americans no matter how progressive people see themselves. Repeatedly, researchers have confirmed that Americans exhibit racial bias when completing the Implicit Association Test (IAT). Banaji and Greenwald (2013) propose that this persistent bias may extend to heterosexuality. That is, if there were enough research conducted with the sexual IAT, as there has been for the racial IAT, we would see that Americans are consistently biased toward heterosexuality and against homosexuality. In their work they have shown that these biases are extremely difficult to change even when the person desires to change (Banaji & Greenwald, 2013). Their work applies to gender and sexual diversity education. Even with racial prejudice as the norm, multicultural teacher preparation provides the possibility of becoming a social justice ally.

We assume that with appropriate gender and sexual diversity education, teacher education faculty, pre-service teachers and in-service teachers develop themselves as social justice allies. An ally makes a conscious decision to be supportive of and accepting of the Other; whoever the Other is. At the most, an ally is able to overcome their own biases sufficiently to make friends with those who are different from them, to have genuine empathy, compassion and intimacy with individuals who are different. We maintain that, at the least, a social justice ally should be willing to put aside their personal biases in professional situations. Knowing one's own cultural identity, one's unearned privileges, and yet putting those aside to work with a student who is different is the professional work of the social justice ally. Developing social justice allies (Ligon, Mason-Browne, McGill, Rummery, & Sannes, 2012; Metzger, Carlson, McGill, & Vickers, 2014) should be included in multicultural teacher preparation along with understanding privilege (McIntosh, 1988, 2009, 2012).

Recommendations

Pre-service teachers must be guided toward a more sophisticated and inclusive understanding of their role as classroom leader. Toward this aim, educational researchers need to answer three essential questions: (1) what best practices should be incorporated across the teacher education program to guide and monitor identity development?; (2) what characteristics of student teachers should be evaluated within student teaching that will ensure the safety and encourage the belongingness of all students in that new teacher's classroom?; and (3) what specific best practices should be incorporated within the multicultural education classroom to prepare new teachers for GSD students? To discover the answers to these questions will require both quantitative and qualitative educational research efforts among many teacher education programs. This effort will ensure that all students are able to learn in their K-12 classroom environment.

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Seclusion Amongst Elementary and High School Students: An Analysis of the Role of Demographic Variables in the Use of Seclusion in Kansas Schools

Felicity Balluch

Demographic variables are suspected to influence seclusion rates in educational settings. However, little is known about the connections between these variables and reported incidents of seclusion, particularly how seclusion is influenced by gender, special education status, race, and eligibility for free and reduced lunch. The purpose of this study was to understand the relationships between demographic variables and seclusion rates for elementary and high school students. It was hypothesized that all predictor variables were directly related to the outcome variable in both cases. This study utilized data from the Kansas Discipline Incident System (Kan-Dis), which is an online web application accessible by all educational facilities in order to provide information regarding discipline incidents to the Kansas State Department of Education. Data were analyzed using a multiple linear regression model to understand the relationships between demographic variables and seclusion rates. More specifically, data were analyzed using R. Pearson's product moments correlation coefficient was utilized with a significance level set at a minimum of 0.001 with confidence intervals set at 95%. Gender, race, special education status, and eligibility for free and reduced lunch were all determined to be positive and significant predictors of seclusion at the elementary level. At the high school level, special education acted as the only significant and positive predictor of seclusion while race and eligibility for free and reduced lunch were positive predictors but not significant. Gender was a negative predictor and was not significant. Results show that connections exist amongst demographic variables and seclusion rates at the elementary and high school levels.

Introduction

Seclusion has been defined by the Council for Exceptional Children (CEC) as “the involuntary confinement of a child or youth alone in a room or area from which the child or youth is physically prevented from leaving” (CEC, 2009). CEC further clarifies that this is true regardless of intended purpose or the name applied to the steps of such a procedure. The principles surrounding the use of seclusion clarify that it should only be used when the behavior of a child poses impending danger of “serious physical harm to self or others” and should be circumvented whenever possible without jeopardizing the safety of both students and staff (U.S. Department of Education, 2012). Throughout the literature, seclusion and restraint are often coupled considering they are both emergency procedures, often happen sequentially (e.g. restraint leads to seclusion), and are reported in a similar fashion (Peterson, 2010). Unfortunately, this makes the extrapolation of data regarding seclusion that much more challenging. No student is immune to the practice of seclusion, with the special education population being at a higher risk for exposure to this aversive procedure (Lorhmann-O'Rourke & Zirkel, 1998).

Now, more than ever before, students with significant behavioral issues are being included in general education environments (Peterson, 2010). Considering that a large number of these students were previously taught in specialized settings such as hospitals, special education settings, and treatment centers, aversive procedures may have been viewed as regular interventions for such a population (Peterson, 2010). Hence, such procedures have followed students into the general education setting making it vital that general education teachers, paraprofessionals, counselors, administrators, special education teachers, and all staff who may encounter these students be able to safely and effectively manage a behavioral crisis (Couvillon, Peterson, Ryan, Scheuermann, & Stegall, 2010). Unfortunately, in education, behavior management is a highly neglected area in which educators do not possess much needed knowledge and expertise (Maag, 2001). Lack of training regarding the limitations and dangers of aversive procedures in addition to inadequate staffing have resulted in the overuse and misuse of both seclusion and restraint (Moses, 2000; Ryan, Peterson, Tetreault, & van der Hagen, 2008; Peterson, 2010).

As the push continues to educate students with disabilities in the inclusive setting (Pudelski, 2013), general education teachers are faced with educating a population of students diagnosed with emotional and/or behavioral disorders. Such a population has been described as nearly impossible to teach and one who presents daunting challenges to teachers and other school personnel (Sutherland & Singh, 2004). Considering that students with emotional and behavioral disorders (EBD) often display high levels of both verbal and physical aggression, the need for aversive procedures such as seclusion continue to intensify (Pudelski, 2013). Thus, schools continue to examine more effective interventions designed to address behavioral crises that put others at risk (Smith, Katsiyannis, & Ryan, 2011).

General concern exists that, although the use of seclusion is restrictive and a potential for abuse exists, it is being used regularly in schools (CCBD, 2009; Ryan, Peterson, Tetreault., et al. 2007; Ryan, Sanders, Katsiyannis, & Yell, 2007; Westling, Trader, Smith, & Marshall., 2010). Seclusion comes with a litany of trepidations including decreased learning opportunities (CCBD, 2009; Gast & Nelson, 1977) , reinforcing the behavior it is supposed to eliminate (Ferleger, 2008), causing physical harm to children (CCBD) , causing psychological harm (Ferleger, 2008; Finke, 2001, & Westling, et al., 2010), IDEA violations (Ryan, Peterson, & Rozalski; 2007; Jones & Feder, 2009; Wolf, McLaughlin, & Williams, 2006) and death (GAO, 2009; Goodmark, 2009). Thus, it is no surprise that such a procedure warrants caution and concern.

At the current time, no federal laws or regulations exist that address the use of restraint or seclusion in schools (Miller, 2011; Butler, 2014). Instead, the federal position on seclusion is largely suggestive in nature and does not call for federal mandates concerning the use of aversive procedures (Peterson & Smith, 2013). In its place, schools have been solicited to revise or create legislation or policy in order to regulate the use of seclusion and restraint within the school setting (Council of Parent Attorney and Advocates, 2009; Duncan, 2009; National Disability Rights Network, 2009). Consequently, merely 19 states have vital protections against seclusion and restraint for all students, with 32 protecting those with disabilities (Butler, 2014). Such protections are believed to be a result of multiple Congressional bills that have been proposed but not passed (e.g. S.2860; Public Law 106-310; H.R. 4247; H.R. 1381; H.R. 1893; S.2020; & S.2036).

Review of Literature

Literature involving the use of seclusion is meager at best (Ryan, Peterson, Rozalski, 2013). What minimal amount of research that has been conducted has primarily relied on anecdotes (COPAA, 2009; GAO, 2009; Scheuermann et al., 2013), convenience surveys (Westling et al., 2010) lists of cases (Lohrmann-O'Rourke & Zirkel, 1998) and frequency tables (Zirkel & Lyons, 2011). As a result, an inadequate amount of research exists for much needed analysis and understanding. Multiple studies offer recommendations regarding the practice of seclusion (Gast & Nelson, 1977; Ryan, Sanders, et al., 2007; Yell, 1994) or focus on reducing the use of the procedure all together (Ryan, Peterson, Tetreault, et al., 2007). Calls for research abound (Council for Children with Behavioral Disorders, 2009; Persi & Pasquali, 1999; Wolf et al., 2006) in addition to reports of related legal proceedings (Zirkel & Lyons, 2011). Alarming, no evidence-based research currently exists which has demonstrated that the use of seclusion is therapeutic, but only that it can be both physically and psychologically harmful to those involved (National Disability Rights Network, 2010). Furthermore, virtually no research exists showing its effectiveness (Peterson, 2010). Other research has uncovered reasons for seclusion use (CCBD, 2009; Ryan, Peterson, & Rozalski, 2007) including: punishment to decrease target behavior (Ferleger, 2008), as a therapeutic approach intent on setting limits or to avoid sensory overload (CCBD, 2009; Busch & Shore, 2000), and in an emergency situation in which a student is out of control and at risk of hurting himself or others (Ferleger, 2008). Multiple studies have also established that seclusion rates can be reduced (Martin, Krieg, Esposito, Stubbe, & Cardona, 2008).

Moreover, research detailing the relationships between demographic information and seclusion is scarce. A number of studies have indicated that seclusion appears to occur more often within elementary and middle school settings (Ryan, Peterson, Tetreault et al., 2007; Westling et al., 2010). Reports also indicate that nearly every type of disability has been represented within the population of students that have experienced seclusion (Hoffman, 2011). Furthermore, males tend to be more likely to be secluded even though gender differences that have been indicated are quite small (Persi & Pasquali, 1999).

In sum, little is known about the use of seclusion in educational settings. Disparate opinions, lack of federal definition and law, as well as an ill prepared population of educators, pose serious threats in regards to the use of this aversive procedure. With the majority of standing research being largely outside of the demographic realm, further inquiry regarding the characteristics of those students who are at-risk of seclusion, is warranted. In order to seek stronger evidence of links between demographic variables and seclusion rates, the focus of this study was narrowed to include the race, special education status, gender, and eligibility for free and reduced lunch of a sample population of students that previously experienced seclusion. The results of this study are expected to shed light on the factors that may predict the use of seclusion and to contribute to the slim amount of research currently available. This study aimed to answer the following question: To what extent do gender, race, special education status, and eligibility for free and reduced lunch predict seclusion? It was hypothesized that a positive and predictive relationship does, in fact, exist between seclusion and all demographic variables explored in both the elementary and high school sample populations.

Research Methods

Participants

The sample that participated in the study consisted of all school-aged students in grades kindergarten through six and nine through twelve across the state of Kansas who were involved in seclusion during the 2009-2012 academic school years. Students included those in public, private, and interlocal elementary and high schools. All identifying information was withheld in order to maintain anonymity.

Sampling Procedures

All seclusion data was obtained from The Kansas Discipline Incident System (KAN-DIS). KAN-DIS is an online web application accessible by all public school districts and other various educational agencies across the state in an effort to provide information regarding discipline incidents. Each individual facility is asked to report specific aversive intervention data twice per academic year. The data, in turn, is then used to produce numerous discipline reports. KAN-DIS was launched in the 2009-2010 school year for the purpose of assisting school districts in monitoring seclusion and restraint data more closely and to provide technical assistance to districts across the state. Mere guidelines were in place during the dates of this study meaning districts were not required by law to report aversive incidents, but rather, were encouraged to do so. As of April 19, 2013, emergency safety intervention regulations have been put in place across the state of Kansas, making reporting a mandated procedure by law.

Procedure

In order to obtain data for analysis, the researcher contacted the Kansas State Department of Education and formally requested all available seclusion records for students in kindergarten through twelfth grade across the state for the years 2009-2013. Available demographic information in regards to race, disability status, gender, eligibility for free and reduced lunch, building level, and building type was specifically requested. Requested information was provided through 2012 and was given in an Excel format. All records involving students in a middle school, junior high school, special school, or other were removed from the study. Incomplete records involving one or more requested demographic areas not reported were also removed.

Data Analysis

Elementary. First, frequency data were obtained for all demographic variables reported. A total of 44,017 incidents of seclusion were reported for the elementary setting from 2009-2012, with 26,946 included in the sample for this study. Only complete incidents including gender, race, disability status, and free and reduced lunch eligibility were included. From the sample, 85.9% of incidents involved male students, 88.6% of students received special education services, 70.9% qualified for free and reduced lunch, and 73.6% of students were White. Next, the relationships between seclusion incidents and demographic variables were investigated. Specifically, seclusion incidents acted as the outcome variable with gender, race, disability status, and eligibility for free and reduced lunch serving as the predictor variables. Pearson's product-moment correlation coefficient with a significance set at a minimum of 0.001 and a confidence interval at 95% were used for analysis. Data were analyzed using R statistical software.

High School. Frequency data were also obtained for all demographic variables reported within the high school population. A total of 43,346 incidents of seclusion were reported for the high school setting from 2009-2012, with a mere 1,060 included in the sample for this study. A significant amount of the reported incidents in KAN-DIS for the high school population were incomplete and therefore removed. Only incidents including gender, race, disability status, and free and reduced lunch eligibility were included. From the sample, 94% of incidents involved male students, 98% received special education services, 51% qualified for a free and reduced lunch, and 87% of the students were White. The same demographic variables and their relationship to seclusion incidents were explored for high school students as elementary aged students. High school data were also analyzed using Pearson's product-moment correlation coefficient with significance set at a minimum of 0.001 and a confidence interval at 95%.

Results

Descriptive statistics were obtained for each sample and are displayed in Table 1.

Table 1

Descriptive Statistics for Elementary and High School Sample Populations

Variable	Elementary			High School		
	N	M	SD	n	M	SD
Incident	26,946	162.32	260.07	1,060	117.77	84.65
Male	23,149	139.45	244.89	996	110.71	83.66
Free	19,112	115.13	200.28	543	60.43	58.20
White	19,839	119.51	169.19	931	103.46	92.87
SPED	23,900	143.97	228.79	1,041	115.75	84.78

Elementary. According to the multiple linear regression analysis results for elementary aged students, male, white, eligibility for free and reduced lunch, and special education status account for 98% of seclusion variance ($p < 0.001$) (Table 2). The model was statistically significant as the p value was well below 0.001 with confidence levels at 95%. Males positively contributed to the model ($R^2 = 0.45$, $p < 0.001$) as well as White ($R^2 = 0.24$, $p < 0.001$), free and reduced lunch eligibility ($R^2 = 0.21$, $p < 0.001$) and special education status ($R^2 = 0.30$, $p < 0.001$). For the elementary sample, the null hypothesis was rejected as a significantly positive and predictive relationship existed amongst all variables explored and seclusion.

Table 2

Predictors of Seclusion in the Elementary Setting

Variable	Unstandardized Coefficient B	Standard Error	95% CI
Male	0.45*	0.03	[0.38, 0.53]
White	0.24*	0.03	[0.17, 0.31]
Free and Reduced Lunch	0.21*	0.03	[0.15, 0.28]
Special Education	0.30*	0.03	[0.22, 0.37]

Note. $R^2 = 0.98$. $\Delta R^2 = 0.98$. $n = 26,946$. CI = confidence interval.

* $p < 0.001$

High School. Multiple linear regression analysis results for high school aged students, male, White, eligibility for free and reduced lunch, and special education status account for 99% of the seclusion variance ($p < 0.001$) (Table 3). The model was statistically significant as the p value was well below 0.001 with confidence levels at 95%. However, unlike the elementary model, only the variable special education was statistically significant ($p < 0.01$). Overall, males

negatively contributed to the model ($R^2=-0.07$). Special Education status ($R^2=0.98$, $p<0.01$), along with eligibility for free and reduced lunch ($R^2=0.02$), and White ($R^2=0.07$) positively contributed. For the high school population, the null hypothesis was not rejected as only special education status was significantly a positive predictor of seclusion.

Table 3
Predictors of Seclusion in the High School Setting

Variable	Unstandardized Coefficient B	Standard Error	95% CI
Male	-0.07	0.13	[-0.43, 0.29]
White	0.07	0.07	[-0.12, 0.26]
Free and Reduced Lunch	0.02	0.01	[-0.02, 0.08]
Special Education	0.98**	0.11	[0.66, 1.30]

Note. $R^2=0.99$. $\Delta R^2=0.99$. $n = 1,060$. CI= confidence interval.

** $p<0.01$

Discussion

The purpose of this study was to explore the relationship of demographic variables and their ability to predict seclusion incidents in the elementary and high school settings. Previous research is very limited in this regard (Connolly, 2014), and this study aimed to further expand the existing research base.

From included frequency data, it appears as though more incidents of seclusion occurred within the elementary setting ($N=26,946$) as compared with the high school setting ($N=1,060$). This finding further validates previous research (Ryan, Peterson, Tetreault., 2007; Westling et al., 2010) suggesting that seclusion happens more often in elementary settings. Lower seclusion rates could result from a number of different circumstances. Student size, fewer coping strategies, and a feeling of developmental appropriateness, may account for the higher use of seclusion amongst younger populations (Persi & Pasquali, 1999; Ryan, Peterson, Tetreault et al., 2008). Additionally, educators are more likely to ignore the behaviors of older students due to the size and strength of the individuals (Miller, Walker, & Friedman, 1989; Persi & Pasquali, 1999), which subsequently would result in lower seclusion rates. According to Sutherland and Singh (2004), students with EBD are more likely to be absent from school, have lower grades, fail, and have higher dropout rates than students diagnosed with other disabilities. Increased absences as well as elevated drop out rates may contribute to lower seclusion rates at the high school level. Last, a decrease in seclusion in the high school setting may suggest that students have a better hold on their emotions and are able to make more responsible decisions regarding behavioral choices.

Persi and Pasquali (1999) suggested that males are more likely to be secluded. In this study, a positive and predictive relationship was found in the elementary sample population. At the same time, this was not the case in the high school setting with a negative predictive relationship being uncovered. This variation may be related to the size of male high school students and the preparedness of educators to place these students in a secluded setting. Data indicate that educators responsible for teaching students with EBD are some of the least qualified special educators, with a high percentage entering the teaching field through alternative certification programs rather than the traditional ones used to prepare most special education teachers (Billingsley, Fall, & Williams, 2006). Further, considering that the majority of the teaching population is female, there exists a real possibility that a large number of male high school students are bigger than those educators responsible for keeping them safe. This, along

with a lack of feeling prepared, may help to explain why seclusion rates are lower amongst the male high school population. Size is not as likely to be a major factor amongst the elementary male population, leading to a greater likelihood that female teachers may be willing to restrain them.

Hoffman (2011) reported that nearly every disability category is represented within the population of students that have been secluded. This study indicated that a positive and predictive relationship exists between students in special education and seclusion within both the high school and elementary sample. While this finding lends support to Hoffman's study, specific disability categories were not available in order to further explore which populations of students were represented.

Last, within both settings, being White and eligible for free and reduced lunch had a positive predictive relationship on seclusion rates. However, these relationships were only significant within the elementary population. Higher seclusion rates may exist amongst the White population because the majority of people in Kansas are, in fact, White. Due to a large White population, one could assume that the educators in Kansas schools are also White, possibly leading to a perceived sense of security surrounding sameness when teachers are faced with the decision to seclude. Additionally, teachers and various other staff are not equipped with the resources or skills to properly manage children with high needs, especially those in high-poverty areas (Atkins, Hoagwood, Kutash, & Seidman, 2009). Students receiving free and reduced lunch may, in fact, dwell in poverty stricken homes. Consequently, teachers responsible for teaching these students may not be properly prepared to manage student behaviors and may, instead, choose to seclude them.

Limitations

One limitation of this study was that locations and demographic information of reporting schools was unknown. Because schools were not mandated to report seclusion incidents, there were no clear indications as to which schools did and did not report them. Consequently, there was no way to discern school size or population characteristics. As a result, these findings are not able to be generalized to other populations. A second limitation of this study was the anonymity of students subjected to seclusion. As a result of no identifiable indicators, the researcher was unable to determine if the same student was responsible for numerous seclusion incidents. A third limitation of this study is that numerous data had to be removed due to being incomplete. Because schools and agencies were not required by law to report data from 2009-2012, no criteria were in place for what did and did not have to be reported. As a result, many incomplete records existed regarding demographic variables that could not be analyzed. Additionally, the variation within the demographics would surely have influenced the predictive relationships that were uncovered. Another limitation of this study was that complete reporting of data for the specified time period can only be assumed. There is no way to know whether or not all seclusion incidents were actually reported by educational agencies. Considering the lack of mandated reporting during the selected timeframe, the likelihood that the number of incidents reported in the data are, in fact, an underestimate of actual incidents is highly probable. Finally, numerous confounding variables exist outside the realm of this study including lack of guidelines, regulations, or accreditation standards (Ryan, Peterson, Tetreault, et al., 2008) an absence of staff training (Greene, Ablon, & Martin, 2006), educator preparedness, intervention models (Martin et al., 2008), and staff support.

Future Research and Implications for Practice

Research suggests that seclusion is an aversive intervention with potentially far reaching effects. That being considered, it is imperative that researchers continue exploring various aspects of seclusion in order to better understand this aversive practice. Future research should further investigate the demographics of students subjected to seclusion in order to gain a better understanding of factors that may influence its use. Researchers should also explore the disability statuses of the secluded population in an effort to understand which population is most at risk. This information can then be used to better inform educators of the needs and challenges facing such populations so as to better meet their diverse needs. Last, researchers could examine other predictors of seclusion outside the demographic realm including teacher training and/or personal feelings of preparedness, a history of involvement in previous seclusion incidents, and the presence of mental health services. One may also consider exploring the number of years in education, feelings of administrative support when dealing with behaviors, as well as personality characteristics of involved educators. All of these proposed avenues could shed light on much needed information for those advocates working tirelessly to ensure that students are being subjected only to evidence-based practices.

This study helps to uncover the demographics of a population at risk for seclusion. This information can be used to create an awareness amongst educators regarding the likelihood of seclusion with their students. Thus, a proactive approach can then be taken by educators to make certain that these students are being afforded the most positive educational experiences available.

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Impacts of Neoliberal Managerial Practices on Faculty Engagement in Student Learning Assessment

Chris Urban

Faculty perceptions of student learning assessment were examined in the context of neoliberal trends in higher education in this exploratory survey study. For this preliminary study, a small department consisting of sixteen faculty members was surveyed. Responding faculty rated themselves as highly engaged in assessment, and rated course uses of assessment as more important than institutional uses of assessment. Faculty perceived administrators as placing more importance on institutional uses over course uses, though the gap between administrators and faculty was less in course uses than in institutional uses. Faculty ratings of neoliberal manifestations at their institution varied considerably, with a perceived institutional focus on job training over liberal arts education the most substantial item. Together, these findings set the stage for future research into whether neoliberal trends impact faculty engagement student learning assessment.

Introduction

Over its three decades of formal existence, student learning assessment has reflected the tensions facing higher education at large. From its beginnings in the 1980s up to its various manifestations in the present, assessment practice has been negotiated between outside groups demanding accountability and internal groups looking to improve the educational quality of their programs (Ewell, 2002). Work by Huba & Freed (2000) and Hutchings (2010) indicates that assessment is more successful—that is, it is broadly utilized by faculty to improve learning—when it is viewed by faculty as an internally-driven practice focused on teaching and scholarship rather than an externally-driven practice focused on accountability and compliance.

The same three decades have also been identified as a period when higher education has been shaped by neoliberal trends. Neoliberalism as a term is considered a “loose and shifting signifier” (Brown, 2015, p. 20). However, in broad strokes it can be understood as a “rationality that disseminates market values and metrics to every sphere of life and...formulates everything, everywhere, in terms of capital investment and appreciation” (Brown, 2015, p. 176). The rationality of neoliberalism manifests itself in higher education in many ways, including:

- an increased use of economic metrics to define productivity and value disciplines
- viewing students as customers or clients;
- a focus on job preparation over a liberal arts education;
- a valuing of knowledge primarily in terms of its economic exchange value;
- the use of corporate practices in governance; and
- increasing external accountability (Brown, 2015; Giroux, 2002; Giroux, 2009; Giroux, 2014).

This list is not exhaustive, but illustrates the various ways in which economic market values have permeated higher education.

More specific survey studies have looked at various aspects of student learning assessment and neoliberalism. Some have shown that faculty are more likely to engage in assessment if it is viewed as a scholarly activity (Wang and Hurley, 2012). Other survey studies have investigated faculty job satisfaction in relation to neoliberal developments (Fredman & Doughney, 2012). Still others have discussed the difference between faculty and administrator perceptions of assessment use (Kinzie, 2010; Kuh & Ikenberry, 2009). Non-survey studies have also conceptualized ways to reconceive assessment in ways that counteract neoliberal trends (Hursh and Wall, 2011).

One item missing from this research on neoliberalism and assessment is an investigation into whether manifestations of neoliberalism in higher education impact faculty engagement in student learning assessment. Engagement in this context is determined by how often faculty use assessment in their courses, how much work faculty perceive they put into assessment, and how much faculty think they know about assessment. The aim of this exploratory study is to provide initial direction toward answering the following questions:

1. Do perceived conflicts between faculty uses (for teaching and learning) and administrator uses (for accountability/compliance, connected to neoliberalism) of assessment impact faculty engagement in student learning assessment?
2. Do non-assessment neoliberal manifestations in higher education impact faculty engagement in student learning assessment?

As assessment in higher education continues to evolve, it is important to understand the relationship between assessment and neoliberalism. Such an understanding would help guide assessment professionals in building a successful assessment culture at their institutions, and illuminate ways to manage assessment in ways that counteract neoliberal trends.

Methods

Survey Development

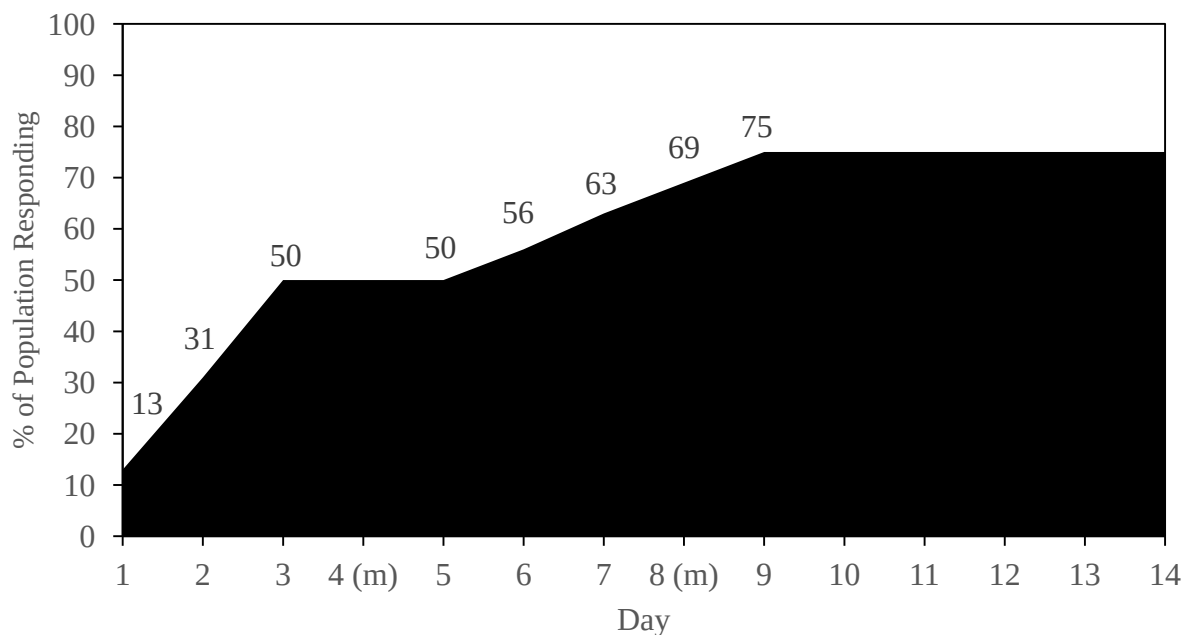
The survey was developed and implemented according to the “Tailored Design Method” guidelines found in Dillman, Smyth, and Christian (2014). The main contextual factors affecting the survey were that it was completed in a relatively short time frame for a class project and, because of that, was considered an exploratory study. The questionnaire was developed by adapting questions from Wang & Hurley’s (2012) items relating to faculty perceptions of assessment as a scholarly activity. Items on the uses of assessment from the faculty and administrative point of view were adapted from National Institute for Learning Outcomes Assessment (NILOA) surveys (Kinzie, 2010; Kuh & Ikenberry, 2009). Items on manifestations of neoliberalism at an institution were adapted from Fredman & Doughney’s (2011) work relating neoliberalism to work satisfaction of faculty. Adapted items were combined into a questionnaire, which was presented to a subject matter expert for review. This resulted in the elimination of several redundant and irrelevant items, the reordering of questions to be more conceptually consistent, and the rewording of items to be less abstract and more grounded in the work faculty members actually do. One cognitive interview with someone unfamiliar with the topic was also done, which resulted in minor revisions to question wording and scales. Demographic items thought to affect results were added relating to number of years worked at the institution and whether the respondent had served as an assessment coordinator for their program, college, or institution. Number of years worked and a history of service as an assessment coordinator may change how faculty perceive assessment uses, importance place on assessment by administrators, and neoliberal trends.

Respondents & Response Rate

Respondents included all faculty and staff in a leadership studies department at a large, Midwest research university whose online listing indicated they taught a course. These faculty were selected for this exploratory study because there were enough faculty to achieve meaningful exploratory results. The list of faculty was taken from the department's website. There were sixteen total respondents in the frame, of which twelve responded and completed the survey, for an overall response rate of 75%.

Figure 1.

Cumulative response rates and reminder messages over time



Reminders represented by (m). Day 1 was Tuesday, April 14. Day 14 was Tuesday, April 28.

Implementation

The survey was implemented using Qualtrics, an online survey tool. Participants were sent an initial invitation email and two reminders, each with unique subject lines and messages. The invitations and reminders were framed as a graduate student seeking help to complete a research project on management and assessment, which was thought to be the message that best induced complete and truthful responses. Figure 1 shows the cumulative percent response trend over the entire two weeks the survey was open.

Limitations

As an exploratory study, several limitations are apparent. With only twelve responses, in-depth data analysis and statistical tests on the surveys items are not feasible. Thus only percentages of respondents selecting given responses are presented. Respondents included only faculty in one department, which may result in error because the department's assessment and managerial culture may not represent the institution as a whole. The study also revealed that the

structure and design of the research was overly complex, which made the results difficult to interpret.

Results

Overall, results show that faculty in this limited study are highly engaged in assessment. While faculty perceive some conflicts in the use of assessment, especially at the institutional level, these do not appear to impact faculty engagement. Items related to neoliberal manifestations showed varied perceptions of neoliberal trends. Like the perceived conflict in institutional uses of assessment, these neoliberal manifestations do not appear to impact faculty engagement in assessment.

Results, as shown in Table 1, indicate that faculty are highly engaged in assessment, with 100% responding that they commonly use assessment and that they put substantial work into completing assessment. However, respondents did rate themselves lower in knowledge about assessment, indicating a potential area for improvement. Surprisingly, faculty rated themselves lower overall than administrators in assessment knowledge, while they rated themselves higher in how often they used assessment and how much work/resources they put into assessment. It was not clear, however, if perceived conflicts in assessment use or neoliberal manifestations impacted these results, as there were too few respondents to expect any meaningful results from statistical tests. The descriptive results, however, indicate that assessment professionals may assist faculty by helping to increase their knowledge, and by encouraging administrator use of assessment data. Interventions such as these would help bridge gaps identified by faculty and contribute to a culture of assessment.

Table 1

Faculty-perceived self and administrator engagement in assessment

Item	% in top two categories of scale		
	Self	Administrators ^a	Difference
Frequency of use ^b	100	70	30
Amount of work/resources ^c	91.7	60	31.7
Knowledge ^d	75	80	-5

^aRatings of "Unsure" excluded. ^bResponse set = Never, Rarely, Sometimes, Often. ^cResponse set for self = None, A little work, Some work, A lot of work; for administrators = No resources, a few resources, some resources, a lot of resources. ^dResponse set = Know nothing, Know a little, Know some, Know a lot.

Results comparing faculty perceptions of the uses of assessment are detailed in Table 2. In general, faculty place importance on course-based uses for assessment above institutional uses, while they perceive administrators as placing more importance on institutional uses. The gap between faculty and administrators in course uses is consistently much smaller than the gap in institutional uses, indicating that faculty perceive administrators as finding importance in teaching and learning uses of assessment in spite of the need for administrators to satisfy institutional requirements. In addition, faculty rate institutional uses with the lowest importance of any group-use combination, indicating that conflicts may be present.

Table 2

Faculty-perceived self and administrator importance on assessment uses

	% in top two categories of scale		
Item	Self	Administrators ^a	Difference
Course uses ^b			
Improves student learning	91.7	75	16.7
Improves instruction	83.3	66.7	16.6
Institutional uses ^c			
Budget requests	50	83.3	-33.3
Institutional improvements	58.3	83.3	-25
Institutional accreditation	50	91.7	-41.7
Governmental accountability	58.3	83.3	-25
Demonstrate public value	50	83.3	-33.3

^aRatings of "Unsure" excluded. ^bResponse set = Not at all important, A little important, Somewhat important, Very important. ^cResponse set = Not at all important, Somewhat important, Important, Very important.

As shown in Table 3, faculty perceptions of neoliberal manifestations at their institution vary considerably across items. Very few indicated a lack of control over their own work and a perception that the institution is focused more on the bottom line than on learning. However, many faculty (over 50%) indicated that they work extra hours without additional pay and also perceive the institution to be focused more on job training than on liberal arts education. From these preliminary results, assessment professionals would be well-served in discussing assessment in terms of student learning and instruction, and focusing on making assessment processes as efficient as possible as faculty.

Table 3

Faculty-perceived neoliberal manifestations

Item	% agree / strongly agree
Work factors	
Not consulted before decisions are made	33.3
Lack control over work	16.7
Work extra hours without pay	58.4
Insufficient employees to get the job done	45.4
Institutional focus	
Bottom line over learning	16.6
Job training over liberal arts	72.7

Note. Scale = Strongly Disagree, Disagree, Agree, Strongly Agree. Some items recoded to create comparable response set for this table.

Summary

While data are limited because of the exploratory nature of the study, there are some indications that faculty may perceive conflicts in assessment use between themselves and administrators, especially in terms of institutional uses of assessment. Whether these conflicts affect faculty engagement in assessment is unclear, as the limited number of faculty in this study generally rate themselves as very highly engaged in assessment. Neoliberal manifestations varied significantly across items, indicating some areas to explore further in terms of how they impact faculty engagement in assessment.

Future Plans

Results from this study and the process by which it was developed will be used to inform future research. The research and questionnaire design will both be revised to more simply and effectively answer the research questions, rather than relying on overly complex connections between several sets of survey items. This revision will also allow for the application of an appropriate statistical model to identify particular use and neoliberal factors that may impact faculty engagement in assessment. Once these revisions are complete, a full institutional pilot study will be undertaken.

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Mind the Gap: Student Researchers Use Secondary Data to Explore Disparities in STEM Education

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Large data sets offer opportunities for graduate students to become involved in meaningful research, but also comes with a unique set of challenges. This paper seeks to examine that relationship through utilizing the High School Longitudinal Study 2009 – representative of US ninth graders in 2009 ($n = 21,444$) – to examine a set of research questions about STEM interest and preparation amongst secondary students. Student researchers identified gaps in plans and outcomes with regards to race, gender, exceptionalities, and socioeconomic status. Findings indicated inequities that affect STEM outcomes. A significant interaction was found between students education expectations by gender on science self-efficacy [$F(4,1264) = 2.797, p = .025$]. This interaction was not observed for math self-efficacy. Females and underrepresented minorities were less likely to pursue computer science courses and computer science careers [Females: $X^2(2, N = 20,594) = 111.500, p < .0001$; Minorities: $X^2(2, N = 13,069) = 6.455, p = .040$]. Students' expectations for post-secondary education differed by IEP status and socioeconomic status [$X^2(3, n = 165,684) = 26.886, p = 0.001$]. Finally, time spent in extracurricular activities impacted academic achievement and students in lower socioeconomic groups were less involved in extracurricular activities [$X^2(4, n = 20,598) = 132.298, p < .0001$].

Introduction

It can be difficult for a single researcher to collect and analyze a large data set. Fortunately, organizations like the National Center for Education Statistics (NCES) make secondary data sets available to faculty, staff, and students for conducting research. The use of secondary data helps to advance the field because it allows for replication and confirmation of studies and findings (Tresniewski, Donnellan, & Lucas, 2011). Additionally, secondary data allows researchers to examine samples representative of a larger population in greater detail. Large data sets can be particularly useful for undergraduate and graduate students learning best practices of research and analysis during a semester-long course.

To develop a better understanding of how existing large data sets can be used to answer research questions, the research team will work with a secondary data set to illustrate common issues of working with secondary data, including: missing data, sampling and weighting, and statistical analysis of large data sets. The team will be exploring the High School Longitudinal Study (HSL:09) collected by the National Center for Education Statistics and representative of the US population of high school students in 2009. This data set will be used to answer questions about gaps in STEM education.

The National Science Foundation's Center for Science and Engineering Statistics shows clear trends of underrepresentation of women in engineering and the computer sciences, and disparities across all sciences, engineering, and mathematics for minorities and people with disabilities (NSF, 2013). At a time when STEM-ready student production is at an all-time low,

this is a serious problem for the nation in terms of infrastructure, security, and social equality. Addressing these questions is therefore a pertinent subject for investigation with a nationally representative dataset like HSLs:09.

The researchers identified four focus areas within the umbrella of STEM disparities: math and science self-efficacy, interest in computer science, extracurricular participation, and post-secondary plans for students with disabilities. These areas will be addressed in each section using the preceding sequential order.

Review of Literature

There is a growing concern in the United States about the performance and interest of elementary and secondary school students in the science, technology, engineering and math (STEM) fields. According to the President's Council of Advisors on Science and Technology (2010), the future of the United States as a leader in technological advancements is dependent upon the education and success of students in these areas, within which women and minorities are known to be underrepresented. As the Council argues, "we must *prepare* all students, including girls and minorities who are underrepresented in these fields, to be proficient in STEM subjects and we must *inspire* all students to learn STEM and, in the process motivate them to pursue STEM careers" (President's Council of Advisors on Science and Technology, 2010, p. 44-45, emphasis theirs).

Math and Science Self-Efficacy and Postsecondary Education Plans by Gender

The President's Council identifies the primary concern related to STEM fields, and brings about the bigger question of how can this be accomplished? If the United States is going to remain competitive in the international community we must increase student achievement and interest in the STEM fields. Developing a better understanding of self-efficacy, social support and the educational and career goals of students is one place to start.

Students' perceptions about their abilities in math and science play a major role in their persistence in STEM fields. Based on the existing gender gaps in the STEM field it may be possible that self-efficacy for males and females varies. According to Rice, Barth, Guadagno, Smith, and McCallum (2013), self-efficacy for girls remains stable or decreases and self-efficacy for boys tends to decrease throughout adolescence. Support from parents, teachers and peers can affect a student's self-efficacy in science and math. Students who perceive support and encouragement of their math and science abilities reported higher self-efficacy in math and science (Rice et al., 2013).

Developing an understanding of students' self-efficacy in the STEM fields and how it changes over time will provide a foundation for identifying strategies to increase student interest. According to Rice et al. (2013), students need support from parents, teachers and peers to increase self-efficacy. Encouragement and positive reinforcement from these groups should lead to students' increased perceptions about their abilities in science, technology, math and engineering. HSLs:09 offers the chance to examine the relationship between supporting factors and STEM-centric math and science self-efficacy.

Disparities in Computer Science Participation

Computer science (CS) and its tools, computational thinking and programming, have grown into invaluable resources for STEM practitioners, reshaping the way we theorize, form

and test hypotheses, and even how we carry out and disseminate research (Bundy, 2007). Jeanette Wing, former CS professor and current Vice President of Microsoft Research has suggested “computational thinking will be instrumental to new discovery and innovation in all fields of endeavor (Wing, 2008, p. 3717).” Given this importance, the current gaps in undergraduate degrees awarded for CS is disconcerting: 61.2% were White, and 85.8% were male (Zweben & Bizot, 2013). While ethnic minorities have been making slow gains, female participation in computing science has actually been declining (National Science Foundation [NSF], 2013). This raises serious concerns for both the United States’ position in the computing field and for gender and racial equality within it. As Brigid Barron expresses, the question becomes “who will have the knowledge that will position them to design, create, invent, and use the [computational] technologies to enhance their personal lives and social worlds?” (2004, pp. 1-2).

Numerous organizations, including the NSF, ACM, CSTA, Code.org, Kahn Academy, and Google have embarked upon ambitious efforts to interest and involve more diverse audiences in CS. HSLS:09 offers the chance to see what impact these efforts have had on current high-school populations, helping to guide future efforts.

Post-Secondary Involvement of Students with Disabilities

Students receiving special education services throughout high school often are conflicted over post secondary plans and have anxiety about the transition after high school. Students with disabilities often pursue employment opportunities and shy away from obtaining a further degree (VanBergeijk, 2012). Sitlington, Frank, and Carson (1993) investigated post secondary adjustments of young who received special education services throughout high school. Of the sampled participants, 49% of those with behavior disorders, 70% of those with learning disabilities, and 54% of those with mental disabilities reported that they received no postsecondary education or training of any kind. When examined by gender 73% of the males and 68% of the females had no postsecondary training. The most frequently reported educational experience was a community college program. The second most commonly reported option for males was military training. Fewer than 5% of individuals in any disability category had attended a 4-year college (Sitlington et al., 1993).

As participation within STEM disciplines is predicated upon receiving specialized post-secondary training, typically through a 4-year college, it is important to understand current trends amongst this population’s post secondary plans. HSLS:09 offers a window into just that for the current cohort of high-school students.

Extracurricular Participation and Postsecondary Education Plans

Fredricks (2012) found involvement in EAs have a positive impact on academic outcomes despite concerns about time required and impact on family dynamics, up to a certain level of participation (more than 20 hours). Participation in Extracurricular activities (EAs) may also result in the ability to demonstrate grit, various levels of independence, leadership skills, and positive social outcomes (Covay & Carbonaro, 2012). These skills and academic improvement can help prepare students for the demands of post secondary education in STEM fields.

However, the accessibility to school-based EAs for students of lower-socioeconomic status (SES) may be reduced compared to those of higher-SES. Opportunities to participate depend on how involved the family is, transportation factors, and the overall financial requirements. Covay and Carbonaro (2012) expressed the need for further research to gain a

deeper understanding of students from lower socio-economic status (SES) and the relationship between EAs and achievement gaps. HSLS:09 offers current data bearing on this relationship.

Research Questions

The research team examined four different research questions related to equity issues in the STEM disciplines, self-efficacy in these fields, and students' post-secondary plans. The following research questions were addressed:

- How do students' math and science self-efficacies relate to students' postsecondary education plans? Are there differences by gender?
- Is gender or race related to students' taking of computer science courses? In the student's choice of a computer science career?
- Do students with individualized education plans (IEPs) differ from general education students in their expectations to obtain a degree post high school? Of the students that have an IEP, are there differences in their expectations for postsecondary plans by socioeconomic status?
- Does participating in extracurricular activities have an effect on a student's plans to attend college? Does SES status affect the relationship between participation and educational plans?

Method

This study used data from the High School Longitudinal Study of 2009 (HSLS:09) conducted by the National Center for Education Statistics (NCES). This is a comprehensive longitudinal quantitative study with follow-up quantitative surveys planned throughout the secondary and postsecondary years (NCES, 2014). Currently, survey data is available for the base year and the follow-up survey in the 11th grade. Data for this study was downloaded using the Educational Data Analysis Tool, an online tool provided by NCES to access HSLS data. This study was found to be exempt from review by the IRB at Kansas State University.

Sampling Plan

HSLS:09 utilizes a two-stage sampling design. Public and private schools were selected using stratified random sampling, resulting in 1,889 schools with 944 (55.5%) choosing to participate. In the second stage, a total of 25,206 students were randomly sampled. Approximately 27 students per school participated resulting in 21,444 respondents (Ingels et al., 2011). Because this sampling plan involved stratified and clustered data, additional steps were taken by the researchers to apply appropriate weights to the data.

Sample populations who share experiences and culture tend to be more similar, displaying a narrower data distributions and smaller standard deviations. As the HSLS:09 sampling plan used participants who attended the same schools and classes, the raw data suffers from clustering effects arising from these shared-experience groups. These can be countered by applying a *design effect weight* to the data, which is computed as part of the sampling effort (Trzesniewski, Donnellan, & Lucas, 2011). Researchers used two different design effect weights from HSLS:09 – one for the base year data and one for the first follow-up, which the researchers

applied based on which data set they were examining when needing to compare measures of variance (measures of centrality are not affected by clustering).

To be generalizable to the national population, the respondent pool needs to also be representative of that population. In practice response rates vary across subgroups of interest, like ethnicity and SES. Further, some groups may be deliberately oversampled to provide the statistical strength needed for within and between-groups analyses – as is the case with HSLs:09, which oversampled the Asian student population (Ingels et al., 2011). To bring the data back into a generalizable format, *sample weights* must be applied to each response based on the respondent's subgroups to adjust their aggregate contributions to the analysis to be proportional to that subgroup's national representation. These weights are provided with the HSLs:09 and vary by survey instrument as the base-year, first follow-up, teacher, administrator, and parent surveys all had different response rates. Researchers therefore also had to select and apply the sample weight appropriate for the data they were working with. Details on specific sample weights used by the researchers can be found in the Appendix.

Secondary Data Challenges

In addition to the need to apply weights to ensure statistical analyses were generalizable to the national population and that standard errors were adjusted for the complex sampling design, other challenges arose from working with secondary data. These centered around what data was collected, and how much of it was available.

Researchers working with secondary data are limited to what items the original researchers chose to include in the study (Trzesniewski, Donnellan, & Lucas, 2011). To address research questions that were not part of the study's original focus can therefore require significant creativity on the part of the researcher. For example, HSLs:09 did not collect data concerning participant's disability status. However, the student data did include a flag to indicate if a student had an individualized education plan (IEP) [x1iepflag], which the researchers used as an indicator of disability status.

As with any survey-based research, missing data also becomes a problem. HSLs:09 preparers imputed missing values in the fields they considered most critical, like ethnicity, gender, and mathematical ability, but other measures did not receive this treatment (Ingels et al., 2011). Returning to the previous example, the parent survey contained an item asking if their student received Special Education Services [p1sppeciald]; while the expectation would be any student receiving such aid *should have* an IEP, in a significant number of cases the x1iepflag variable did not reflect the parent's report. Accordingly, the researchers created a new variable in which either a positive response to either the x1iepflag or p1sppeciald variables indicated disability status.

To protect participants, potentially identifying information related to schools and the participants were removed by NCES from the public dataset. This was not limited to participants' identities, but extended to any item that involved a small enough group that responses could be used for identification. In these instances, the response was replaced with a *data redacted* code. For example, NCES collected information on participant's career plans and coded them using both the general 2-digit [X2STU30OCC02] and the more specific 6-digit O*NET [X2STU30OCC06] occupational codes (Ingels et al., 2011). The 6-digit code was redacted from the public data set, so the researchers used the more generic 2-digit code, which reduced the specificity of that particular analysis.

Math and Science Self-Efficacy and Postsecondary Education Plans by Sex

The first research question examined the relationship between math and science self-efficacies on student postsecondary education plans. *Self-efficacy* can be defined as an individual's belief in his ability to complete tasks and reach goals (Bandura, 1997). Self-efficacy measures were scale scores [X1MTHEFF, X1SCIEFF] computed by NCES using four survey items, which asked about students' confidence in their ability to master skills, successfully complete assignments, understand textbooks and do well on tests in either math or science. Student educational expectations were obtained from a survey item [X1STUEDEXPCT] asking students to report how far in school he or she thinks they will go in school. For this study, the researcher collapsed the student educational expectations categories from 11 categories to five categories: (1) high school or less, (2) associates, (3) bachelors, (4) advanced degree, and (5) don't know.

Base-year data were pulled from HSLS:09 for student math self-efficacy, student science self-efficacy and student educational expectations. Mean self-efficacies were compared between each of the student education expectation categories for math and science self-efficacy. A two-way ANOVA was conducted to examine the interaction between student educational expectations and sex on math self-efficacy. A second two-way ANOVA was conducted to examine the interaction between student educational expectations and sex on science self-efficacy.

Disparities in Computer Science Participation

The second research question examined the relationship between race, gender (X2SEX), and student's plans to take a computer science course and anticipation of a computer science career. For this study, the researcher collapsed race (x2race) into three categories: (1) White, (2) Asian, and (3) Underrepresented minorities. Underrepresented minorities consisted of Black and Hispanic students. All other races were not included in subsequent analyses.

In the first follow-up study, students were asked if they were taking a computer-related course in Spring 2012. The options were: a computer applications course (S2COMPAPP12), a computer programming course [S2COMPPROG12], an AP Computer Science course [S2APCOMPSCI12], or other computer or information science course [S2OTHCOMP12]. The researcher collapsed the latter three categories into a single category — taking a computer science course. The computer applications course option was intentionally left out, as these courses were likely to focus on basic computer literacy, not computer science topics.

In the same survey, students were also asked to write in their anticipated career choices in the base year and follow-up survey, these responses were coded by NCES using 2-digit O*NET occupational codes [X2STU30OCC02]. The researcher created a binary variable with a value of 1 when the student indicated a career with an O*NET code of 15 (Computer & Mathematics Occupations) and a value of 0 for all other values. Undecided, missing, and uncodable responses were left out of the subsequent analyses.

Tables were constructed and Chi-Squared values computed to determine if computer science course taking and computer science career plans were related to student's race/ethnicity or gender (Tables 3-6).

Post-Secondary Involvement of Students with Disabilities

To answer the third research question regarding students' post-secondary expectations by disability status, disability status was operationalized as the student having an individualized

education plan (IEP). IEP status was determined from x1iepflag and p1specialed. If a conflict of reporting was present (i.e. parents reported no IEP but school enrollment stated that a student did have an IEP), the researcher used the information from the school enrollment forms as detailed in the Secondary Data Challenges section, above.

Students were also asked to self-report on how far they expected to get in school [X1STUEDEXCPT], which the researcher collapsed into four different categories, (1) high school or less, (2) associates/bachelor's degree, (3) advanced degree (Masters or PhD), and (4) students who did not know.

Socioeconomic status (SES) for students was divided by NCES into 5 different levels [X1SESQ1, X1SESQ2, X1SESQ3, X1SESQ4, X1SESQ5], conceptualized by responses using five components: highest education among parents, education level of the other parent (if applicable), highest occupational prestige score of parent, occupation prestige of the other parent (if applicable), and the family income. To better examine differences in the expectations of students who had an IEP based on socioeconomic status, these SES quintiles were collapsed into three groups; low, middle, and high.

A table was created to identify students postsecondary expectations based on IEP status in each SES group. A chi-square was conducted to determine the difference between postsecondary expectations of students with an IEP in the lowest and highest socioeconomic quintiles (Table 8).

Involvement in Extracurricular Activities and Student Plans on Achievement Outcomes

To answer the fourth research question examining how far students planned to go in school in relation to EC involvement, the researcher drew upon the base year data. Involvement in EAs was measured by NCES as the amount of time spent in EAs [S1HRACTIVITY]. For the analysis the eleven educational expectation categories [x1studexpct] were collapsed by the researcher into five: (1) High school (HS) or less, (2) Associates Degree (AA), (3) Bachelor's Degree (BA), (4) Advanced Degrees, and (5) Don't know.

As this analysis did not indicate a significant difference between the number of hours that a student participated in EAs and his or her plans to complete an AA or a BA (Table 9), the researcher collapsed the data pertaining to the educational expectation levels again. Five categories were collapsed into three: (1) No College, (2) College, and (3) Don't Know. Additionally, this analysis included collapsed levels of SES quintiles (Table 10).

Results

Missing Data and Imputed Values

NCES identified a number of variables as critical to future analyses, and took great steps to ensure that data was available in these categories, including combining items from multiple surveys, telephone follow-ups, scouring school records, and, as a last resort, imputation (Ingels et al., 2011). Among these variables were several used by the researchers – gender [X1SEX, X2SEX], race/ethnicity [X1RACE, X2RACE], SES quintile [X1SESQ1, X1SESQ2, X1SESQ3, X1SESQ4, X1SESQ5], IEP Status [X1IEPFLAG]. Specific details on how missing values were handled by NCES for these variables can be found in the Appendix.

Math and Science Self-Efficacy and Postsecondary Education Plans by Gender

This analysis is dependent upon survey results for math and science self-efficacy. The math self-efficacy score is based on a scale computed by NCES using four survey items. This

scale score had 13.1% missing values, most likely because of block scheduling. Students who were not enrolled in math or science did not respond to any of the self-efficacy questions. These cases were omitted from analysis. When comparing the respondent group and the non-respondent group by gender there were more males in the non-respondent group (54%) compared to the respondent group (49.4%).

Table 1

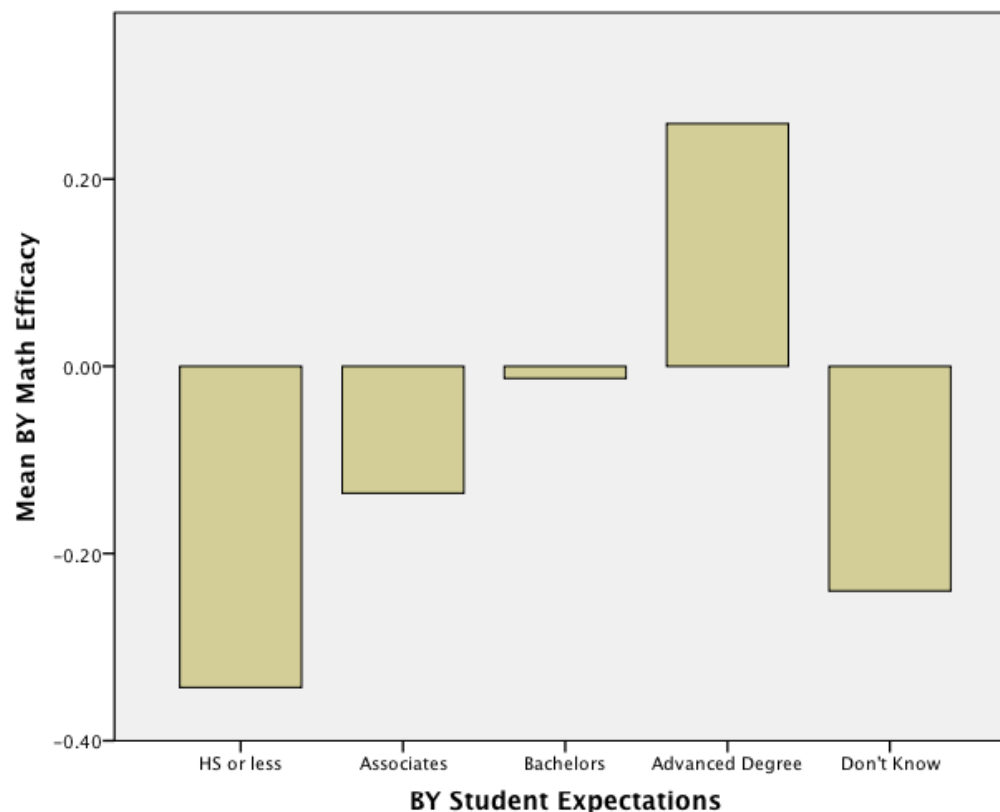
Student Educational Expectations.

Educational Expectations	Frequency	Percent
HS or Less	606,356	14.4%
Associates	279,940	6.8%
Bachelors	682,255	16.6%
Adv. Degree	1,653,843	40.2%
Don't Know	892,566	21.7%
Total	4,114,690	100.0%

* Weighted by W1STUDENT

Figure 1

Student education expectations by math self-efficacy.



Science self-efficacy was also computed by NCES as a scale score based on four survey items. The science self-efficacy scale had 20.5% missing values, most likely due to block scheduling. Students who were not enrolled in a science course during the fall 2009 term would not have completed these survey items. These cases were omitted from analysis. When comparing the respondent group and the non-respondent group there were more males in the non-respondent group (54.6%) compared to the respondent group (49.7%).

The missing data for math and science self-efficacy were examined by gender. The missing data did not indicate notable differences between the two genders. The missing data appears to be at random and those cases were omitted from analysis.

A 2 x 1 ANOVA on student education expectations and sex on math self-efficacy showed significant differences for some of the five education expectation categories. Students with expectations of earning an advanced degree had a higher self-efficacy than all of the other categories (Figure 1). There was a statistically significant effect for student education expectations [$F(4,1455) = 23.606, p = .001$] and a significant main effect for sex [$F(1,1455) = 4.572, p = .033$], but no significant interaction [$F(4,1455) = 1.026, p = .392$] between education expectations and sex. Math self-efficacy was different between categories of student education expectations. Math self-efficacy was different for students based on sex. However, there was no significant interaction between education expectations and sex on math self-efficacy.

Table 2

Two-Way Analyses of Variance for Math Self-Efficacy and Science Self-Efficacy as a Function of Student Educational Expectations and Sex.

Source	df	MS	F	P	η^2
On Math Self-Efficacy					
Student Expect	4	21.904	23.606	< .05	.061
Sex	1	4.242	4.572	< .05	.003
Student Expect x Sex	4	.952	1.026	.392	.003
Error	1445	.928			
On Science Self-Efficacy					
Student Expect	4	30.955	34.764	< .05	.099
Sex	1	.091	.102	.749	.000
Student Expect x Sex	4	2.491	2.797	< .05	.009
Error	1264	.890			

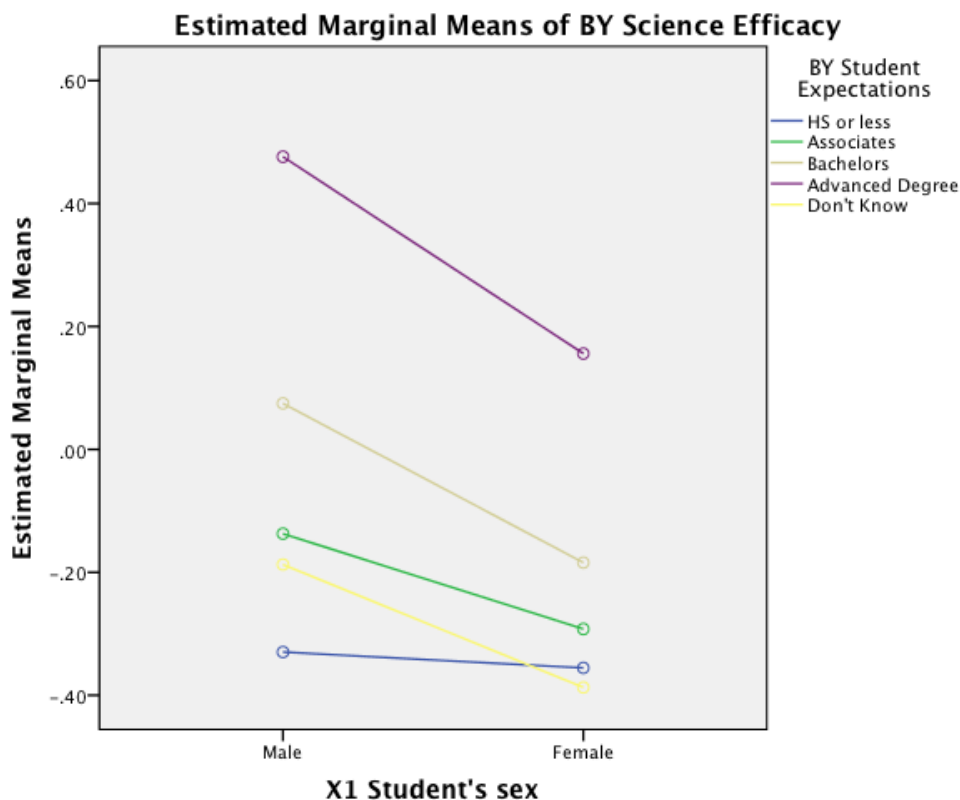
* Weighted by DEFF Weight

There was a statistically significant effect for student education expectations [$F(4,1264) = 34.764, p = .001$] and a significant interaction between education expectations and sex on science self-efficacy [$F(4,1264) = 2.797, p = .025$], but no statistically significant effect for sex [$F(1,1264) = .102, p = .749$]. Science self-efficacy was different between categories of student

education expectations (Figure 2). There was a significant interaction between student education expectations and sex on science self-efficacy. There was not a significant difference by sex on science self-efficacy. Table 2 shows the effects of student education expectations and sex on math and science self-efficacy.

Figure 2

Interaction between science self-efficacy and education expectations.



Disparities in Computer Science Participation

This analysis focused on two different subgroups – gender and ethnicity – and their relationship with CS course and career plans. Of the career choice responses, 354 were missing. These and an additional 5,550 "don't know", 131 uncodable, and 2,821 non-response responses were left out of the analysis. In determining which students were taking computer science courses in Spring 2012, 583 missing and 2,821 non-respondents were left out of the analysis, while 4,023 legitimate skips were merged into the "No" category. In analyzing relationships with race, 105 American Indian/Alaskan, 1,287 multi-race non-Hispanic, and Native Hawaiian/Pacific Islander, Non-Hispanic respondents were left out of the analysis.

Race and computer science career plans

A chi-square test of independence was performed to examine the relationship between race and anticipated computer science career among students who had developed career plans. The relation between these variables was statistically significant [$X^2(2, N = 13,069) = 6.455, p = .040$]. The odds ratio for underrepresented minorities to White students was 1.699 with a 95%

confidence interval of [1.017, 2.840]. This suggests that White students are 69.9% more likely to plan for a computer science career as their underrepresented minority counterparts.

Table 3

Anticipated Computer Science Career vs. Race.

		White	Asian	Underrepresented Minorities
Not Anticipating Computer Science Career	Count	1,469,434	83,974	1,027,594
	% within race	97.1%	95.3%	98.2%
Anticipating Computer Science Career	Count	44,557	4,121	18,311
	% within race	2.9%	4.7%	1.8%
Total	Count	2,151,495	147,067	1,498,620

*Weighted by W2STUDENT

Gender and computer science career plans

A chi-square test of independence was performed to examine the relationship between gender and anticipated computer science career among students with career plans. The relation between these variables was statistically significant [X^2 (1, N = 14,529) = 63.252, $p < .0001$]. The odds ratio for the Males is 10.017 with a 95% confidence interval of [4.997, 20.078]. This suggests that males are 10 times more likely than females to express plans for a career in computer science.

Table 4

Anticipated Computer Science Career vs. Sex.

		Male	Female
Not Anticipating Computer Science Career	Count	1,281,212	1,560,822
	% within race	95.2%	4.8%
Anticipating Computer Science Career	Count	64,964	7,894
	% within race	2.6%	0.5%
Total	Count	1,346,176	1,568,716

*Weighted by W2STUDENT

Race and computer science course plans

A chi-square test of independence was performed to examine the relationship between race and taking a computer science course. The relation between these variables was not statistically significant [X^2 (2, N = 18,120) = 1.286, $p = .526$]. There was no statistically

significant relationship found between a student's race and likelihood of taking a computer science course.

Table 5

Plans for Taking a Computer Science Course in Spring 2012 vs. Race.

		White	Asian	Underrepresented Minorities
Not Taking Computer Science Course	Count	2,036,181	136,860	1,409,203
	% within race	96.7%	95.7%	97.1%
Taking Computer Science Course	Count	68,633	6,147	41,674
	% within race	3.3%	4.3%	3.1%
Total	Count	2,104,814	143,034	1,450,877

* Weighted by W2STUDENT

Gender and computer science course plans

A chi-square test of independence was performed to examine the relationship between gender and taking a computer science course. The relation between these variables was statistically significant [X^2 (1, N = 20,071) = 17.394, $p < .0001$]. This suggests that males are more likely than females to take a course in computer science. The odds ratio for the males is 2.066 with a 95% confidence interval of [1.456, 2.932]. This suggests that males are more than twice as likely as females to take a course in computer science.

Table 6

Plans for Taking a Computer Science Course in Spring 2012 vs. Gender.

		Male	Female
Not Taking a Computer Science Course	Count	1,944,471	1,976,737
	% within sex	95.7%	97.9%
Taking a Computer Science Course	Count	86,532	42,228
	% within sex	4.3%	2.1%
Total	Count	2,031,003	2,018,965

* Weighted by W2STUDENT

Post-Secondary Involvement of Students with Disabilities

To determine the amount of missing data in students IEP status the researcher combined reports of IEP status from school enrollment and parent responses to whether or not students had an IEP; 5% of students had data missing for IEP status. Missing values were examined for parent responses in each of the SES groups to identify patterns. Each SES group had a similar

percentage of missing values, indicating that removal of these cases would not bias the results by SES. The cases without data were removed.

IEP status and educational expectations

The percentage and frequencies of students' reports for how far they expected to go in school by IEP status was examined. The largest difference was observed in the percentage of students who expected to get through high school or less. Of students with an IEP, 25.8% reported that they only expected to get through high school or less compared to the 11.8% of students without an IEP. There was also a large difference in the plans for advanced degrees. Of the students without IEPs, 44.3% reported an expectation to obtain an advanced degree compared to only 22.9% of students with IEPs expectation for an advanced degree. There was also a large percentage of students with IEPs that are still unsure and/or do not know how far they plan to go in school (table 7).

Table 7

Student educational expectations by IEP Status.

IEP Status	HS or Less		Assoc./Bach		Adv. Degree		Don't Know	
	%	N	%	N	%	N	%	N
Y	26.40%	102,580	21.70%	84,349	22.20%	86,476	29.70%	115,725
N	12.10%	359,613	24.40%	723,030	43.10%	1,279,325	20.30%	602,919
Total	14.70%	606,355	23.40%	962,195	40.20%	1,653,843	21.70%	892,567

* Weighted by W1PARENT

SES, IEP status, and educational expectations

To address the second portion of the research question, the effect of SES categories on expectations by both IEP status was examined. A chi-square test of independence was performed to examine the relation between expectations of students with an IEP in the highest and the lowest SES groups. The relationship between these variables was significant [$\chi^2(3, n = 165,684) = 26.886, p = 0.001$].

Students with an IEP in the lowest quintile had differences in their postsecondary plans compared to students with an IEP in the highest quintile (See table 8). Students from a high socioeconomic status who had an IEP had a higher expectation to attend some type of postsecondary education. Of students with an IEP from a lower socioeconomic status, a large percentage only expected to obtain a high school diploma or less.

Table 8

Educational Expectations by IEP status grouped in SES groups.

SES	IEP Status	HS or Less	Assoc./Bach.	Adv. Degree	Don't Know
Lowest Quintile	Y	34% 44,779	20.6% 27,073	16.2% 21,372	29.2% 38,433
	N	22% 151,482	25.5% 175,669	30.6% 210,733	22% 151,558
Middle 3 Quintiles	Y	26.1% 61,456	22.5% 52,866	19.8% 46,643	31.5% 74,087
	N	11.7% 222,307	25.5% 484,682	42.8% 813,412	20% 379,750
Highest Quintile	Y	8.5% 5,642	23.6% 15,610	47.1% 31,137	20.8% 13,741
	N	3% 26,645	22.2% 197,038	58.3% 516,764	16.5% 146,023
Total	Y	25.8% 111,877	22.1% 95,549	22.9% 99,152	29.2% 126,261
	N	11.5% 400,434	24.7% 857,389	44.3% 1,540,909	19.5% 677,331

* Weighted by W1PARENT

Extracurricular Participation and Postsecondary Education Plans

Findings suggest that time spent in EAs is associated with higher rates of planning to pursue advanced degrees. Overall, 20% of the ninth graders do not have plans for post secondary education. Of the students that were sampled, 50% participated in over three hours SIEA per day. The relationship between SAPO and seeking an advanced degree was significant [X^2 (4, n = 20,598) = 132.298, p = < .0001] (See table 9).

Table 9

Student Involvement in EA and Educational Expectations.

SIEA (hrs)	HS<	AA	BA	Advanced	Unknown	Total
<1	21%	8%	15%	31%	26%	1,369,077
1-3	12%	7%	18%	44%	20%	1,772,482
3+	9%	5%	18%	50%	18%	790,032
Total						3,931,519

* Weighted by W1STUDENT

SIEA and SAPO reports were combined with the quintile of SES for analysis. Students in the lowest quintile participated in less than one hour of SIEA compared to 5% of students who participate in less than one hour from the highest quintile [X^2 (4, $n = 2,550$) = 123.988, $p = .0001$] (See table 10).

Of students who did not plan to go to college 32% of students from the lowest SES quintile participated in less than one hour of EAs in comparison with 5% of students from the highest quintile [X^2 (4, $n=2550$), $p<.0001$].

Table 10:

SIEA and SAPO by Socioeconomic Status

	SES & SIEA (hrs.)	No College	College	Don't Know
Lowest Quintile	<1	32%	43%	26%
	1-3	25%	55%	21%
	3+	20%	63%	17%
	Total			758,253
Middle Quintiles	<1	20%	54%	26%
	1-3	12%	67%	21%
	3+	9%	72%	19%
	Total			2,367,693
Highest Quintile	<1	5%	71%	25%
	1-3	3%	81%	16%
	3+	3%	82%	15%
	Total			815,646

* Weighted by W1PARENT

Discussion

The following section includes discussion about the conclusions and implications for each of the four research questions. This is followed by future research recommendations.

Math and Science Self-Efficacy and Postsecondary Education Plans by Gender

When looking at the frequency distribution for student education expectations a large group (40%) of 9th grade students indicated plans to earn an advanced degree; either a master's or doctoral degree. The second largest group of students did not have educational plans (21%). This group of students is particularly interesting.

The two-way ANOVAs conducted on math and science self-efficacy by sex and education expectations yielded significant results in some areas. In the math self-efficacy ANOVA, females indicated lower self-efficacies than males. Additionally, students with higher self-efficacy in math indicated higher education expectations. As math self-efficacy decreased education expectations decreased as well.

The two-way ANOVA conducted on science self-efficacy yielded a significant interaction between sex and education expectations. Significant differences were observed for males in the "don't know" group and the "high school or less" group. The males in the education expectation group "don't know" had a higher self-efficacy than those who indicated they planned to complete high school or less. This interaction should be re-examined in future studies.

It would be interesting to examine the follow-up survey data to see how the males in the "don't know" and "high school or less" groups reported self-efficacy and education expectations in the eleventh grade. According to Rice et al. (2013), males may experience a decrease in self-efficacy throughout adolescence while females' self-efficacy often remains stable over the adolescent years. Future research could include examination of student perceptions of the support and interactions with their teachers, parents, and peers. Rice et al. (2013), report perceived support from these individuals leads students to report higher self-efficacies in math and science. This indicates self-efficacy may be affected by feedback received from teachers, parents and peers. Encouragement from these groups may make a difference in student self-efficacy.

The finding that males in the "don't know" education expectation category had higher self-efficacies than those reporting education expectations of "high school or less" calls for a closer look at the education system. The President's Council of Advisors on Science and Technology calls for an increased effort to encourage and educate students in the STEM fields (2010). It may be necessary to examine the K-12 curriculum to identify how science and math are treated and taught. Ensuring that schools are afforded the time and resources to teach science and math may be one place to start.

Disparities in Computer Science Participation

No statistically significant relationships were found between a student's race and their likelihood to plan on a CS career. Additionally, the percentages were very similar between White and underrepresented students. These results suggest that national efforts to recruit underrepresented minorities into high school CS courses are succeeding. A good follow-up question would be if this holds true across SES categories, as a more subtle and profound source of disparity is the lack availability of CS courses in poorer schools which generally have a higher proportion of underrepresented minorities (Margolis & Fischer, 2003).

Nonetheless, even while efforts at recruiting underrepresented minorities into CS coursework at the high school level has been successful, the significant relationship that was found between race and anticipated career at 30 – with minorities about half as likely to choose a CS career – raises questions about how well these efforts will succeed at changing disparities within the professional field. This particular finding would benefit from further analysis with the restricted HSLs:09 data set, where the more-specific 6-digit O*NET occupational codes could be used to separate students interested in CS careers from those interested in math and other computing careers. Additionally, as further follow-up data becomes available it would be valuable to see if this population of students does pursue higher education and eventual careers in the field, despite their lack of current intent.

Given the low numbers of students overall interested in Computing Science (131 underrepresented students taking a CS course and 83 planning on a CS career of 21,095 students included in the analysis) the statistical power for this comparison was very weak. Further work would greatly benefit from oversampling students interested in CS to increase this statistical power.

In examining female interest and participation in CS, strongly significant results were found despite the small numbers. This is due to the sheer size of the disparities, with females half as likely as males to take CS courses and ten times less likely to plan on a CS career. The greater number of females taking high school CS courses again suggests that recruitment efforts at that level have been fruitful, but less so at enticing females to consider a computer science career. This finding does align with the literature, which suggests that females are more likely to have an interest in using the tools of computer science in another career (Barron, 2004; Margolis, 2003). Nonetheless, the computer science industry suffers without gender balance, and research suggests that females are more likely to enter computer science degrees and careers when they are part of a strong cohort of women (Margolis, 2003). Thus, gender disparities in CS remain an open problem amongst the 2009 national high school freshmen cohort.

Post-Secondary Involvement of Students with Disabilities

The findings show a clear disparity in educational expectations for student with disabilities. Students with an IEP do not have as high of expectation for themselves in post secondary education. Further, students with an IEP in lower SES groups had even lower expectations than those in the higher SES groups.

However, when comparing this study to the 1993 study conducted by Sitlington et al. results suggest that current students with IEPs have higher expectations to obtain post secondary education. The 1993 study found that on average 57.7% of the 737 students they surveyed reported no post secondary education or training. The current HSLs:09 study indicated that only 26.4% of students expected to obtain no type of post secondary education or training. This implies that current students receiving special education services have higher expectations from themselves than their counterparts in the 1993 study. They may be more confident in their abilities and/or supports that may be available in their endeavors for post-secondary education.

Though this study found that 43.4% of students with an IEP expect to obtain some type of degree after graduating high school, in reality these students may not have the resources or supports to actually do so. The follow-up surveys planned for these students post graduation will be an important resource for researchers interested in examining these implications further.

Barriers are still very much present for students with an IEP wanting to pursue post-secondary education. It is important individuals are aware of current supports and programs

available for special education services post high school. With the boom in distance education, students who require accommodations and modifications to educational programs have more opportunities to receive assistance without the stigma that comes with receiving supports in higher education. Students have the ability to pace themselves and obtain necessary supports to complete courses from within their own home.

Students receiving special education services need to continue to be encouraged and supported in order to see a continued upward trend in expectations for post secondary education. Though it is still important to enter the work field, it is equally important that students with an IEP feel that they can be successful in postsecondary education programs. Anxiety surrounding the transition to college can be reduced if students are more aware of the supports and unique programs available for those who require special services.

Extracurricular Participation and Postsecondary Education Plans

This study examined the relationship between involvement in extracurricular activities and student academic plans. Results support the hypothesis that a positive relationship exists. Further, the relationship between students' involvement in extracurricular activities and their socioeconomic status was examined; low socioeconomic status correlated to less time in EAs.

These findings imply that students from the lowest quintile have unequal opportunities to participate in EAs. Future research and school administrators should consider providing supports to increase equity. Increasing participation opportunities for students in this quintile may result in higher levels of academic achievement goals and outcomes for these students, which in turn will better prepare them for undergraduate STEM programs and eventual careers.

Conclusion

The research conducted in this study provides an example of how secondary data sets can be used by faculty and students to address pressing national problems. The HSLs:09 data obtained from NCES allowed four distinctly different and meaningful research questions to be addressed with enough depth to provide guidance to policy makers and support ongoing research efforts. Further, these results (as captured in this paper) were not confined to the classroom, but shared back into the corpus of educational research.

Large data sets like HSLs:09 provide a veritable wealth of data that can answer a broad range of questions – were the combined analytical powers of the nations' education graduate student population applied to these data sets, the pace and significance of research, both original and conformational, could be vastly increased. Given the slow pace of educational research (limited by resources, researchers, and the growth and learning rates of participants), this kind of crowd-sourced research effort offers the opportunity to accelerate research efforts through parallel inquiries.

Furthermore, this study also prepared four graduate student researchers to conduct future quantitative research efforts, gave them hands-on experience in statistical analysis, and helped them to see the challenges and limitations of such studies. The benefits from this extra depth are two-fold: For those students going into future research, this experience was clearly valuably preparatory and helped establish them as published researchers. For those who intend to return to educational practice, it helped them to understand the role of research in their field, as well as how to evaluate and understand research findings so as to better apply them within their area of practice.

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Appendix

Sample Weights

HSLs:09 involved surveys of students, as well as surveys of school administrators, math and science teachers, counselors, and parents. As the base unit of analysis for HSLs:09 was the student, all additional surveys were tied back to individual students. In many cases not all students had a corresponding secondary survey. In order to ensure as much data would be available to the researcher as possible, different sample weights were published with HSLs:09 to correspond to the available survey data. These sample weights appear as extra variables in the data, and have different values for each student. When performing an analysis, the variable in question is multiplied by the weight, which adjusts its influence on the outcome.

For example, if the researcher wanted to ask a question drawing from the base year parent survey, they would apply the weight W1PARENT to their analysis. This weight would zero out the influence of any students whose parents had not filled out a survey, and adjust the influence of the remaining responses to be nationally representative. As many parents did not complete the survey, this necessarily reduces the sample size and statistical power of the analysis. This is why multiple weights are published – by choosing the right sample weight the researcher maximizes the statistical power of their analysis by including all relevant responses.

Similarly, each follow-up survey has a different set of weights. For HSLs:09 the base year survey weight was indicated by a 1 as the second character in the variable name, while the first follow-up survey uses a 2. Additionally, there are weights for longitudinal studies (those comparing students between base year and follow-up surveys), though these were not used by the researchers. The following list describes the sample weights used by the researchers:

Weight	Description
W1STUDENT	Base-year sample weight for the items on the student instrument
W1PARENT	Base-year sample weight for items on the parent or parent and student instrument
W2STUDENT	First follow-up sample weight for items on the student instrument

Variables

The HSLs:09 variables used by the researchers were:

Variable	Description
P1SPECIALED	Indicates 9 th grader is receiving special education services, Based on parents' reports of their students special education services. Item wording is: Does [your 9 th grader] currently receive Special Education Services? Students receiving these services often have an Individualized Education Plan (IEP). Yes No
S1HRACTIVITY	Hours student spends on extracurricular activities on the typical schoolday. Item wording is: During a typical weekday during the school year, how many hours do you spend... participating in extracurricular activities such as sports

teams, clubs, band, student government?

Less than 1 hour

1 to 2 hours

2 to 3 hours

3 to 4 hours

4 to 5 hours

More than 5 hours

S2COMPAPP12 Indicates student is taking a computer applications course in Spring 2012. Item wording is:
 What science, computer science, or engineering course or courses are you currently taking? What science, computer Science courses were you taking during the Spring term of 2012?
 Computer Applications
 0 = No
 1 = Yes
 Question wording was customized depending on if the student indicated they were currently attending school. A legitimate skip was generated if the student indicated they weren't taking a science, computer science, or engineering course on a previous item.

S2COMPPROG12 Indicates student is taking a computer programming course in Spring 2012. Item wording is:
 What science, computer science, or engineering course or courses are you currently taking? What science, computer Science courses were you taking during the Spring term of 2012?
 Computer Programming
 0 = No
 1 = Yes
 Question wording was customized depending on if the student indicated they were currently attending school. A legitimate skip was generated if the student indicated they weren't taking a science, computer science, or engineering course on a previous item.

S2APCOMPSCI12 Indicates student is taking AP computer science in Spring 2012. Item wording is:
 What science, computer science, or engineering course or courses are you currently taking? What science, computer Science courses were you taking during the Spring term of 2012?
 Advanced Placement (AP) Computer Science
 0 = No
 1 = Yes
 Question wording was customized depending on if the student indicated they were currently attending school. A legitimate skip was generated if the student indicated they weren't taking a science, computer science, or engineering course on a previous item.

S2OTHCOMP12	Indicates student is taking other computer or information science course in Spring 2012. Item wording is: What science, computer science, or engineering course or courses are you currently taking? What science, computer Science courses were you taking during the Spring term of 2012? Other computer or information science course 0 = No 1 = Yes Question wording was customized depending on if the student indicated they were currently attending school. A legitimate skip was generated if the student indicated they weren't taking a science, computer science, or engineering course on a previous item.
X1IEPFLAG	Indicates if the student has an individualized education plan (IEP). Information is provided by the 9th grade enrollment lists or subsequent sampled student roster by school personnel.
X1MTHEFF	Scale of student's math self-efficacy; higher X1MTHEFF values represent higher math self-efficacy. Variable was created through principal components factor analysis (weighted by W1STUDENT) and standardized to a mean of 0 and standard deviation of 1. The inputs to this scale were Math tests, math textbooks, math skills and math assessment [S1MTESTS, S1MTEXTBOOK, S1MSKILLS, S1MASSEXCL]. Only respondents that provided a full set of responses were assigned a scale value, and legitimate skips were assigned if the student indicated they were not taking a fall math class. Coefficient of reliability for the scale (alpha) was .65.
X1SCIEFF	Scale of student's science self-efficacy; higher X1SCIEFF values represent higher science self-efficacy. Variable was created through principal components factor analysis (weighted by W1STUDENT) and standardized to a mean of 0 and standard deviation of 1. The inputs to this scale were Math tests, math textbooks, math skills and math assessment [S1MTESTS, S1MTEXTBOOK, S1MSKILLS, S1MASSEXCL]. Only respondents that provided a full set of responses were assigned a scale value, and legitimate skips were assigned if the student indicated they were not taking a fall science class. Coefficient of reliability for the scale (alpha) was .65.
X1SESQ1 X1SESQ2 X1SESQ3 X1SESQ4 X1SESQ5	Socioeconomic status coded by quintiles, Based on the following 5 component variables; parents highest level of education, education level of other parent, highest occupation prestige of parent, occupation prestige of other parent, and family income. For cases with nonresponding parent/guardians, imputed values are generated.
X1SEX	Student's sex taken from the base-year student questionnaire, parent questionnaire, and/or school provided sampling roster. If any of these sources was inconsistent, X1SEX was coded based on manual review

of student's first name.

X1STUEDEXPCT	The highest level of education the student expects to achieve at 9 th grade. If missing from the student questionnaire, it is statistically imputed.
X1RACE	Student race/ethnicity composite determined by NCES based on 6 dichotomous variables (X1HISPANIC, X1WHITE, X1BLACK, X1ASIAN, X1PACISLE, X1AMINDIAN) collected through the student survey. If not present there, the value was based on (in order of preference) data from the school-provided sample roster or data drawn from the parent questionnaire.
X2SEX	Composite based on X1SEX, and when missing updated with data from the first follow-up student questionnaire.
X1STU30OCC02	2-digit Occupational Information Network (O*NET) code of the job the student expects to have at age 30. Students were asked to indicate what job they expected to have at age 30, and the textual responses were coded by NCES into O*NET codes.
X2RACE	Pulled from X1RACE in the base year survey, and if missing drawn from the first follow-up student questionnaire. If still missing, they are based on data from the first follow-up parent questionnaire

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